NextGen Advisory Committee (NAC)
December 12, 2019 Meeting Summary

The NextGen Advisory Committee (NAC) was held December 12, 2019 at The MITRE Corporation in McLean, VA. The meeting discussions are summarized below. Reference the attachments for additional contextual information.

List of attachments:
- Attachment 1: NAC Briefing
- Attachment 2: Attendance List
- Attachment 3: FAA Update on Addressing Emissions from U.S. Aviation Information Paper

Opening of Meeting

Mr. Chip Childs, NAC Chairman (SkyWest, Inc.), opened the meeting and welcomed attendees. He announced that the FAA had elected to allow a listen-only phone line for public attendees who registered in advance in accordance with the Federal Register notice for this NAC meeting (reference Attachment 2 for the complete attendance list). He also indicated that Mr. Steve Dickson, FAA Administrator, would make a brief appearance later in the meeting, which may cause minor shifts to the agenda to allow for him to make brief remarks.

Chairman’s Report

Mr. Childs then provided the Chairman’s Report. To begin he called for a motion to approve the July 30, 2019 NAC meeting summary, which the NAC approved.

Outcome: The NAC passed a motion to approve the July 30, 2019 NAC Meeting Summary Package

Mr. Childs said that he had recently discussed the NAC’s importance and role with Mr. Dickson. The Secretary of Transportation chartered the NAC to contemplate issues of significance the FAA designates and return consensus advice from the aviation community. He emphasized the importance of all NAC members being engaged and heard as it is the NAC, not any of its subordinate bodies, that makes the final decision on advice provided to the FAA. NAC taskings vary in size and scope. Mr. Childs added that he and NAC Subcommittee (SC) Chairman Craig Drew (Southwest Airlines) are coordinating on making the best use of FAA and NAC resources in responding to tasks. Not all NAC taskings will require inputs from every NAC member or experts from the many organizations involved with NAC activities. He emphasized that everything provided to the FAA as advice is first presented to the NAC, adding that it is incumbent on the members to ensure that the advice is indeed consensus.

Mr. Childs then provided the NAC with a brief overview of his goals as NAC Chairman, including reducing mixed equipage and realizing the full benefit of NextGen investments, respectively. He
concluded by emphasizing the importance of focusing on the broader goals of the NAC and not getting sidetracked by details, which can inadvertently contribute to additional work.

**FAA Report**

Next, Mr. Childs handed off to Mr. Dan Elwell, FAA Deputy Administrator, who provided the FAA Report. He began by thanking Mr. Childs for leading responses to NAC taskings. He also thanked Gregg Leone and Carolyn Cowan of MITRE for their assistance in providing the conference facility and related coordination. Mr. Elwell then read the Public Meeting Announcement as the designated federal officer responsible for Federal Advisory Committee Act (FACA) compliance. He emphasized the importance of continuing to adhere to FACA processes wherein the FAA issues a tasking and the NAC responds with advice that is objective and accessible to the public.

Regarding the FAA budget, Mr. Elwell indicated that the FAA program data presented later in the agenda is dependent on steady, uninterrupted funding. In the event of interruptions to FAA funding flows, the data may need to be reassessed and, potentially, adjusted.

On the subject of ADS-B compliance in ruled airspace on January 1, 2020, he said that no operator should expect regular and routine access to ADS-B airspace unless it has complied with the equipage mandate.

The FAA will begin negotiating an agreement for the operational introduction of space-based ADS-B in FAA-controlled airspace during an operational evaluation in the Caribbean starting in Spring 2020. As this evaluation progresses, the FAA will develop a one to three-year roadmap to identify and pursue additional opportunities to expand its use. He added that an area where the FAA sees promise for the technology is in Bermuda, which is a key transition point for trans-Atlantic flights.

Mr. Elwell announced that per a request at the July 30, 2019 NAC Meeting for information on greenhouse gas emissions relative to US aviation, the FAA provided NAC members an information paper on the subject it delivered at the 40th Session of ICAO in September 2019 (reference attachment 3).

He formally acknowledged receipt of the official NAC advice provided at the July 30, 2019 NAC with the NAC’s approval of the summary. He added that since the July 30 NAC, in mid-October the FAA had finalized and delivered NAC taskings for Minimum Capabilities List and Section 547: Enhanced Air Traffic Services, respectively (available on the NAC public website at https://www.faa.gov/about/office_org/headquarters_offices/ang/nac/).

Next, Ms. Lirio Liu, Acting FAA Deputy Associate Administrator for Aviation Safety, provided insight on the work of the Drone Advisory Committee (DAC). She said that the FAA has tasked the DAC to identify other drivers that lead to widespread use of remote identification prior to enactment of a Final Rule. Additionally, the FAA has tasked the DAC to identify existing or near-term technical solutions at the aircraft or operational limitation/capacity level that could reduce the chance that UAS operators pose a safety or security threat through careless operation.

Ms. Pam Whitley, Acting FAA Assistant Administrator for NextGen, then acknowledged the work of former NAC SC Co-Chair Melissa Rudinger (AOPA) who recently changed positions within AOPA and will no longer be serving as co-chair. Ms. Whitley added that Mr. Drew has accepted the FAA’s request
to serve as the sole chair of the NAC SC through the remainder of the current NAC charter, which runs through June 2020.

Ms. Whitley emphasized that the focus moving forward will be on operationalizing NextGen, which involves jointly focusing on the details of implementing the joint industry and government commitments. She added that this takes discipline to keep the focus on agreed upon commitments in the NextGen Priorities Joint Implementation Plan (current version calendar years 2019–2021).

Next, Ms. Teri Bristol, FAA Air Traffic Operations (ATO) Chief Operating Officer, provided ATO updates. She announced that the FAA will have implemented Consolidated Wake Turbulence standards at seven facilities by the end of the year. This included 30 airports and training of 764 air traffic controllers in a 35-day window.

She added that the FAA is also excited at achieving initial operating capability status for en route Data Comm at the Indianapolis and Kansas City centers, respectively. To be truly successful, this will require continued commitment from avionics and aircraft manufacturers.

Mr. Elwell closed the FAA Report by indicating that the NAC continues to make progress on some of the most consequential issues facing the modernization of the National Airspace System.

Public Statements

The FAA did not receive any requests from the public to submit a written statement or make a public statement at the December 12, 2019 NAC.

Community Engagement

Next, Mr. Childs introduced Ms. Kim Stover (FAA) and Mr. Sean Torpey (FAA), who provided updates on community engagement efforts. Mr. Torpey indicated that they would be explaining the challenge of community engagement, how the FAA has responded, and how the FAA is moving forward. Ms. Stover explained the various challenges, including more aircraft flying and fleet mixes continuously changing to meet customer demand. She emphasized that addressing community concerns is an aviation industry issue and needs to be addressed collectively.

Mr. Torpey explained that the FAA takes a proactive strategic, coordinated, and purposeful approach to communication. This includes communication with airports, airport roundtables, internal personnel, local officials, congressional offices, and members of the public. He added that although the FAA understands that each location introduces unique challenges, it is developing standard operating procedures to promote unified practices and approaches.

Ms. Stover said the FAA has found that it is most effective to address noise issues regionally with local personnel. Mr. Torpey added that FAA Regional Administrators (RAs) serve as the entry point for information and requests. These RAs lead integrated community engagement teams that work to address requests from airport and community roundtables and congressional offices. Ms. Stover added that the FAA is looking for additional and consistent industry engagement in the future. Future initiatives include consistent use of noise abatement procedures, more proactive discussions of possible future changes to the airspace, and specific and continued engagement with airports and communities.

Mr. Torpey explained that it is important to communicate the reasons the FAA is making changes to the airspace. He said that community workshops are a great venue for this. These workshops are efforts
to truly engage with community members to hear their concerns and convey information in person. Participation from airports, industry, and FAA personnel helps to clarify roles and responsibilities to the communities.

Ms. Stover concluded by re-emphasizing that community concerns are not solely an FAA issue. She said it is imperative to continue to work through these issues collectively. During extensive follow-on NAC member discussion, the following actions resulted:

**Action:** NAC Member Brad Pierce (NOISE), with support of other NAC Members and NAC Chairman, requested that community engagement and related noise concerns be a standing agenda item for future NAC meetings

- NAC Chairman Chip Childs emphasized the need for continued and early engagement between FAA and Industry

**Action:** NAC Member Joe DePete (ALPA) offered ALPA pilot safety officer resources to support FAA community engagement efforts; FAA Deputy Administrator Dan Elwell agreed to connect ALPA with FAA

**Performance Based Navigation (PBN) Way Forward**

Next, Ms. Stover and Mr. Drew provided an overview of some of the NAS modernization work founded on PBN, along with a recommendation for next steps toward continued evolution of that work. Progress over the past 20 years has been the result of FAA and industry partnership and alignment. They said that NAS modernization through PBN has relied on consensus. The continued evolution of plans to meet current needs have built upon the foundation set by earlier strategies and successes, which enabled continuity and progress.

Ms. Stover said that this modernization continues, which relies on the FAA and industry delivering a tremendous amount of agreed-upon work. The PBN NAS NAV Strategy provided the foundation for prior, current, and future work. She said that ongoing progress will require collective effort and commitment.

FAA program managers work diligently to openly communicate together to ensure alignment and integration across and throughout the NAS to accomplish this body of work. Every goal in the strategy has been assigned to an FAA organization, with clear roles and responsibilities, to shepherd the work forward. Once the programmatic delivery is complete, operational experts ensure the programs are ready for routine use in the operation, which is then maintained applying an enterprise perspective.

In describing the wave of new entrants to the NAS, Ms. Stover said the FAA must support all the NAS users with conflicting priorities, various access needs, and differing operational capabilities. There is an urgency to continue to evolve the NAS NAV Strategy to support this near-future environment. As PBN moves into the future, the FAA will need to deliver modernized service to legacy operators, and at the same time, integrate an exponential number of diverse new entrants.

The FAA recognizes how important it is to continue to consider community concerns around aviation. Regional Administrators are leading outreach efforts; community engagement officers and ombudsmen are engaging; and airports are supporting community round tables.
Further progress will continue to rely on alignment of critical issues and priorities for longer-term
success to move PBN into the future. As work continues towards realizing the modernization strategy,
the team has identified some disconnects in how it has defined the strategies. In discussing these
disconnects within a small workgroup of personnel from FAA and Industry, it recognized the need to
reset expectations, and refocus our collective efforts, commitments, and priorities. This smaller group
worked together to identify and outline a future tasking to enable collectively working together to
continue to evolve the joint strategy.

Ms. Stover and Mr. Drew reviewed an overview of the tasking. The small group focused on the actual
tasking recommendations with the expectation the work would be done by a broader, more inclusive
and diversified group. Aspects of the tasking includes the following:

- Develop a consensus agreement on a PBN baseline
  - A baseline of existing work will be identified to demonstrate where the PBN NAS NAV
    Strategy has been completed so far
  - This first step aligns with the MCL initiative and provides a foundation for ongoing
dialogue and transparency; it will also ensure starting from the same understanding of
what currently exists
- Consensus agreement on delivering a PBN NAS
  - The second step requires a realistic review of what has changed in the NAS since 2016
    and provides an opportunity to apply what has been learned
  - By defining desired outcomes and performance attributes, the team will then be ready
to work together to jointly identify evolved critical priorities and commitments
- List of specific outcomes
  - With the baseline and desired outcomes identified, jointly determine what gaps exist,
    and what gaps need to be filled to continue to move the strategy forward
  - This will allow the team to address some of the unintended consequences of
    modernization and proactively reach out to communities to identify their concerns; and
to work with them towards mitigation where and when possible
  - It will also allow for working with pilots and controllers to improve understanding of the
    procedures available today and what is coming in the future

Outcome: FAA Deputy Administrator Dan Elwell formally tasked the NAC with NAC Tasking 19-4:
Performance Based Navigation (PBN) Clarification (tasking letter available on the NAC public website
at https://www.faa.gov/about/office_org/headquarters_offices/ang/nac/).

- NAC Subcommittee (SC) Chairman Craig Drew will brief on the task response construct at the
  next NAC meeting (Spring 2020)

FAA Update: Joint Implementation Plan (JIP) Milestones

Data Communications (Data Comm)

Mr. Jesse Wijntjes (FAA) provided an update on FAA Data Comm milestones detailed in the following
table.
## Data Communications Milestone

<table>
<thead>
<tr>
<th>Milestone Description</th>
<th>Milestone Date Quarter / Calendar Year</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deploy Tower Services to an additional seven towers</td>
<td>3Q2019</td>
<td>Completed.</td>
</tr>
<tr>
<td>Baseline additional Data Comm capabilities for En Route utilizing the existing FANS message set</td>
<td>3Q2021</td>
<td>Formulating an acquisition strategy</td>
</tr>
<tr>
<td>IOC for Initial En Route Services at all CONUS ARTCCs</td>
<td>4Q2021</td>
<td>First site (ZKC) went IOC on 11/15/19 and second site (ZID) went IOC on 11/18/19. The remaining ARTCCs are on schedule.</td>
</tr>
<tr>
<td>Loadability Solution for Runway SID/STARs</td>
<td>3Q2019</td>
<td>Completed. Identified solution for Runway/SID with all stakeholders. Implementation of the capabilities in TFDM and TDLS pending funding approval. NIWG agreed not to implement the STAR portion in En Route.</td>
</tr>
<tr>
<td>Solution for Full Automation for the Confirm Assigned Route Capability</td>
<td>3Q2019</td>
<td>Completed. NIWG agreed not to implement this capability in En Route</td>
</tr>
</tbody>
</table>

## Northeast Corridor (NEC)

Mr. Rob Hunt (FAA) and Mr. Robert Novia (FAA) provided the following NEC looking back FAA update:

- Completed 21 FAA implementation and pre-implementation milestones in the past year
  - Improved the flow of PHL and NY area departures through implementation of TBFM’s departure capability, and expanded use of capping and tunneling
  - Enhanced flight efficiency in the narrow corridor of offshore airspace between Warning Areas; improvements resulting from redesigned airspace and new PBN routes that segregate flows to/from NY area airports
- JAT has completed the post-implementation analysis for the TBFM departure capability; currently analyzing capping and tunneling

Mr. Bryan Quigley (United Airlines) commented that operators had invested in this densely populated area and asked when benefits may be realized. Mr. Hunt responded that there is lead time required to implement industry recommendations—bolder changes have several up-front considerations to work through.

**Outcome:** Following discussion of Northeast Corridor pre-implementation milestones, NAC Chairman Chip Childs, with the encouragement of several NAC Members, requested a process clarification to consider the addition of implementation milestones for pre-implementation items in the current Joint Implementation Plan (JIP)
Mr. Hunt and Mr. Novia also provided the following NEC looking forward update:

- On track to implement a number of improvements in the coming year
  - Increase the ability of Air Traffic Control to use the most effective and Industry-desired routing for NY area departures
  - Continue the incremental rollout of iTBO via the implementation of airborne metering and TBFM departure scheduling from airports within eight ARTCCs destined to PHL
  - Enhanced throughput into and out of NEC airports through high altitude airspace modernization

**Performance Based Navigation (PBN)**

Mr. Novia and Mr. Hunt provided the following FAA update on PBN accomplishments and current plans:

- Cleveland-Detroit Metroplex - Completed
  - This is the FAA’s eighth Metroplex to be completed to date
  - Project implemented Sept 2018
  - Post-implementation work completed Oct 2019
- Denver Metroplex - On-track
  - Airspace/procedure designs are complete
  - Published the Final Environmental Assessment Nov 2019
  - Implementation phase to start Jan 2020
  - Publish procedures on March 26, 2020
- Las Vegas Metroplex - On-track
  - Airspace/procedure designs are complete
  - Published the DRAFT Environmental Assessment (Nov 2019)
  - Implementation phase to start April 2020 and complete by (publish) May 2020
- South-Central Florida - On-track
  - Airspace/procedure designs are complete
  - Environmental Contract modeling is underway
  - Implementation phase to start Oct 2020
  - Expect to publish procedures Aug 2021

Next, they provided the following looking forward FAA update on iTBO Operating Areas/Sites:

- Northeast Corridor
  - On track to incrementally implement iTBO for PHL through 2021
    - 2020: Departure scheduling from airports within eight ARTCCs for aircraft destined to PHL
    - 2020-21: Airborne metering within surrounding ARTCCs for aircraft destined to PHL
    - Leveraging PBN SIDs for departures destined to PHL and PBN STARS for PHL arrivals
- Northwest Mountain
  - On track to incrementally implement iTBO for DEN through 2021
    - 2020: Extended Metering and Departure Scheduling in ZDV and tier 1 ARTCCs
● 2020: PBN Metroplex (STARS, Approaches, SIDs) for DEN arr/dep
● 2021: Terminal Sequencing and Spacing in Denver TRACON

They concluded with an update on the Barriers to Established on RNP milestone, which is a joint analysis with industry on potential barriers that inhibit the consistent use of EoR procedures at six NSG 1-4 airports (Q2 CY2020), including Denver, Houston, Nashville, Portland, Austin, Sacramento. The team has completed an initial draft. The PBN NIWG subgroup has identified six barriers, then further classified the barriers into three categories:

● Safety analysis to examine possible separation or criteria changes
● Mixed equipage/capabilities and participation rates, and
● Procedure development and operational implementation

**Multiple Runway Operations (MRO)**

Mr. Natee Wongsangpaiboon (FAA) provided the following looking back FAA update:

● MRO 2019-2021 Joint Implementation Plan
  o Focuses on implementing a suite of Multiple Runway Operations (MRO) capabilities to increase arrival and departure efficiency based on new procedures and data-driven changes to wake turbulence separation standards
  o No obvious risks to achieving milestones

● 2019 Milestones
  o Completed all pre-implementation milestones
    ▪ Established the feasibility of several concepts and identified initial safety risks and benefit opportunities for arrivals and departures during simultaneous closely spaced parallel operations
    ▪ Conducted Wake Turbulence analyses and concept development to inform operational improvements for capacity constrained airports.
  o CWT Implementation at seven sites (two initial and five RECAT 1.5 and 2.0 terminals)
    ▪ Implemented CWT at A90/BOS, D10/DFW, M98/MSP, MIA/FLL, SCT/SAN, LAX/ONT
    ▪ PHL/ACY is on track to be implemented on December 17, 2019

Mr. Wongsangpaiboon provided the following MRO looking forward FAA update:

● 2020 Milestones
  o On track to complete a number of pre-implementation and implementation milestones
  o Continue to collaborate with stakeholders and closely monitor progress and identify risks

Mr. Don Dillman (FedEx) thanked the MRO team for the good coordination with ATO, adding that these MRO efforts are producing good benefits. Mr. Pete Bunce (GAMA) added that MRO is a good example of a tool that can be easily explained for Congressional engagement.
NAC Subcommittee (SC) Co-Chair’s Report

Industry Update: Joint Implementation Plan (JIP) Milestones & 18-4 and 18-5 JIP Industry Risks and Mitigations

Next, Mr. Drew began the NAC SC Co-Chair’s Report by indicating that while there are many important details in the following briefings, he wanted to highlight the Data Comm avionics update, which will provide an update on important industry work to resolve the risk, and the vertical navigation (VNAV) discussion during the MRO briefing, which will present a recommendation for official NAC advice to consider a VNAV option that could begin to remove barriers to certain PBN procedures.

Surface and Data Sharing

First, Surface & Data Sharing Co-Chair Mr. Rob Goldman (Delta) and Mr. Steve Vail (Mosaic ATM) briefed the following update:

- Industry remains committed to Terminal Flight Data Manager (TFDM)
  - Traffic Flow Management Departure Scheduling is a key component in the TBO/iTBO vision where flights are more efficiently sequenced into the overhead stream
  - System Consolidation of TFDM, TFMS, TBFM and DSP functionality will benefit the NEC as well as entire NAS through increased efficiency and better predictability
- Departure metering still needs clarity
  - CONOPS to implementation requires details
  - Its only one component of the benefit “quad”
  - What is the cost-benefit and ROI?
  - What is the impact to D0, customer expectations and operations
  - Collaborative Site Implementation Teams (CSITs) are helping but we need more outreach
- Surface “equipage” is through data sharing and tool/process development
  - Provision of surface data elements was only the first step
  - SWIM TPP and TFCS connections will require a business case decision
    - SWIM and the data from individual producers is complicated
      - SWIFT has greatly helped
- Industry Milestone: Is there a significant number of non-CDM member operations at any of the Build 2 installations through October of 2023?
  - Reviewed waterfall though 2023 and FAA provided operations by operator data
  - LAX was identified as an example of “high” non-CDM operations (impact depends on density of non-CDM ops)
  - LAX airport is already actively engaged
  - Change industry milestone to green/closed
- TFDM Waterfall Change Recommendation
  - SEATAC (SEA) has requested swapping it’s TFDM dates with a different site for earlier implementation
    - SEA has had a 40 percent increase in operations during the last few years
    - FAA (Air Traffic / SYSOPS) already engaged
Industry supports changes to the TFDM waterfall that support NAS efficiency and benefits to the flying public that do not negatively impact the overall waterfall.

**Data Comm**

Data Comm NIWG Co-Chairs Chuck Stewart (Delta) and Chris Collings (L3Harris) briefed next. They reviewed the status of industry milestones, including a status update on availability commitments and operator avionics on the previously identified risk to the “Resolution of avionics/Pegasus 1 (B757/B767) interoperability issue” milestone (details below).

**Action:** NAC Chairman Chip Childs requested additional context from future Data Comm NIWG briefing charts on operator avionics status, including capacity and timeline information, install by dates, and regional carrier information.

Mr. Stewart and Mr. Collings provided the following background information on the risk:

- **JIP Milestone:** Resolution of avionics/Pegasus 1 (B757/B767) interoperability issue
  - Pegasus 1 would be restricted from participation after Q4 2021
  - FAA made ground automation mitigations to account for the inability of the Pegasus to load a STAR/Transition in en route

They proposed the following recommendation to the NAC:

- Adjust Joint Implementation Plan (JIP) milestone to allow Pegasus 1 aircraft to participate beyond Q4 2021
  - FAA ground automation mitigations also mitigate separate issue on Pegasus 2, B787, B748, and future Boeing aircraft

The provided the following rationale for the recommendation:

- **Pegasus 1**
  - Boeing confirmed Pegasus 1 could not support the fix
  - Pegasus 1 fleet continues to grow; some passenger variants are being repurposed to freighters; Boeing continues to deliver freighter variants of B767 with Pegasus 1

- **Pegasus 2**
  - The fix in Pegasus 2 still requires ground automation mitigation
  - To date the Pegasus 2 does not close the operator retrofit business case
    - Cost, installation time (3-4 yrs), mixed fleet training differences between Pegasus 1 and 2, etc.

Ms. Liu requested that discussions continue in the ad hoc forum. Despite this request, Mr. Drew called for a motion to provide the recommendation as advice to the FAA.

**Outcome:** The NAC passed a motion to provide the following as advice to the FAA: adjust the resolution of avionics/Pegasus 1 interoperability issue JIP milestone to extend FAA ground mitigation beyond Q4 2021 to allow Pegasus 1 aircraft to participate.
• FAA ground automation mitigations also mitigate separate issue on Pegasus 2, B787, B748, and future Boeing aircraft
• NOTE: motion passed in lieu of a FAA request to continue discussion in ad hoc forum

**NEC**

NEC NIWG Co-Chairs Mr. Mark Hopkins (Delta) and Mr. Ralph Tamburro (PANYNJ) briefed NEC, announcing that it had identified no new risks to milestones. They indicated that the NEC NIWG focus has turned to moving pre-implementation progress to implementation successes, including working together to meet NJIP commitments and to bring additional detail to future implementation, including:

- Technical input and feedback on aircraft performance and equipage plans
- Expertise for safety panels
- Consistent and proactive participation community involvement activities
- Collective input on planning and implementation priorities

**PBN**

PBN NIWG Co-Chair Mr. Brian Townsend (American) briefed PBN, announcing that they had identified no additional risks to achieving Industry milestones, which are tied to completion of Metroplex projects. He provided the following updates on the Barriers to Established on RNP milestone:

- Proliferation and more consistent use of EoR procedures was identified as priority for 2019-2021 by PBN NIWG
- Industry and FAA have agreed to conduct a joint analysis of the potential barriers that inhibit the consistent use of EoR procedures
- Barriers identified in three broad categories
  - Safety analysis and subsequent separation change requirements for changes to the NAS
  - Mixed equipage/capabilities and participation rates
  - Procedure development and operational implementation
- Initial draft of the report is complete and will be delivered to the FAA

Mr. Townsend also briefly introduced the Use of RNAV(GPS) LNAV Minimums to Conduct Simultaneous Parallel Instrument Approaches with ILS or Glide Slope Out issue, which is discussed in detail in the following section.

**MRO**

MRO NIWG Co-Chairs Mr. Glenn Morse (United Airlines) and Mr. Phil Santos (FedEx) provided an industry update on MRO.

- MRO 2019-2021 Rolling Plan Industry Commitment Status
  - No obvious risks to completing near-term milestones.
  - Industry commitments linked to FAA milestones.
- 2019 Milestone on track
  - CSPO Dependent Departure Concepts – Review and provide input on feasibility and initial safety analysis of closely spaced parallel operations dependent departure concepts. (Q4 2019).
  - FAA action complete; industry review underway and will be delivered by year-end
2020 Milestones on track
- Wake Turbulence Encounter Reporting - Encourage increased wake encounter reporting based on new FAA reporting guidance
  - Industry outreach in progress: excellent support to date from industry organizations (AOPA, NBAA, A4A). Additional outreach planned to operators through principal operations inspectors and industry organizations (Q1 2020).

 Recommendation to Allow the Use of RNAV(GPS) LNAV Minimums to Conduct Simultaneous Parallel Instrument Approaches with ILS or Glide Slope Out

Mr. Morse introduced the following proposed NAC action:

- Review and accept industry agreement to allow use of RNAV (GPS) LNAV minimums to conduct Simultaneous Independent Parallel Approaches during planned and unplanned ILS or glide slope outages
- Approve forwarding recommendation to FAA to amend national standards as required to authorize the use of RNAV (GPS) LNAV minimums to conduct simultaneous independent parallel approaches during temporary planned and unplanned ILS or glide slope outages

Mr. Morse then provided background information on what led to this proposed NAC action. The NextGen Priorities Joint Implementation Plan Executive Report Rolling Plan 2017-2019 Multiple Runway Operations (MRO) Focus Area memorialized FAA commitment to amend national standards to allow use of RNAV (GPS) LNAV Minimums for Simultaneous Independent Parallel Approaches based on positive pre-implementation safety analysis and SMS process. At the June 2017 NAC meeting, it was decided to pause the national standard change. The milestone was removed from the JIP; however NAC discussion supported continuing to “consider” the issue without a specific milestone, while exploring short term solutions (refer to the June 28, 2017 NAC Meeting Summary).

The use of LNAV minimums is linked to key PBN initiatives. The PBN NIWG agreed to narrow the scope of the discussions to the use of LNAV minimums for simultaneous operations during temporary facility outages. A small work group was formed to address concerns and seek a solution. The group reached an agreement to allow temporary use of LNAV minimums for simos with ILS or Glide Slope out. The agreement has been endorsed by the PBN and MRO NIWGs and was approved by the NAC SC in October 2019.

The NAC SC recommends the NAC:

- Accept the industry agreement for use of LNAV minimums for simos with ILS or GS out
- Forward agreement to FAA recommending it serve as a basis for authorizing the use of LNAV minimums for simultaneous independent parallel approaches with ILS or glide slope out

Mr. Morse proposed the NAC consider the following motion for NAC Approval: Forward industry agreement and recommendations for the use of RNAV (GPS) LNAV only minimums for simultaneous independent parallel approaches during scheduled and unscheduled ILS and GS outages to FAA with recommendation to go forward with implementation considering the specific elements of the agreement.

Outcome: The NAC passed a motion to provide the following as advice to the FAA: “forward industry agreement and recommendations for the use of RNAV (GPS) LNAV only minimums for simultaneous
independent parallel approaches during scheduled and unscheduled ILS and GS outages to FAA with recommendation to go forward with implementation considering the specific elements of the agreement”

Remarks by the FAA Administrator

Next, Mr. Dickson provided brief remarks. He commented on how fortunate we are to live in a country with the safest NAS in the world, which he said needs to be a consideration on every decision. He indicated that the FAA is looking at ways to also account for the work of the DAC and COMSTAC in thinking about the full paradigm, specifically mentioning that the UAS community is maturing.

Mr. Dickson thanked the NAC for its leadership, acknowledging that all members have a day job. He said that the looks forward to continuing to work together, adding that the NAC will always be a valuable part of the ecosystem.

He concluded with briefly discussing the 737 MAX 8 certification process, indicating that there are 8-10 steps left in the process. He mentioned that Boeing is going through software validation with the FAA, as well as internationally.

19-2: FAA Reauthorization Act of 2018 Section 547

Mr. Childs provided an overview of NAC Task 19-2. He said the FAA has tasked the NAC with the important work of providing advice in accordance with the FAA Reauthorization Act of 2018, Section 547. This task requires an aggressive timeline to provide industry recommendations to the FAA. In response, he formed a small, nimble ad hoc team of a few NAC members to provide some initial analysis and bring insights to the broader NAC for consideration prior to making a recommendation to the FAA.

He clarified that the Section 547 recommendation to the FAA will come from the full NAC. This ad hoc group is simply a method for the NAC to begin the work quickly in order to meet the congressional mandate. The advice must be consensus, not only of the Ad Hoc group, but of the entire NAC. He explained that successful scope of the work is as follows:

- Agreement on consensus advice from the full NAC to the FAA, which will ultimately be shared with Congress
- Encourage equipage
- Analyze the projected benefit of investments in NextGen and aircraft equipage
- Potential benefits should provide insight relevant to the entire National Airspace System.
- Work as expeditiously as possible to enable any potential pilot program to begin on time with as much preparation from Industry and Government as possible

Mr. Childs said that the ad hoc team will also discuss economics and cost/benefit impacts of equipage, as well as fleet and network impacts and aircraft noise implications and provide insight back to the NAC.

He provided a status update of activities to date. The ad hoc team conducted an initial call and reviewed existing data regarding current operator and airport capabilities across the NAS. This data removed all assumptions and conclusions to ensure an objective NAC review. The team expects to have more information and possibly an initial broad candidate list at the next NAC meeting for the NAC to review.
19-1: Minimum Capabilities List (MCL)

Mr. Drew briefed a status of MCL. He said that Mr. Ron Renk (United Airlines) began his efforts to provide the FAA advice on the MCL concept with a very small and dedicated set of colleagues.Industry now has the official FAA tasking to proceed to the next level. Rather than develop a large, layered, and time consuming NAC MCL construct, it is going to pursue a much more targeted “kick off” event instead. This will allow industry to gather insight from across the aviation community and get their input upfront. From there, the group will decide how best to structure the work going forward.

Mr. Drew provide background on the MCL effort, as well as an overview of the NAC Task 19-1 sub-tasks, including:

- 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

The team is planning an early 2020 MCL tasking kickoff meeting, which it will use this to begin working sub-task elements, including discussion of current fleet equipage and engagement/adoption strategy. He said this will launch the task and be used as an opportunity to work on the details of this task.

Leveraging ADS-B Infrastructure for Future Operational Benefits

Mr. David Gray (FAA) provided an overview of future operational benefits that the ADS-B mandate set a path for. He said the ADS-B program’s strategy has always been to deploy an infrastructure that can be leveraged for future operational benefits, including:

- Reduce ATC Separation: Enable 3nm separation standards in en route airspace where it was not available before, resulting in increased NAS efficiency for commercial operators.
- Space-Based ADS-B: ADS-B In brings the opportunity to implement various applications (EATS, ECAVS, CAVS, IM) that transform the ability of controllers and pilots to increase efficiency of spacing ops in the NAS.
- Radar Divestiture: Overlapping ADS-B and legacy radar coverage provides the FAA with the opportunities to right-size our surveillance infrastructure across the NAS.
- ADS-B In Applications: ADS-B In brings the opportunity to implement various applications (EATS, ECAVS, CAVS, IM) that transform the ability of controllers and pilots to increase efficiency of spacing ops in the NAS.
- Search and Rescue: ADS-B coverage is often available below legacy radar surveillance. The availability of high-accuracy, high-update rate surveillance information makes it easier to find an accident site. Faster rescues equals lives saved.
- Conflict Probe: More accurate surveillance data from ADS-B Out in ERAM Conflict Probe will decrease the number and magnitude of conflict predictions, reducing vectoring and saving fuel.
- Unknown Opportunities: The 2020 mandate creates an aperture to a future where the FAA can pursue new opportunities and increase the real value of its investment to date in this
technology, we will discover new opportunities to provide value in areas not yet considered. January 1, 2020 is just the beginning.

**Equip 2020 Working Group 4 Update**

Mr Rocky Stone (United Airlines) and Mr. Townsend provided an update and background on Equip 2020 Workgroup 4, which they said has provided a recent forum for stakeholder and FAA discussions about ADS-B In applications. They concluded with the point that with the impending sunset of Equip 2020, there is no other forum for required Industry/FAA collaboration on ADS-B In deployment and integration with Trajectory Based Operations (TBO), which they said is critical to success.

Several NAC members voiced support for continuing this collaboration. Based on this NAC discussion regarding how to continue this collaboration, the FAA took the following action:

**Action:** The FAA agreed to explore forums / approaches to continue ADS-B In industry collaboration.

**NAC Meeting Actions and Outcomes**

- The NAC passed a motion to approve the July 30, 2019 NAC Meeting Summary Package
- NAC Member Brad Pierce (NOISE), with support of other NAC Members and NAC Chairman, requested that community engagement and related noise concerns be a standing agenda item for future NAC meetings
  - NAC Chairman Chip Childs emphasized the need for continued and early engagement between FAA and Industry
- NAC Member Joe DePete (ALPA) offered ALPA pilot safety officer resources to support FAA community engagement efforts; FAA Deputy Administrator Dan Elwell agreed to connect ALPA with FAA
- FAA Deputy Administrator Dan Elwell formally tasked the NAC with NAC Tasking 19-4: Performance Based Navigation (PBN) Clarification
  - NAC Subcommittee (SC) Chairman Craig Drew will brief on the task response construct at the next NAC meeting (Spring 2020)
- NAC Chairman Chip Childs requested additional context from future Data Comm NIWG briefing charts on operator avionics status, including capacity and timeline information, install by dates, and regional carrier information
- The NAC passed a motion to provide the following as advice to the FAA: adjust the resolution of avionics/Pegasus 1 interoperability issue JIP milestone to extend FAA ground mitigation beyond Q4 2021 to allow Pegasus 1 aircraft to participate
  - FAA ground automation mitigations also mitigate separate issue on Pegasus 2, B787, B748, and future Boeing aircraft
  - NOTE: motion passed in lieu of a FAA request to continue discussion in ad hoc forum
- Following discussion of Northeast Corridor pre-implementation milestones, NAC Chairman Chip Childs, with the encouragement of several NAC Members, requested a process clarification to consider the addition of implementation milestones for pre-implementation items in the current Joint Implementation Plan (JIP)
- The NAC passed a motion to provide the following as advice to the FAA: “forward industry agreement and recommendations for the use of RNAV (GPS) LNAV only minimums for simultaneous independent parallel approaches during scheduled and unscheduled ILS and GS
outages to FAA with recommendation to go forward with implementation considering the specific elements of the agreement*

• The FAA agreed to explore forums / approaches to continue ADS-B In industry collaboration

Closing Comments and Adjourn

Mr. Childs thanked everyone for their participation and adjourned the meeting.
Opening of Meeting and Introduction of NAC Members

NAC Chair Chip Childs, SkyWest, Inc.
Chair’s Report

NAC Chair Chip Childs, SkyWest, Inc.
Motion For NAC Approval

• July 30, 2019 NAC Meeting Summary
FAA Report

Dan Elwell, FAA Deputy Administrator
This meeting is being held pursuant to a notice published in the Federal Register on November 25, 2019. The agenda for the meeting was announced in that notice, with details as set out in the agenda handed out today. I am the designated FAA 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.
Joint Implementation Plan 2019 to 2021
185 Total Milestones

FOCUS AREAS
- NEC: 69
- MRO: 31
- PBN: 17
- Surface & Data Sharing: 32
- DataComm: 36

98% (47 of 48) on-time completion thru Q3 CY2019
Public Statements

Members of the Public
Community Engagement

Kim Stover & Sean Torpey, FAA
COMMUNITY ENGAGEMENT

DRIVING PUBLIC AND INDUSTRY ENGAGEMENT STRATEGY IN AN AGENCY WIDE EFFORT
Noise Challenge

- More aircraft are flying
- Fleet mix changes to meet passenger demand
- Addressing community concerns is an aviation industry issue and needs to be addressed collectively by the aviation industry
Strategic Engagement with Communities and Airports

• Exceed the engagement requirements spelled out in the environmental review process (NEPA)

• Increased participation and engagement with Airports and Community Roundtables

• Reviewing data to identify root cause
Community Outreach Framework

Preliminary Activities
- Environmental Review

Design Activities
- Collaboration
  - Technical Integration
  - Airport Integration
  - Political Integration
  - Community Integration
- Decision Point

Community Engagement*
- Collaboration
  - Technical Integration
  - Airport Integration
  - Political Integration
  - Community Integration
- Decision Point

Design and Environmental Review Completed
- Procedure becomes part of the operation.

Implementation
- Collaboration
  - Technical Integration
  - Airport Integration
  - Political Integration
  - Community Integration

Post-Implementation, Monitoring and Evaluation
- Collaboration
  - Technical Integration
  - Airport Integration
  - Political Integration
  - Community Integration

Technical – Industry - to include Airlines, Cargo Carriers, Business Airways, etc., Air Traffic, Technical Operations, System Operations, and Service Centers

Airport – FAA Airports, Local Sponsor/Director, Airport Sponsored Roundtable

Political – Congress, Local Elected Officials, Regional Administrators

Community – Defined by Airports and Political

*Community Engagement –
- Gather Comments
- Adjudication
- Back to Group for Consideration
Keeping the issues in the Region

The Regional Administrator (RA)

• leads the community engagement team in the region
• is the entry point for all requests for support:
  ✦ Airport and Community Airport Roundtables
  ✦ Congressional meetings
  ✦ Correspondence
Community Engagement Officers/Noise Ombudsman

- 8 total positions
  - 1 in Eastern RA Office
  - 1 in Western RA Office
  - 1 in Great Lakes RA Office
  - 1 assigned to the Noise Complaint Initiative
  - 2 in Eastern Service Center
  - 2 in Western Service Center
  - 1 in the Southwest Region
Keeping the issues with the Airport

- The FAA has received noise complaints from Airports for years
- Continue to work with the Airports to share data and responses
- Airport roundtables provide effective constructive means for equitable engagement with communities and airport stakeholders
Community Workshops

- Important to communicate the reason we are making necessary changes to our airspace

- Provide clear and understandable graphics that represent how flight paths may be changing

- Utilize Air Traffic Subject Matter Experts (SME’s), Airport officials and Airline representatives to explain the changes and answer questions
Public Engagement Snapshot

October 2019
PBN Way Forward

Kim Stover, FAA & NAC Subcommittee Co-Chair Craig Drew, Southwest Airlines
National Airspace System (NAS) Modernization
The Role of Performance Based Navigation (PBN)
December 2019 NAC Update
**PBN Summary**

**20 years of evolution** with considerable effort from FAA & industry

**significant progress** since 2016

---

*continued progress* will require alignment with industry, more homogenous fleet capability, ground automation & controller tools

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**“streamline service delivery”** from nav. strategy | implement advanced PBN (EoR, MARS, shorter paths, etc.) NAS-wide to leverge improved TBM

---

Fully leverage and integrate with TBO

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Increase utilization from nav. strategy | Optimize PBN to TSAS & TBM requirements
### Cross-FAA effort required to deliver remaining PBN goals

| P = Primary POC for near term activities | AVS | AVV-A | AVV-P | AVV-E | AVV-C | AVV-W | AIM-100 | AIM-200 | AIM-2 | AIM-3 | AIM | ANG | AIR | AEA | ARP | APO | AJW |
|-----------------------------------------|-----|-------|-------|-------|-------|-------|---------|---------|-------|-------|-----|-----|-----|-----|-----|-----|-----|-----|
| Vertically Guided Approaches            | x   |       | x     | x     | x     | x     | x       | x       | x     | x     |     |     |     |     |     |     |     |     |
| PBN for Helicopters                     |     | x     | x     |       | x     | x     | x       | x       | x     | x     |     |     |     |     |     |     |     |     |
| PBN SIDs & STARs at NSG 1 & 2 airports  |     | x     |       | x     | x     | x     | x       | x       | x     |       | x   |     |     |     |     |     |     |     |
| Replace Jet routes and Victor Airways with PBN routes |     | x     | x     |       | x     | x     | x       | x       |       |     | x   | x   |     |     |     |     | x   |     |
| Establish on RNP (EoR)                   | x   | x     | x     | x     | x     | x     | x       | x       | x     |       |     |     |     |     |     |     |     |     |
| Expand Use of RNAV (GPS) Approaches with RF Legs | x   | x     | x     | x     | x     |       | x       | x       | x     | x     |     |     |     |     |     |     |     |     |
| NAS transitioned to time-based management |     |       | x     |       | x     | x     | x       | x       | x     | x     |     |     |     |     |     |     |     |     |
| Discontinue VORs                        |     |       | x     | x     | x     | x     | x       | x       | x     | x     |     |     |     |     |     |     |     |     |
| ILS Rationalization                     |     |       | x     | x     | x     | x     | x       | x       | x     | x     |     |     |     |     |     |     |     |     |
| Reduce Unnecessary IFPs (e.g., circling, NDB) |     | x     |       | x     |       |       |         | x       |       | x     |     |     |     |     |     |     |     |     |
| Automate Procedure Design Tools and Processes |     | x     |       | x     |       |       |         | x       |       | x     |     |     |     |     |     |     |     |     |
| Enable Digital Delivery of Navigation Chart Data |     | x     |       | x     |       |       |         | x       |       | x     |     |     |     |     |     |     |     |     |
| Develop Automated Tool for Procedure Periodic Review | x   |       | x     |       | x     |       |         | x       |       | x     |     |     |     |     |     |     |     |     |
| Synthetic Vision Guidance System (SVGS) |     |       | x     |       | x     |       |         | x       |       | x     |     |     |     |     |     |     |     |     |
| Lower minima access with LPV            |     | x     |       | x     |       | x     |         | x       |       | x     |     |     |     |     |     |     |     |     |
| DME/DME RNAV Service at NSG 1 & 2 airports |     | x     |       | x     |       | x     |         | x       |       | x     |     |     |     |     |     |     |     |     |
| DME/DME RNAV Service in En Route Airspace |     | x     |       | x     |       | x     |         | x       |       | x     |     |     |     |     |     |     |     |     |
| Satellite Operations Coordination Concept (SOCC) |     | x     |       | x     |       | x     |         | x       |       | x     |     |     |     |     |     |     |     |     |
| Advanced-Required Navigation Performance (A-RNP) |     | x     |       | x     |       | x     |         | x       |       | x     |     |     |     |     |     |     |     |     |
| PBN with visual separation standards    |     | x     |       | x     |       | x     |         | x       |       | x     |     |     |     |     |     |     |     |     |
| Reduce RNP-based separation standards (oceanic) |     | x     |       | x     |       | x     |         | x       |       | x     |     |     |     |     |     |     |     |     |
| Community Engagement                    |     | x     |       | x     |       | x     |         | x       |       | x     |     |     |     |     |     |     |     |     |
| Reduce Separation Standards for PBN in IMC | x   |       | x     |       | x     |       |         | x       |       | x     |     |     |     |     |     |     |     |     |
| Standardization of FMS functionality    |     | x     |       | x     |       | x     |         | x       |       | x     |     |     |     |     |     |     |     |     |

**Note:** Interim FAA POC & Key Stakeholder assignments are shown, which will be refined based on outreach to the relevant programs over the next several months.
PBN Strategy – Now and into the Future
### PBN Procedure and Equipage Baseline

#### Procedures

<table>
<thead>
<tr>
<th>Procedures</th>
<th>Totals</th>
<th>RNAV SIDs</th>
<th>RNAV STARs</th>
<th>Q-Routes</th>
<th>T-Routes</th>
</tr>
</thead>
<tbody>
<tr>
<td>6,650 RNAV (GPS) Approaches</td>
<td>541</td>
<td>438</td>
<td>162</td>
<td>110</td>
<td></td>
</tr>
<tr>
<td>415 RNAV (RNP) Approaches</td>
<td>Per airport averages</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSG 1</td>
<td>8.5</td>
<td>7.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSG 2</td>
<td>4.5</td>
<td>3.6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Equipage

<table>
<thead>
<tr>
<th>Year</th>
<th>RNAV 1</th>
<th>RNAV 2</th>
<th>RNP-1 RF</th>
<th>RNP-1 TF</th>
<th>RNP Approach</th>
<th>RNP AR Approach*</th>
<th>VNAV Approach*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>99%</td>
<td>99%</td>
<td>77%</td>
<td>97%</td>
<td>96%</td>
<td>75%</td>
<td>84%</td>
</tr>
<tr>
<td>2025 Forecast</td>
<td></td>
<td></td>
<td>85%</td>
<td>99%</td>
<td>99%</td>
<td>75–82%</td>
<td>88–91%</td>
</tr>
</tbody>
</table>

*Forecasted 2025 percentage depends on exercised equipment options on new airplanes

Sources: IFP Inventory 10/10/2019; d-TPP Cycle 1910; MITRE Equipped Capability Forecast

Equipage percentages provide the percent of total IFR filing Part 121 airplanes operating in the NAS
1. CONSENSUS AGREEMENT ON PBN BASELINE
   - Existing NAS procedure inventory
   - Current and forecast equipage
   - Current projects and activities

2. CONSENSUS AGREEMENT ON DELIVERING A PBN NAS
   - What effort (from all stakeholders) results in a resilient PBN NAS?
   - What is possible based on barriers and challenges experienced since 2016?
   - Characterize desired outcomes and performance attributes

3. LIST OF SPECIFIC OUTCOMES
   - Industry PBN priorities: which procedures/where/why (e.g., 1 and 3-year plan)
   - Joint plan to:
     - Precondition communities for PBN procedure changes
     - Improve pilot / controller use of existing PBN procedures

Opportunity for alignment between FAA and Industry

near-term priorities

1. CONSENSUS AGREEMENT ON PBN BASELINE
   - Existing NAS procedure inventory
   - Current and forecast equipage
   - Current projects and activities

2. CONSENSUS AGREEMENT ON DELIVERING A PBN NAS
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FAA Update: Joint Implementation Plan (JIP) Milestones

- Data Communications (Data Comm)
- Northeast Corridor (NEC)
- Performance-Based Navigation (PBN)
- Multiple Runway Operations (MRO)

FAA NIWG Subject Matter Experts
Data Comm

Jesse Wijntjes, FAA
## Milestone Status Updates - FAA

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Milestone Date Q/CY</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deploy Tower Services to an additional seven towers</td>
<td>3Q2019</td>
<td>Completed</td>
</tr>
<tr>
<td>Baseline additional Data Comm capabilities for En Route utilizing the existing FANS message set*</td>
<td>3Q2021</td>
<td>Formulating an acquisition strategy</td>
</tr>
<tr>
<td>IOC for Initial En Route Services at all CONUS ARTCCs</td>
<td>4Q2021</td>
<td>First site (ZKC) went IOC on 11/15/19 and second site (ZID) went IOC on 11/18/19. The remaining ARTCCs are on schedule.</td>
</tr>
<tr>
<td>Loadability Solution for Runway SID/STARs</td>
<td>3Q2019</td>
<td>Completed. Identified solution for Runway/SID with all stakeholders. Implementation of the capabilities in TFDM and TDLS pending funding approval. NIWG agreed not to implement the STAR portion in En Route.</td>
</tr>
<tr>
<td>Solution for Full Automation for the Confirm Assigned Route Capability</td>
<td>3Q2019</td>
<td>Completed. NIWG agreed not to implement this capability in En Route</td>
</tr>
</tbody>
</table>

*Joint FAA and Industry Goal*
Data Comm Critical Path

Key:
- ZDC: rollout Valid.
- ZTL: Scenario Dev Activities.
- ZNY: Adaptation Changes:
- ZBW: Scenario Dev Activities.
- ZJX: Uplink Error Free Text.
- EAE210 Build:
- ZTL NAP 9/20
- EAE300:
- Key Site
- ZID and ZKC: Key Sites
- ISD:
- 2/26
- EAE310
- 4/27
- EAE400:
- 6/16

EAE300 Critical Content Required before DFV begins at Waterfall Sites

ISD is required for Waterfall DFV Activities to begin

July 2019 - June 2020

Data Comm
Critical Path
Data Comm
En Route Initial Services Waterfall

Key
- Planned
- In Limited Site Testing
- In 24x7 Testing
- Fully Operational

Map showing various key sites with dates of planned services.
NEC NIWG – Looking Back

• Completed 21 FAA implementation and pre-implementation milestones in the past year
  ➢ Improved the flow of PHL and NY area departures through implementation of TBFM’s **departure capability**, and expanded use of **capping & tunneling**
  ➢ Enhanced flight efficiency in narrow corridor of offshore airspace between Warning Areas. Improvements resulting from redesigned airspace and **new PBN routes** that segregate flows to/from NY area airports.

• JAT has completed the post-implementation analysis for the TBFM departure capability; currently analyzing capping & tunneling
• On track to implement a number of improvements in the coming year
  ➢ Increase the ability of Air Traffic to use the most effective and Industry-**desired routing** for NY area departures
  ➢ Continue the incremental rollout of iTBO via the implementation of **airborne metering** and TBFM departure scheduling from airports within 8 ARTCCs destined to PHL
  ➢ Enhanced throughput into and out of NEC airports through **high altitude airspace modernization**
PBN NIWG Update

Presented to:  NAC
By:    Robert Novia, Rob Hunt
Date:  December 12, 2019
PBN NIWG Metroplex Milestones
Accomplishments and What’s to Come

Cleveland-Detroit Metroplex - *Completed*
- This is the FAA’s 8<sup>th</sup> Metroplex to be completed to date
- Project implemented Sept 2018
- Post-implementation work completed Oct 2019

Denver Metroplex - *On-track*
- Airspace/procedure designs are complete
- Published the Final Environmental Assessment Nov 2019;
- Implementation phase to start Jan 2020
- Publish procedures on March 26, 2020

Las Vegas Metroplex - *On-track*
- Airspace/procedure designs are complete
- Published the DRAFT Environmental Assessment (Nov 2019)
- Implementation phase to start April 2020 and complete by (publish) May 2020

South-Central Florida - *On-track*
- Airspace/procedure designs are complete
- Environmental Contract modeling is underway
- Implementation phase to start Oct 2020
- Expect to publish procedures Aug 2021
Looking Forward: iTBO Operating Areas/Sites

Northwest Mountain
- On track to incrementally implement iTBO for DEN through 2021
  - 2020: Extended Metering and Departure Scheduling in ZDV and tier 1 ARTCCs
  - 2020: PBN Metroplex (STARS, Approaches, SIDs) for DEN arr/dep
  - 2021: Terminal Sequencing and Spacing in Denver TRACON
- Implementing iTBO at additional locations in 2022 (EWR, ATL).

Northeast Corridor
- On track to incrementally implement iTBO for PHL through 2021
  - 2020: Departure scheduling from airports within 8 ARTCCs for aircraft destined to PHL
  - 2020-21: Airborne metering within surrounding ARTCCs for aircraft destined PHL
  - Leveraging PBN SIDs for departures destined to PHL and PBN STARS for PHL arrivals
Barriers to Established on RNP (EoR)

Joint analysis with industry on potential barriers that inhibit the consistent use of EoR procedures at six NSG 1-4 airports (Q2 CY2020)
  • Denver, Houston, Nashville, Portland, Austin, Sacramento
  • Team has completed an initial draft

PBN NIWG subgroup has identified six barriers, then further classified the barriers into three categories:
  • Safety analysis to examine possible separation or criteria changes
  • Mixed equipage/capabilities and participation rates, and
  • Procedure development and operational implementation
MRO
Status Update

Natee Wongsangpaiboones
Raul Zamora, Jr.
MRO NIWG – Looking Back

• MRO 2019-2021 Joint Implementation Plan
  • Focuses on implementing a suite of Multiple Runway Operations (MRO) capabilities to increase arrival and departure efficiency based on new procedures and data-driven changes to wake turbulence separation standards
  • No obvious risks to achieving milestones

• 2019 Milestones
  • Completed all pre-implementation milestones
    • Established the feasibility of several concepts and identified initial safety risks and benefit opportunities for arrivals and departures during simultaneous closely spaced parallel operations
    • Conducted Wake Turbulence analyses and concept development to inform operational improvements for capacity constrained airports.
  • CWT Implementation at 7 sites (2 initial and 5 RECAT 1.5 and 2.0 terminals)
    • Implemented CWT at A90/BOS, D10/DFW, M98/MSP, MIA/FLL, SCT/SAN, LAX/ONT
    • PHL/ACY is on track to be implemented on December 17, 2019
MRO NIWG – Looking Forward

• 2020 Milestones
  • On track to complete a number of pre-implementation and implementation milestones
  • Continue to collaborate with stakeholders and closely monitor progress and identify risks
NAC Subcommittee (SC)
Co-Chair’s Report

Industry Update: Joint Implementation Plan (JIP) Milestones & 18-4 and 18-5: JIP
Industry Risks and Mitigation

- Surface and Data Sharing
- Data Communications (Data Comm)
- Northeast Corridor (NEC)
- Performance-Based Navigation (PBN)
- Multiple Runway Operations (MRO)

NAC Subcommittee Co-Chair Craig Drew, Southwest Airlines & NIWG Co-Chairs
NAC Tasking Responses

Task 18-4: Northeast Corridor: Implementation Risks and Mitigations of the NextGen Priorities Joint Implementation Plan

Task 18-5: NextGen Priorities Four Focus Areas: Implementation Risks and Mitigations of the NextGen Priorities Joint Implementation Plan
Surface and Data Sharing

Rob Goldman, Delta and Steve Vail, Mosaic ATM
Risk Identification Tasking

• Industry remains committed to Terminal Flight data manager (TFDM)
  • Traffic Flow Management Departure Scheduling is a key component in the TBO/iTBO vision where flights are more efficiently sequenced into the overhead stream
  • System Consolidation of TFDM, TFMS, TBFM and DSP functionality* will benefit the NEC as well as entire NAS through increased efficiency and better predictability

• Departure metering still needs clarity
  • CONOPS to implementation requires details
  • Its only one component of the benefit “quad”
  • What is the cost-benefit and ROI?
  • What is the impact to D0, customer expectations and operations
  • Collaborative Site Implementation Teams (CSITs) are helping but we need more outreach

• Surface “equipage” is through data sharing and tool/process development
  • Provision of surface data elements was only the first step
  • SWIM TPP and TFCS connections will require a business case decision
    • SWIM and the data from individual producers is complicated
      • SWIFT has greatly helped

---

**Electronic Flight Data**
TFDM will provide an improved Electronic Flight Data (EFD) exchange and Electronic Flight Strips (EFS) in the tower to replace printed flight strips. This functionality will be integrated with Flight Plans for automatic updating.

**Collaborative Decision Making for the Surface**
TFDM will provide a departure scheduler with live data provided by Air Traffic systems/airports and Flight Service Providers. The system will provide a departure metering capability; runway balancing and other surface management tools, improving surface traffic flow management.

**Traffic Flow Management**
TFDM will enhance the traffic flow management data integration with Time Based Flow Management (TBFM) and Traffic Flow Management System (TFMS) to enable airlines, controllers and airports to share and exchange real-time data. This will result in improved surface traffic management as well as improve the products produced by TFMS and TBFM.

**Systems Consolidation**
TFDM will replace multiple unsupportable systems in the National Airspace System through integration of their functionality into TFDM. This achieves technology modernization, improved data sharing and lower maintenance costs. The systems to be consolidated include ARMT, DSP, EFSTS, AEFS, and SMA.
Industry Milestone:

- Is there a significant number of non-CMD member operations at any of the Build 2 installations through October of 2023?

- Reviewed waterfall thru 2023 and FAA provided operations by operator data
- LAX was identified as an example of “high” non-CMD operations (impact depends on density of non-CMD ops)
- LAX airport is already actively engaged
- Change industry milestone to green/closed
TFDM Waterfall Change Recommendation

- SEATAC (SEA) has requested swapping its TFDM dates with a different site for earlier implementation
  - SEA has had a 40 percent increase in operations during the last few years
  - FAA (Air Traffic / SYSOPS) already engaged
  - Industry supports changes to the TFDM waterfall that support NAS efficiency and benefits to the flying public that do not negatively impact the overall waterfall
## Data Comm NIWG CY19-21
### Milestone Status Updates - Industry

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Milestone Date Q/CY</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airlines to Equip 1,900+ Aircraft</td>
<td>4Q2019</td>
<td>Completed</td>
</tr>
<tr>
<td>Baseline additional Data Comm capabilities for En Route utilizing the existing FANS message set*</td>
<td>3Q2021</td>
<td>FAA formulating acquisition strategy</td>
</tr>
<tr>
<td>Resolution of avionics/Pegasus 1 interoperability issue</td>
<td>4Q2021</td>
<td>Industry recommendation: FAA allow Peg 1 mitigations beyond Q4 2021</td>
</tr>
<tr>
<td>Recommendation for target equipage rates for follow-on capabilities*</td>
<td>2Q2019</td>
<td>Completed</td>
</tr>
<tr>
<td>Recommendation for the equipage strategy for Regional Jet equipage</td>
<td>2Q2019</td>
<td>Completed</td>
</tr>
</tbody>
</table>

*Joint FAA and Industry Goal
# Data Comm Avionics Availability

## Commitments and Risks

<table>
<thead>
<tr>
<th>OEM</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collins Core 16</td>
<td>On plan for March 2020</td>
</tr>
<tr>
<td>Pegasus I Mitigation</td>
<td>Expect initial mitigations published early December 2019, on track for Jan 2020 re-start</td>
</tr>
<tr>
<td>Honeywell Mark II+ v523</td>
<td>Boeing/Honeywell documents released. Back on track for March 2020 SWA fleet retrofit.</td>
</tr>
<tr>
<td>Boeing 787 BP6</td>
<td>On plan for mid-December 2019</td>
</tr>
</tbody>
</table>
### Operator avionics status

**Bold: Data Comm en route critical path**

<table>
<thead>
<tr>
<th>Action</th>
<th>Installed by</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMU 900 Core 14</td>
<td>31 Dec 2019</td>
<td>Installs in progress</td>
</tr>
<tr>
<td>CMU 900 Core 16</td>
<td>6 months from release</td>
<td>Pending release</td>
</tr>
<tr>
<td>Collins VDR SB</td>
<td>30 Mar 2020</td>
<td>Start Jan 2020</td>
</tr>
<tr>
<td>A320 CSB 7.5</td>
<td>Plans to install</td>
<td>Pending release</td>
</tr>
<tr>
<td>CMU 900 Core 16</td>
<td>80% 3 months from release, full fleet by 6mo</td>
<td>Pending release Planned</td>
</tr>
<tr>
<td>Collins VDR SB</td>
<td>31 Dec 2019</td>
<td>67% installed Will not complete by 12/31</td>
</tr>
<tr>
<td>A320 CSB 7.5</td>
<td>Plans to install</td>
<td>Pending release</td>
</tr>
<tr>
<td>B757/67 Peg I</td>
<td>TBD</td>
<td>Pending procedure approval Planned after VDR fixed</td>
</tr>
<tr>
<td>B757/67 Peg II</td>
<td>TBD</td>
<td></td>
</tr>
<tr>
<td>B777 BP17B</td>
<td>Plans to install</td>
<td>Pending release</td>
</tr>
<tr>
<td>B787 BP6</td>
<td>Plans to install</td>
<td>Pending release</td>
</tr>
<tr>
<td>CMU 900 Core 16</td>
<td>80% 2 months from release, full fleet by 6mo</td>
<td>Pending release Planned</td>
</tr>
<tr>
<td>Collins VDR SB</td>
<td>31 Dec 2019</td>
<td>All VDRs corrected Complete</td>
</tr>
<tr>
<td>A320 CSB 7.5</td>
<td>TBD</td>
<td></td>
</tr>
</tbody>
</table>
## Operator avionics status

**Bold: Data Comm en route critical path**

<table>
<thead>
<tr>
<th>Action</th>
<th>Installed by</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMU 900 Core 14</td>
<td>1 month from release</td>
<td>Acquiring fix</td>
</tr>
<tr>
<td>CMU 900 Core 16</td>
<td>6 months from release</td>
<td>Pending release</td>
</tr>
</tbody>
</table>
| Collins VDR SB       | B767 – Jan 2020  
B777 – Feb 2020  
MD11 – Mar 2020  
B757 – July 2020    | 26% installed         |
| B757/67 Peg I        | TBD                  | Pending procedure approval         |
| B757/67 Peg II       | TBD                  | Pending release                    |
| B777 BP17B           | TBD                  | Pending release                    |
| A320 CSB 7.5         | 6 months from release| Pending release                    |
| Mark II+ CMU v523    | 31 Mar 2020          | Ops trial started  
6% installed             |
| Mark II+ CMU v522    | End Apr 2020         | 8% installed  
(60 a/c trial)           |
| RTA 44D SB           | 31 Dec 2022          | 5% installed                       |

**FedEx Express**

**Collins VDR SB**

**jetBlue**

**Southwest**
## Operator avionics status

**Bold: Data Comm en route critical path**

<table>
<thead>
<tr>
<th>Action</th>
<th>Installed by</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMU 900 Core 16</td>
<td>8 months from release</td>
<td>Pending release</td>
</tr>
<tr>
<td>CMU 900 VM update</td>
<td>30 Apr 2020</td>
<td>Starting Jan 2020</td>
</tr>
<tr>
<td>Collins VDR SB</td>
<td>30 Apr 2020</td>
<td>63% installed</td>
</tr>
<tr>
<td>B757/67 Peg I</td>
<td>TBD</td>
<td>Pending procedure approval</td>
</tr>
<tr>
<td>B757/67 Peg II</td>
<td>TBD</td>
<td></td>
</tr>
<tr>
<td>B777 BP17B</td>
<td>Plans to install</td>
<td>Pending release</td>
</tr>
<tr>
<td>B787 BP6</td>
<td>3 months from release</td>
<td>Pending release</td>
</tr>
<tr>
<td>CMU 900 Core 14</td>
<td>31 Dec 2019</td>
<td>Install complete</td>
</tr>
<tr>
<td>CMU 900 Core 16</td>
<td>70% 3 months from release, full fleet by 6 mo</td>
<td>Pending release</td>
</tr>
<tr>
<td>Collins VDR SB</td>
<td>Complete</td>
<td>Complete</td>
</tr>
<tr>
<td>B757/67 Peg I</td>
<td>TBD</td>
<td>Pending procedure approval</td>
</tr>
<tr>
<td>B757/67 Peg II</td>
<td>TBD</td>
<td></td>
</tr>
<tr>
<td>B748 BP4</td>
<td>30 Sep 2019</td>
<td>Ops start Nov 22</td>
</tr>
</tbody>
</table>
Data Comm NIWG Pegasus Recommendation

Background

• JIP Milestone: Resolution of avionics/Pegasus 1 (B757/B767) interoperability issue
  • Pegasus 1 would be restricted from participation after Q4 2021
• FAA made ground automation mitigations to account for the inability of the Pegasus to load a STAR/Transition in en route

Recommendation to NAC

• Adjust Joint Implementation Plan (JIP) milestone to allow Pegasus 1 aircraft to participate beyond Q4 2021
  • FAA ground automation mitigations also mitigate separate issue on Pegasus 2, B787, B748, and future Boeing aircraft

Rationale

• Pegasus 1
  • Boeing confirmed Pegasus 1 could not support the fix
  • Pegasus 1 fleet continues to grow; some passenger variants are being repurposed to freighters; Boeing continues to deliver freighter variants of B767 with Peg 1
• Pegasus 2
  • The fix in Pegasus 2 still requires ground automation mitigation
  • To date the Pegasus 2 does not close operator retrofit business case
    • Cost, installation time (3–4 yrs), mixed fleet training differences between Pegasus 1 and 2, etc
Northeast Corridor - Ongoing Operational Priority

• The NAC has recognized the Northeast Corridor as an **implementation priority** for NextGen and Trajectory Based Operations

• Continuous improvements to the system in the NEC operationally benefits the entire US aviation system

• The NEC accounts for roughly 50% of delays in the NAS
Progress on NEC NIWG Milestones

2017
Phase 1 Report – NEC objectives, goals, success metrics
Phase 2 Interim Report – Implementation milestones and other pre-implementation commitments

2018
Phase 2 Final Report – Commitments in support of the 2019-2021 Rolling Plan (feeds into the FAA NextGen JIP)
Implementation completed:
- EDC at ZNY
- IDAC for 4 NY airports

2019
Reconciled Industry milestones for June 2019 NJIP Implementation completed:
- EDC at ZNY
- IDAC for 4 NY airports
- SCIA for PHL
- Eliminate passback restrictions
- Pre-departure scheduling PIT-PHL
- ZNY Offshore Transition Routes
- New high-speed exit for JFK 31R
- SWA aircraft intent data

No new risks identified
- FAA milestones on schedule
- Industry milestones (mostly) tied to FAA milestones

Focus on...
- Moving pre-implementation progress to implementation successes

- NOD review and feedback
Community/Environmental:
- Dispersal headings for LGA13 on existing GLDMN/TNNIS/NTHNS
- Community Involvement strategy for the NY area
Safety assessment:
- SCIA operations with RNAV for PHL 9R/35

Pre-implementation completed:
- Sequence analysis of NEC airports to receive en route metering
- Procedure concept assessment/feasibility:
  - Deconflict LGA/EWR/TEB when on LGA 13ILS
  - JFK EoR simultaneous operations to 13R RNP and 13L ILS
  - MARS concept exploration and priorities
  - TEB 19 RNAV SID for nighttime use
  - EWR 22L/29 arrival operations
  - LGA GLDMN/NTHNS climb gradients
  - LGA 31 RNAV approach to approximate LGA 31 EXPWY VIS
  - EFVS and eCAVS benefits assessments
  - NBAA input on high-performance escape routes
Highlighted Initiatives – Moving toward Implementation

Atlantic Coast Routes:
• Industry stakeholders included in work group meetings
• Transparency on incremental implementation steps
• Productive joint planning sessions and safety panels

Washington Center Redesign:
• Design and assessment completed early
• Implementation planning continuing, in conjunction with other initiatives

Philadelphia Metering Initiatives:
• Demo results and goals reviewed
• Details of phased deployment shared with stakeholders
Moving Forward – Transparency and Collaboration

- Working together to meet NJIP commitments and to bring additional detail to future implementation
  - Technical input and feedback on aircraft performance and equipage plans
  - Expertise for safety panels
  - Consistent and proactive participation community involvement activities
  - Collective input on planning and implementation priorities
PBN
Steve Fulton, Fulton Aviation and Brian Townsend, American
PBN NIWG

• Goal:
  • Deliver desired outcome of routine PBN use, supported by appropriate policies, rules and tools

• Status and progress:
  • No additional risks to achieving Industry milestones, which are tied to completion of Metroplex projects
  • Barriers to EoR FAA-Industry pre-implementation milestone complete
  • Positive progress in addressing several recommendations from the NIWG Rolling Plan*
    • FAA PBN re-organization in Fall 2019
    • Way forward regarding VNAV issue

* NIWG Rolling Plan was delivered to the NAC in October 2018 and adopted by the FAA into the latest NJIP in June 2019
Barriers to Established on RNP

• Proliferation and more consistent use of EoR procedures was identified as priority for 2019-2021 by PBN NIWG
• Industry and FAA have agreed to conduct a joint analysis of the potential barriers that inhibit the consistent use of EoR procedures
• Barriers identified in three broad categories
  • Safety analysis and subsequent separation change requirements for changes to the NAS
  • Mixed equipage/capabilities and participation rates
  • Procedure development and operational implementation
• Initial draft of the report is complete and will be delivered to the FAA
• Next steps...
  • 2018 Rolling Plan made recommendation for next steps including identifying resolutions, down-selection to three sites, applying resolutions, and validating findings/outcomes
  • FAA considering recommendation and potential approach
  • PBN NIWG ready to collaborate with FAA on next steps
VNAV Issue – Way Forward

• ALPA/Industry agreement for use of LNAV Minimums during ILS Outages – Independent Parallel Approaches
  • MRO NIWG following up with FAA coordination
• Use of Advisory VNAV to mitigate CFIT
  • Meeting in mid-December with various airlines that train and use Advisory VNAV
• Remaining Issues for non-VNAV concerns
  • EoR with RF-TF
  • EoR Parallel Operations
MRO Industry Update

Glenn Morse, United and Phil Santos, FedEx
MRO Industry Update

• MRO 2019-2021 Rolling Plan Industry Commitment Status
  – No obvious risks to completing near-term milestones.
  – Industry commitments linked to FAA milestones.

• 2019 Milestone on track
  – CSPO Dependent Departure Concepts – Review and provide input on feasibility and initial safety analysis of closely spaced parallel operations dependent departure concepts. (Q4 2019).
  – FAA action complete; industry review underway and will be delivered by year-end

• 2020 Milestones on track
  – Wake Turbulence Encounter Reporting - Encourage increased wake encounter reporting based on new FAA reporting guidance
    o Industry outreach in progress: excellent support to date from industry organizations (AOPA, NBAA, A4A). Additional outreach planned to operators through principal operations inspectors and industry organizations (Q1 2020).
MRO Industry Update

• 2020 Milestones on track*
  – Reduced Minimum Radar Separation Feasibility Study –
    o Review and provide input on feasibility of reduced minimum radar separation within 10 and 20 miles on final approach (Q2 2020)
  – Consolidated Wake Turbulence (CWT) Separation Standards Benefit Analysis
    o Assess benefits from implementation of CWT separations at initial CWT locations and existing Wake RECAT Phase 1.5 and 2.0 sites (Q4 2020).
    o * Potential Risk – Industry resources to conduct detailed analysis. Industry may request JAT support for this task based on previous JAT analyses.
Recommendation to Allow the Use of RNAV(GPS) LNAV Minimums to Conduct Simultaneous Parallel Instrument Approaches with ILS or Glide Slope Out

MRO Co-chairs:
Glenn Morse, United and Phil Santos, FedEx
Proposed NAC Action

• Review and accept industry agreement to allow use of RNAV (GPS) LNAV minimums to conduct Simultaneous Independent Parallel Approaches during planned and unplanned ILS or glide slope outages.
• Approve forwarding recommendation to FAA to amend national standards as required to authorize the use of RNAV (GPS) LNAV minimums to conduct simultaneous independent parallel approaches during temporary planned and unplanned ILS or glide slope outages.
Background

• NextGen Priorities Joint Implementation Plan Executive Report Rolling Plan 2017-2019 Multiple Runway Operations (MRO) Focus Area memorialized FAA commitment to amend national standards to allow use of RNAV (GPS) LNAV Minimums for Simultaneous Independent Parallel Approaches based on positive pre-implementation safety analysis and SMS process.

• At June 2017 NAC meeting, it was decided to pause the national standard change. The milestone was removed from the JIP; however NAC discussion supported continuing to “consider” the issue without a specific milestone, while exploring short term solutions. (June 28, 2017 NAC Meeting Summary)
Background (cont’d)

• Use of LNAV minimums is linked to other key PBN initiatives. The PBN NIWG agreed to narrow the scope of the discussions to the use of LNAV minimums for simultaneous operations during temporary facility outages; a small work group was formed to address concerns and seek a solution.

• The group reached an agreement to allow temporary use of LNAV minimums for simos with ILS or Glide Slope out.

• The agreement has been endorsed by the PBN and MRO NIWGs and was approved by the NAC SC in October.

• The NAC SC is recommending the NAC:
  – Accept the industry agreement for use of LNAV minimums for simos with ILS or GS out;
  – Forward agreement to FAA recommending it serve as a basis for authorizing the use of LNAV minimums for simultaneous independent parallel approaches with ILS or glide slope out.
Industry Agreement Highlights

Objective: Allow use of RNAV (GPS) LNAV minimums during temporary planned or unplanned glide slope outages

- Existing FAA policy allows limited use of localizer only approaches to conduct simultaneous approaches; other RNAV minimums (LPV, RNP, LNAV/VNAV) are authorized for simultaneous independent parallel approaches.

- Vertically guided approaches (ILS, GLS, LPV) are preferred for simultaneous operations; pilot retains option to request vertically guided approach.

- In the event of a planned or unplanned ILS or GS outage, simultaneous parallel approaches may be conducted using all approved RNAV (GPS) approach minimums, including LNAV; FAA should not delay restoration nor consider decommissioning facilities based on this agreement.

- Planning for scheduled outages should include industry outreach and consideration of actions to mitigate the loss of ILS or GS.
Motion for NAC Approval

• Forward industry agreement and recommendations for the use of RNAV (GPS) LNAV only minimums for simultaneous independent parallel approaches during scheduled and unscheduled ILS and GS outages to FAA with recommendation to go forward with implementation considering the specific elements of the agreement.
Remarks by the FAA Administrator

Steve Dickson, FAA Administrator
19-2: FAA Reauthorization Act of 2018 Section 547

NAC Chair Chip Childs, SkyWest, Inc.
SEC. 547. ENHANCED AIR TRAFFIC SERVICES.

• (a) IN GENERAL.—Not later than 180 days after the date of enactment of this Act, the Administrator shall establish a pilot program to provide air traffic control services on a preferential basis to aircraft equipped with certain NextGen avionics that—
  – (1) lasts at least 2 years; and
  – (2) operates in at least 3 suitable airports.

• (b) DURATION OF DAILY SERVICE.—The air traffic control services provided under the pilot program established under subsection (a) shall occur for at least 3 consecutive hours between 0600 and 2200 local time during each day of the pilot program.

• (c) AIRPORT SELECTION.—The Administrator shall designate airports for participation in the pilot program after consultation with aircraft operators, manufacturers, and airport sponsors.
19-1: Minimum Capabilities List (MCL)

NAC Subcommittee Co-Chair Craig Drew, Southwest Airlines
Minimum Capability List (MCL) Update

• MCL overview
• FAA response to the NAC
• Ideas to move MCL forward
• Next steps
Minimum Capabilities List

Overview

• The MCL is the result of extensive industry-FAA collaboration to define the minimum aircraft capabilities to derive optimal benefits from NextGen investments

• It includes:
  – Navigation - Performance Based Navigation
  – Communication - Data Communications
  – Surveillance – ADS-B Out
  – Resiliency - Inertial Reference Units for nav resiliency

• Includes aircraft components required, associated technical specifications, benefits mechanisms, example use cases, enabling ground capabilities and risks

• The MCL was approved as a recommendation by the NAC to the FAA at the July NAC Meeting
Minimum Capabilities List

Details

Navigation - PBN

• RNP-2 (Enroute)
• RNP-1 with RF (Terminal Arrival/Departure)
• RNP APCH, A-RNP or RNP AR 0.3 with RF and scalability and coupled VNAV (Approach)

Communication – Data Comm

• FANS-1/A over multi-frequency VDL mode 2 with push to load

Surveillance – ADS-B Out

• ADS-B Out to meet rule/mandate

Resiliency equipage

• Navigation resiliency via Inertial (IRU)

MCL also includes “Supplemental Capabilities” where equipage decisions should be considered on an individual operator basis, given business case, fleet, operation, etc.
MCL Events Since July NAC Meeting

• Continued socialization in multiple venues, including:
  – Commercial Aviation Safety Team (CAST)
  – Briefing to ICAO Flight Ops Panel in Montreal

• FAA response to MCL recommendation with tasking to move forward adoption and use of the MCL

• MCL data used to inform EATS tasking and scoping discussions
FAA Response to the NAC

NAC Task 19-1: NAS Aircraft Minimum Capability List (MCL) dated 4 Oct 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
Kicking Off Tasking Work

• Planning an MCL tasking kickoff meeting January 22, 2020

• Will use this to begin working sub-task elements, including discussion of current fleet equipage and engagement/adoption strategy

• This will launch the task and be used as an opportunity to workshop on details of tackling this effort
Leveraging ADS-B Infrastructure for Future Operational Benefits

David Gray, FAA
The ADS-B program’s strategy has always been to deploy an infrastructure that can be leveraged for **future operational benefits**. The ADS-B mandate set the FAA on a path to be able to achieve future success in the initiatives below:

**Reduce ATC Separation**
Enable 3nm separation standards in en route airspace where it was not available before, resulting in increased NAS efficiency for commercial operators.

**Fast Fact**: The first phase to expand availability of 3nm separation is fast approaching - it is planned for 2020!

**Radar Divestiture**
Overlapping ADS-B and legacy radar coverage provides the FAA with the opportunities to right-size our surveillance infrastructure across the NAS.

**Fast Fact**: FAA plans to divest 32 sites by 2025, with the first two planned in 2020.

**Search and Rescue**
ADS-B coverage is often available below legacy radar surveillance. The availability of high-accuracy, high-update rate surveillance information makes it easier to find an accident site. Faster rescue = lives saved.

**Fast Fact**: FAA estimates that ADS-B aircraft can be located 2.5 hours faster than aircraft without ADS-B in remote mountainous locations.

**Unknown Opportunities**
The 2020 ADS-B mandate creates an aperture to a future where the FAA can pursue new opportunities and increase the real value of its investment to date in this transformational technology. **We will discover opportunities to provide value in areas not yet considered**. January 1, 2020, is just the beginning.

**Space-based ADS-B**
Space-based ADS-B represents a technological innovation with the potential to deliver a data-driven approach to enhancing Air Traffic operations, exemplifying the FAA’s commitment to being a global leader in safety and efficiency.

**Fast Fact**: Caribbean Operational Validation will occur in 2020, giving us a chance to prove out Space-based ADS-B technology.

**ADS-B In Applications**
ADS-B In brings the opportunity to implement various applications (EATS, ECAVS, CAVS, IM) that transform the ability of controllers and pilots to increase efficiency of spacing ops in the NAS.

**Fast Fact**: American Airlines is leading commercial airlines by retrofitting over 300 A321 aircraft with ADS-B In equipment as part of AIRS Eval.

**Conflict Probe**
More accurate surveillance data from ADS-B Out in ERAM Conflict Probe will decrease the number and magnitude of conflict predictions, reducing vectoring and saving fuel.

**Fast Fact**: Faster update rates and greater accuracy of ADS-B reduces the workload of ATC for false conflicts.
Equip 2020 Working Group 4 Update

Rocky Stone, United Airlines & Brian Townsend, American Airlines
ADS-B In Strategy and Enabling Industry/FAA Collaboration

Capt. Rocky Stone, United Airlines
Capt. Brian Townsend, American Airlines
Equip 2020 WG4 Co-Chairs

12 December 2019
 Equip 2020 Workgroup 4

- ADS-B Out provides the infrastructure to enable beneficial ADS-B In applications throughout the NAS
- Equip 2020 WG4 has provided a recent forum for stakeholder and FAA discussions about ADS-B In applications
- Recent operator investment, avionics and aircraft manufacturer developments, and increased FAA support, has energized ADS-B In
- WG4 has developed a “living” ADS-B In deployment strategy to yield benefits and align stakeholders
Industry/FAA Collaboration on ADS-B In

• Avionics Standards complete and Regulatory Documents pending
• Airline flight test and demonstration activities
  – Alaska, American, Delta, United, UPS
• ADS-B In Retrofit Spacing (AIRS) Evaluation - American Airlines
  - Equipping over 300 aircraft
• Aircraft and avionics manufacturers are offering forward and retrofit solutions that enable ADS-B In deployment
• ADS-B In in TBO Industry Day in October 2019 with exceptional attendance from across the industry
Path to Success requires continued collaboration

• ATC Decision Support Tools synchronized with equipage will yield ADS-B In benefits
• Expected benefits must be realized to assure continued equipage
• With the impending sunset of Equip 2020, there is no other forum for required Industry/FAA collaboration on ADS-B In deployment and integration with Trajectory Based Operations (TBO)
Implementation of ADS-B Out enables ADS-B In benefits

All stakeholders must work together to develop a roadmap for deployment that leads all sides to invest
Summary of Meeting and Action Item Review

Greg Schwab, FAA
2020 NextGen Advisory Committee Schedule

• Spring 2020
  – March 24 from 1:00 – 4:00 PM EST

• Summer 2020
  – Tentative: mid-late July 2020
  – Options: July 15, 16, 29, or 30

• Fall 2020
  – Tentative: November 2020
  – Options: November 17 or 18
Closing Comments and Adjourn

Chip Childs, SkyWest, Inc.
Recommendation to Allow the Use of RNAV(GPS) LNAV Minimums to Conduct Simultaneous Parallel Instrument Approaches with ILS or Glide Slope Out

Backup
Full Industry Agreement and Recommendations – Use of RNAV (GPS) LNAV for Simultaneous Approaches

Agreement and Recommendations
For
The Use of RNAV (GPS) LNAV only Minimums for Simultaneous Independent Parallel Approaches during Scheduled and Unscheduled ILS or GS Outages

Issue: RNAV (GPS) LNAV minimums are currently not authorized for simultaneous independent parallel approaches. With respect to a glide slope outage, existing FAA policy allows the use of localizer only approaches to conduct simultaneous approaches for a limited timeframe. RNAV (GPS) LPV and LNAV/VNAV, and RNAV (RNP) approach minimums are authorized for simultaneous independent parallel approaches.

Objective: Allow the use of RNAV (GPS) LNAV minimums during temporary planned or unplanned ILS or glide slope outages.

Agreed:

- Vertically guided instrument approach procedures (ILS, GLS, LPV, and RNAV (GPS) with LNAV/VNAV) will be the primary means of conducting simultaneous independent parallel instrument approaches.
- In the event of planned or unplanned ILS or ILS glide slope outage, simultaneous independent parallel instrument approaches may be conducted using approved RNAV (GPS) approach procedures, including LNAV only minimums.
- In the event of a planned ILS or ILS glide slope outage of a defined duration (i.e. construction projects), the planning and design process for the project should include collaboration with operators, including the regional airline community, serving the airport. Industry representatives should include a mix of flight operations and pilot representatives of the air carriers/operators to identify potential mitigations for the loss of vertically guided procedures to the maximum practical extent before conducting any simultaneous independent parallel instrument operations using approved RNAV (GPS) approach procedures with “LNAV Only” minimums.
- RNAV (GPS) LNAV will not be authorized to conduct an offset approach during simultaneous independent instrument approach operations.
- The pilot in command retains the authority to request an ILS (or vertically guided procedure that the aircraft and pilot are authorized to conduct) during simultaneous independent parallel approach operations.
Recommendations:

- In the event of a planned extended ILS or ILS glide slope outage caused by airport construction or facility maintenance, the planning and design process for the project should include collaboration with operators at the airport including flight operations and pilot representatives of the air carriers to identify ways to mitigate the loss of vertically guided procedures. This could include installation of temporary or relocated electronic or visual NAVAIDs, development of temporary instrument approaches or other traffic management mitigations that will enhance the safety of the operations.

- Authorization to conduct simultaneous independent parallel approaches with RNAV (GPS) LNAV minimums in the event of planned and unplanned facility outages would be implemented by waiver, similar to existing FAA GS out authorization, and NOTAM with ATIS advisory. Alternative means of implementation and mitigations should also be considered as needed.

- A monitoring program should be established to identify any risks or safety concerns associated with the conduct of simultaneous independent parallel approaches with RNAV (GPS) LNAV only minimums. The elements of the monitoring program will be determined collaboratively with FAA and stakeholder organizations using accepted data sources, including, but not limited to ASIAS and ASRS.

- FAA should not delay restoration of an ILS or glide slope, nor should FAA consider decommissioning an ILS or GS at an airport with air carrier service based on the authorization to use RNAV (GPS) approach procedures. (Note: this is a statement of existing FAA policy.)
Motion For NAC Approval as Advice to the FAA

NAC Responses to:

• Task 18-4: Northeast Corridor: Implementation Risks and Mitigations of the NextGen Priorities Joint Implementation Plan

• Task 18-5: NextGen Priorities Four Focus Areas: Implementation Risks and Mitigations of the NextGen Priorities Joint Implementation Plan
Attachment 2
## NextGen Advisory Committee (NAC)
### December 12, 2019 Attendance List

<table>
<thead>
<tr>
<th>Last Name</th>
<th>First Name</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adcock</td>
<td>Tom</td>
<td>National Air Traffic Controllers Association</td>
</tr>
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*Phone Attendee
FAA Update on Addressing Emissions from U.S. Aviation

**Issue.** At the July 30, 2019, meeting of the NAC, the FAA was requested to provide an update on greenhouse gas emissions from U.S. aviation, and related U.S. actions. The FAA took an action to provide information on the topic to the next meeting of the NAC.

**Summary.** Attached to this cover note is an “Information Paper” from the United States to the 40th Assembly of the International Civil Aviation Organization in September 2019. The paper provides a summary of the strong record of addressing greenhouse gas emissions from aviation in the United States, as well as an overview of the actions that the United States is undertaking, in collaboration with stakeholders, to improve efficiency and address emissions from aviation.
ASSEMBLY — 40TH SESSION
EXECUTIVE COMMITTEE

Agenda Item 16: Environmental Protection – International Aviation and Climate Change — Policy and Standardization

UNITED STATES EFFORTS TO ADDRESS AVIATION’S CLIMATE IMPACT

(Presented by the United States)

EXECUTIVE SUMMARY

For years, the United States has been a leader in promoting, supporting, and funding efforts to increase aviation’s efficiency, and these efforts are yielding noteworthy results. This information paper provides details on historical improvements of aviation’s efficiency in the United States. It also examines ongoing research and development of improvements in technology, operations, and sustainable aviation fuels by the U.S. government and aviation sector.

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1. SUMMARY

1.1 The aviation sector’s record in addressing climate change is one of increasing efficiency and action to reduce fuel burn. Since 1991,1 the U.S. civil aviation sector’s efficiency has increased by 71%. The United States has been a leader in promoting, supporting, and funding efforts to increase aviation’s efficiency and reduce greenhouse gas emissions, and these efforts are yielding great results. These efforts are aligned with ICAO’s focus on a basket of measures to reduce emissions, including but not limited to the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). While there continues to be a need for further progress, this information paper highlights historical improvements in efficiency by the United States aviation sector, recent efforts and successes, and concludes with an assessment of future trends. It should be noted that this progress reflects a collective and serious effort across aviation stakeholders, including governments, manufacturers, airlines, and airports, among others.

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1 Online access to official U.S. Government data compiled by the Department of Transportation’s Bureau of Transportation Statistics goes back to 1991.
2. **HISTORICAL IMPROVEMENTS**

2.1 As Figure 1 below demonstrates, while U.S. aviation has seen increased traffic in terms of enplanements, the share of CO₂ emissions from aviation has remained relatively constant, indicating that the National Airspace System (NAS) is operating much more efficiently—moving more passengers on the same amount of energy. These data are captured in Figure 2. Today’s fleet of aircraft has an average fuel efficiency of 57.5 passenger-miles per gallon of fuel, which is on par with a modern Toyota Prius hybrid, which has a fuel economy of 54 miles per gallon (MPG).²

![Fig. 1. Historical U.S. Revenue Passengers Enplaned (i.e., enplanements) and Aircraft Fuel Use](image1)

![Fig. 2. Historical U.S. Fuel per Passenger Mile](image2)

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2.2 Data from the Bureau of Transportation Statistics (BTS) show that the aviation sector has increased efficiency to the point that it has decoupled its growth in emissions from its growth in traffic. Aviation’s share of U.S. CO$_2$ emissions remains at about 2.7% (including both commercial and non-commercial). Since 1991, traffic by U.S. airlines, measured in Revenue Ton Miles, has increased by 133%. In 2018, the U.S aviation sector carried about 32% more passengers than in the year 2000, while using almost the same amount of fuel. As mentioned, today’s U.S. fleet of aircraft operates with a fuel efficiency better than today’s hybrid-electric cars. In addition, many passenger aircraft are also hauling cargo, which adds further value to each gallon of fuel being used by aviation. As noted above, these historical improvements in efficiency are a result of collective efforts across aviation stakeholders, to address fuel burn and CO$_2$ emissions through a variety of measures. The net result of this collaboration is that the U.S. aviation sector has a strong track record and continues to improve its environmental performance.

3. **ONGOING U.S. EFFORTS AND SUCCESS**

3.1 The United States Government (USG) has been investing resources over many years to advance technologies that improve aircraft fuel efficiency, improve the architecture that underlies national air space system operations, and enable the development of sustainable aviation fuels. Each of these endeavours provides both economic and environmental benefits to society.

3.2 Overall, the efforts by the USG serve to reinforce and amplify leadership by the private sector to improve efficiency and reduce fuel burn and emissions. As one of the largest costs for operators, reducing fuel burn makes both business and environmental sense, and the industry has shown a continued commitment to developing and deploying cleaner, more efficient technology. As mentioned in Paragraph 1.1, the collaboration among stakeholders has been key to our successes. The following sections highlight some of the successes of these investments.

3.3 Technology: The evolution of modern, more efficient airframes and engines has historically produced the most significant aviation fuel, emissions, and noise reductions. Technology will continue to drive more reductions in the future. The USG is leading a number of efforts and collaborating with the aviation industry to mature new technology that results in increased fuel efficiency and reduced noise and emissions. USG actions to improve aircraft and engine technology are carried out by the FAA, the National Aeronautics and Space Administration (NASA), and the Department of Defense (DoD), among others, and are coordinated through the [National Aeronautics Research and Development Plan](https://www.faa.gov/about/office_org/headquarters_offices/apl/research/aircraft_technology/cleen/).

3.3.1 NASA continues to push research and exploration of environmentally sustainable aviation technologies. NASA does this primarily through its Advanced Air Vehicles Program (AAVP) and Transformative Aeronautics Concepts Program (TACP), which include the Advanced Air Transport Technology (AATT), and Transformational Tools and Technology (TTT) projects among others. These projects focus on new vehicle technologies that have the potential to significantly reduce aviation’s impact on the environment. NASA does not build engines or engine components, but rather, NASA programs and research generate advanced technologies and knowledge.

3.3.2 The Continuous Lower Energy, Emissions, and Noise (CLEEN) program is the FAA’s principal effort to accelerate the development and maturation of new aircraft and engine technologies. While NASA conducts low technology readiness level (TRL) fundamental aeronautics research and development, CLEEN fills a gap by focusing support to promising, pre-commercial TRL technologies.

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5 *Id.*

6 See [https://www.faa.gov/about/office_org/headquarters_offices/apl/research/aircraft_technology/cleen/](https://www.faa.gov/about/office_org/headquarters_offices/apl/research/aircraft_technology/cleen/).
CLEEN funding helps mature these technologies to a point where industry led commercialization can follow. The program goals for CLEEN include the development and demonstration of certifiable aircraft technology that reduces aircraft fuel burn, emissions, and noise. The CLEEN program is currently nearing conclusion of its second five-year phase, and the third five-year phase of CLEEN is scheduled to begin in 2020. Georgia Institute of Technology conducted an independent assessment of the technologies in the initial CLEEN Program. The assessment found that use of the technologies that were supported in the first five-year phase of CLEEN could reduce U.S. fleet-wide fuel burn by 2% from 2025 through 2050, representing a cumulative savings of 22 billion gallons of jet fuel.\(^7\)

3.3.3 These research programs include close cooperation with industry. Typically, five to ten years after the conclusion of a NASA program, and at the conclusion of the CLEEN program, industry can build on results and integrate the associated knowledge into commercial products.

3.3.4 A comprehensive analysis of future technology development was carried out by the Volpe Center using data from the Aviation Sustainability Center (ASCENT),\(^8\) a leading aviation cooperative research organization with a broad portfolio of contributions. The analysis indicates a fuel reduction potential from the baseline scenario of approximately 30% in 2050 for a moderate use of technologies and of 52% in 2050 for the aggressive improvement scenario due to aircraft technology and operational improvements, both being measured relative to 2016. These rates of improvement are similar to the ICAO Environmental Trends Analysis. However, both of these analyses were based on the use of conventional tube-and-wing technologies, and if further reductions are needed, then industry will likely need to work with governments to collaboratively reduce the risk of developing additional technologies, potentially including new airframe architectures.

3.4 Infrastructure and Operations: Achieving more efficient aircraft operations is another critical element for reducing fuel and emissions from aviation. The FAA is implementing a comprehensive, multi-year modernization of the NAS known as NextGen. While the benefits of NextGen are many and go well beyond environment, among the key elements of NextGen are reducing delays, establishing more precise routes, and improving overall efficiency of the NAS, all of which can contribute to reduced fuel burn and emissions. Data from 2010-2017 show achieved benefits of 264.6 million gallons of fuel saved, translating to 2.53 million metric tons of CO\(_2\).\(^9\)

3.5 Sustainable Aviation Fuels: Jet fuels produced from waste materials and renewable resources, also known as sustainable aviation fuels (SAF), have the potential to provide economic development, increased supply certainty, a hedge against petroleum price volatility, reduced life cycle GHG emissions, and reduced air quality emissions relative to conventional jet fuel. These fuels can play a central role in generating domestic economic development and providing energy security for sustained aviation growth while simultaneously mitigating aviation’s contribution to climate change and emissions that impact air quality. Since 2006, the United States has been actively supporting and facilitating the development and deployment of these fuels through the Commercial Aviation Alternative Fuels Initiative\(^\circledR\) (CAAFI), a public private partnership that brings together all of the stakeholders who are involved in fuel production and use.\(^10\) While centered in the United States, CAAFI has grown to include participants from around the world, and the achievements of the CAAFI team—such as establishing the protocols and procedures for approval of SAF under the jet fuel specifications—are shared by the aviation sector worldwide.

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\(^8\) More information on ASCENT is available at [https://ascent.aero/](https://ascent.aero/). More information on the referenced study is available at [https://ascent.aero/project/aircraft-technology-modeling-and-assessment/](https://ascent.aero/project/aircraft-technology-modeling-and-assessment/).

\(^9\) For detailed information on NextGen, see [https://www.faa.gov/nextgen/](https://www.faa.gov/nextgen/).

\(^10\) For more information about CAAFI, see [http://www.caafi.org/](http://www.caafi.org/).
3.5.1 Sustained commercial production and use by air carriers of SAF began in the United States in 2016, when Altair Fuels (now World Fuels Paramount) began production of SAF made from waste tallow at their facility near Los Angeles, California. This fuel has been certified by the Roundtable on Sustainable Biomaterials (RSB) as providing a greater than 60% greenhouse gas reduction over petroleum fuel.\textsuperscript{11} The end of 2018 marked the third year of sustained commercial production and continuing use of SAF by a wide range of operators. In 2016, total U.S. SAF use was approximately 1.1 million neat gallons. In 2017, total use expanded to approximately 1.5 million gallons by 10 airlines, two aircraft manufacturers, and deliveries to five U.S. airports. In 2018, total use was approximately 1.2 million neat gallons, again by airlines, manufacturers, and business aviation.\textsuperscript{12}

3.5.2 As shown in Figure 3, below, production capacity across the United States is also increasing. All told, the production capacity represented has the potential to reach more than 250 million gallons per year of neat SAF within the next five years if market conditions warrant, and numerous companies are working on additional financing, engineering, and planning to build out additional facilities. A recent analysis from ASCENT showed that there are sufficient renewable and waste resources in the United States to supply all of the jet fuel requirements in the United States in 2050, but considerable effort would be needed to realize this potential.\textsuperscript{13}

![Sustainable Aviation Fuel Production Facilities](image)

Fig. 3. Existing and Planned SAF Production Facilities in the United States\textsuperscript{14}

\textsuperscript{11} See https://rsb.org/2018/01/29/altair-rsb-certification-biofuel-refinery/.
\textsuperscript{12} The current state of SAF deployment is available from CAAFI at http://www.caafi.org/focus_areas/docs/Alternative_Jet_Fuel_Deployment_Status_July%202019.pdf.
\textsuperscript{13} See http://www.caafi.org/resources/pdf/2.3_Future_Production.pdf.
\textsuperscript{14} See http://caafi.org/focus_areas/deployment.html.
3.6 Policies, Standards, and Measures: In addition to domestic efforts across the board, international efforts will also yield tremendous benefits for aviation.

3.6.1 In 2016, ICAO/CAEP reached consensus on adopting an aircraft fuel efficiency standard with support from the USG, U.S. industry, and other global stakeholders. The primary aim of the aircraft fuel efficiency standard is to incentivize faster development of fuel efficient technology and serve as a basis for ensuring that less efficient aircraft technologies are eliminated over time. Since 2016, the USG has been working to promulgate the international standard into domestic regulations. This is a dual-regulatory process whereby the EPA sets regulatory emissions levels, and the FAA enforces the EPA emissions regulations via airworthiness certification.

3.6.2 When considered with other measures internationally, the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) will serve to offset CO₂ emissions from international aviation from a 2020 baseline. CORSIA was carefully negotiated among all ICAO Member States, and it will serve as a critical springboard for all Member States and their operators going forward. CORSIA provides a single, agreed-upon measure that will be more effective globally at reducing emissions with manageable compliance costs, so resources can be invested on additional in-sector reductions.

4. CONCLUSION

4.1 Aviation is an integral part of our everyday lives. It connects billions of travellers and moves millions of tons of cargo every year. The global aviation industry supports $2.7 trillion (3.5%) of the world’s gross domestic product (GDP),¹⁵ this connectivity enables economic growth around the world including in many developing areas. Air travel has helped change the way people see and experience the world. Families now live all over the globe and are connected by rapid and affordable flight.

4.2 Aviation is an industry that has been making air travel much more sustainable for decades now. Collaborative efforts to implement ICAO’s “basket of measures” within the United States involving government, manufacturers, airlines, and airports have and will continue to yield significant benefits to address aviation’s climate impact. We have and will continue to invest in these efforts as they yield positive economic and environmental benefits, and we look forward to partnering with other ICAO Member States to continue to build on the significant progress made to date. We are confident that with the right investments and partnerships, aviation can meet the environmental challenges of the 21st century.

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