NextGen Advisory Committee (NAC)
October 19, 2021 Meeting Summary

The NextGen Advisory Committee (NAC) convened virtually October 19, 2021. The meeting discussions are summarized below. Reference the attachments for additional contextual information.

List of attachments:

- Attachment 1: NAC Presentation Deck
- Attachment 2: Attendance List
- Attachment 3: Public Statements

Opening of Meeting

NAC Chairman Mr. Chip Childs (SkyWest, Inc.) opened the meeting and welcomed virtual attendees.

Chairman's Report

Mr. Childs then provided the Chairman's Report. To begin, he called for a motion to approve the June 21, 2021 NAC Meeting Summary Package, which the NAC approved.

Outcome: The NAC passed a motion to approve the June 21, 2021 NAC Meeting Summary Package

Mr. Childs provided a state of the industry update. He said there is some positive news regarding international travel. Since the recent announcement of the U.S. lifting travel restrictions to Europe, airlines are reporting a significant surge in bookings. Coupled with a very strong return in domestic travel bookings this past summer, he said opening international travel is an important next step to getting network carriers back to healthier economic levels. He said the industry has recovered this far based primarily on leisure travel, but it still needs the return of the domestic and international business travelers to recover fully.

Next, Mr. Childs handed off to NAC Member Mr. Brad Pierce (N.O.I.S.E.) for an update on his efforts to develop some thoughts on how the NAC might provide greater support to the FAA's community engagement efforts.

Mr. Pierce said he previously told the NAC that it was important to explore ways that NAC member organizations and companies might participate more and add value to the community engagement structure that the FAA has built over the years. He said that as the NAC member who was appointed to represent environment issues on the committee, he felt strongly that he should take the lead. Since then, he has been brainstorming potential opportunities and developing thoughts on how to best encourage NAC organizations to help.

He reported that he had preliminary conversations with some of his environment domain colleagues and clarified that the initiative was to encourage broader aviation industry participation in the existing community engagement structure and not to build a new structure or work community engagement issues in the NAC. He said he enjoyed the conversation and believe they are on board with what the NAC is attempting to do with this initiative.

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Mr. Pierce said the natural next step is to sit down with NAC members or their technical representatives to further develop the preliminary ideas into something more tangible. He said he would like to leverage the Data Comm Avionics Ad Hoc working group structure to further the discussion in an industry-only forum. He indicated that he will be sending an invitation to NAC members for a meeting soon, requesting that they pass the invitation along to anyone that would be able to help take the concept to the next level.

Action: NAC Member Brad Pierce (N.O.I.S.E.) will be reaching out to NAC Member organizations to participate in industry-only conversations to encourage broader aviation industry participation in the FAA's existing community engagement structure

Public Statements

After reading the public meeting announcement and providing administrative housekeeping notes, Mr. Greg Schwab (FAA) invited the following public speakers to make their respective pre-approved public statements. Reference Attachment 3 for the full text of the statements.

- Darlene Yaplee of Aviation-Impacted Communities Alliance (AICA) and Concerned Citizens of Palo Alto
- Cindy Christiansen of National Aviation-Impacted Communities Alliance and BOS Fair Skies
- Kermit Kubitz (no affiliation provided)
- Mark Shull of Palo Alto, CA

Mr. Childs then concluded the Chairman's Report and handed off to Mr. Bradley Mims, FAA Deputy Administrator and NAC Designated Federal Officer (DFO), for the FAA Report.

FAA Report

Mr. Mims began by by acknowledging that the FAA is aware that many in industry have seen a letter sent from the Secretary of Transportation to congressional committee chairs outlining an FAA proposal to comply with mandates in the 2018 FAA Reauthorization Act. He clarified that the mandates call for the creation of an FAA assistant administrator position to oversee research and development, as well as the establishment of a Chief Technology Officer in the Air Traffic Organization to centralize the system engineering and technical oversight of the FAA's continued air traffic modernization. He said this plan is not final, as it is still under review with relevant congressional committees. He noted that this plan will not result in any employee job losses or relocations. He said that if the congressional committees support the proposal, the FAA will keep all stakeholders, including the NAC, informed. He clarified that nothing in the proposal changes the FAA's level of commitment to the NAC's priorities or its level of engagement with the NAC that the FAA has valued for more than a decade. He said these are exciting times for the FAA. As the agency continues to meet the evolving needs of aviation, he said they look forward to the NAC's continued partnership in forging innovative ways to advance the FAA's mission to provide the safest, most efficient aerospace system in the world.

He continued by saying that the President recently signed two executive orders pertaining to the COVID-19 vaccine. One executive order requires federal workers to be vaccinated, with limited exceptions, and another order requires the same for employees of federal contractors. He said that the FAA is working on executing these orders in coordination with the Department of Transportation and

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the White House Safer Workforce Taskforce. The White House taskforce is responsible for directing the vaccination efforts of all Executive Departments and Agencies to implement the Executive Orders.

He said also re-emphasized that, as Deputy Administrator, one of his priorities is to strengthen diversity, equity, inclusion, and accessibility at the FAA and throughout the aviation and aerospace industries. A diverse workforce makes everyone safer by bringing different perspectives to the table. The FAA is expanding its STEM and career outreach efforts to reach more people, including women, minorities and people from underserved communities. He said the FAA wants the best, brightest, and most diverse group of young professionals from all walks of life. He added that they are eager to strengthen partnerships with industry, academia, and non-profits to make this happen.

Mr. Mims then explained that the FAA Report will focus on a wide range of topics to provide NAC Members with insight into what the FAA has been working on since the June NAC Meeting. He said that in a bit of a break from tradition, they will have FAA leaders introduce key topics, then have subject matter experts expand on the material to add important context later in the agenda. He first handed off to FAA Administrator Mr. Steve Dickson for some insights.

Mr. Dickson began by echoing Mr. Mims' comments that the FAA's efforts to plan for the changes mandated in the FAA Reauthorization Act of 2018 should not be a surprise. He said they are working closely with Congress to ensure the FAA meets their intent. He clarified that a large part of what the FAA is doing is about operationalizing NextGen, which he said is a decade-plus journey. He said that as the technologies get implemented there should be a greater trajectory benefits curve going forward. He said the plan in no way affects the work of the NAC, nor does it affect the FAA's commitment to continue seeking the NAC's advice on implementing and operationalizing NextGen. He also echoed Mr. Mims' comments on the FAA's commitment to developing plans for the future workforce, adding that this is very important work for the future of aviation and aerospace at large.

He continued by saying that commercial space operations have increased exponentially and will likely continue to increase. In Fiscal Year 2021, there were 59 launches and 5 reentries, which is nearly double from the year before. The FAA will continue to leverage all of its expertise and air space management tools to maximize airspace availability to all NAS operators during commercial space operations. Mr. Dickson said that in reference to commercial human space flight, this summer alone three separate U.S. companies flew civilians into space. On July 11, Virgin Galactic completed its Unity flight with SpaceShipTwo. Shortly after on July 20, Blue Origin completed a New Shepard flight and then flew again on October 13. On September 15, SpaceX made history by completing the first ever all-civilian flight (Inspiration 4). He clarified that each used different types of vehicles for different types of missions. He said these operations will likely increase as time goes on and more companies enter the commercial space industry. He said that in July, the FAA also activated the Space Data Integrator (SDI) prototype to track a space launch or reentry vehicle in near-real time as it travels through the NAS. In addition to existing tools, the FAA can also use SDI to manage air traffic more efficiently as a space operation progresses and address contingencies in the event of an anomaly during a mission.

Mr. Dickson said that in late September he had a good conversation with the board of directors of the Regional Airline Association (RAA). This meeting gave him the opportunity to pass along that the NAC's advice on MCL is foundational to operationalizing NextGen—getting the most out of the investment and the infrastructure—and foundational as a springboard for future airspace modernization efforts. He said that thanks to the NAC work on MCL, VNAV, and ADS-B In, it is no secret now that the regional

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airline fleet is facing large challenges in equipping to MCL levels, as compared to mainline and business aircraft operator counterparts, for some very important reasons. He said he also passed along that the NAC needed a leader like Mr. Childs with his depth of understanding of the regional sector to navigate this very complicated situation and to explore ways to raise the equipage levels, particularly at the busiest airports. He said the bottom line is that when operators equip to MCL levels, they can take advantage of fuel-efficient PBN routings, Optimized Profile Descents, and real time Data Comm clearances, among other options. He said that while demand forecasts for 50-seat aircraft vary, the FAA is aware that avionics manufacturing to equip the 50-70-seat RJ fleet will be very challenging and expensive. However, manufacturers continue to deliver 70-90 seat aircraft that can meet the MCL level. He said he left RAA with a discussion on the need for both regional and network carrier help in increasing MCL equipage in the regional fleet so that all NAS operators can get closer to unlocking the full benefits of NextGen.

Mr. Dickson then said he recently participated in an Airspace Technology Demonstration 2 (ATD-2) media event with NASA Administrator Mr. Bill Nelson, whose agency partnered with the FAA to develop, demonstrate, and now deploy ATD-2 technology. He said the FAA is grateful for NASA's partnership and said the effort has led to a promising technology that is going to result in a more sustainable aviation system, a safer system, and a better experience overall. These kinds of data analytic technologies can put the community in a position to make countless other improvements in aviation, and offer greater value for the American public. He thanked NASA for partnering with the FAA to develop, demonstrate, and deploy the technology. Mr. Dickson then handed off to Mr. Mims.

Next, Mr. Mims handed off to Ms. Pamela Whitley, Assistant Administrator for NextGen.

Ms. Whitley began by highlighting that the FAA recently published the *NextGen Annual Report, Fiscal Year 2020*[1]. This report lays out the history, current program status, and future focus of NextGen NAS modernization. She said this report highlights the big NextGen milestones, beginning with the passing of the Vision 100 legislation in 2003. She added that it also looks beyond what the FAA had in its original NextGen plans and lays out the FAA's vision of an information-centric NAS. She said this concept is focused on leveraging investments to turn data in to information. She committed to sharing more about this concept at a future NAC meeting. She said this report is the culmination of a multi-year effort to consolidate many essential congressionally mandated and other supporting FAA reports into a single document. It is the FAA's way of communicating the body of NextGen work to both Congress and the public. She added that NextGen's progress to date, as detailed in the report, could not have been possible without the engagement and support of the aviation community. She thanked current and former NAC members for all the essential support and advice along the way.

Ms. Whitley said that although the last 18 months have been tough, the FAA continues to make progress. For example, she said that despite measures to reduce travel and limit access for human safety, the FAA has been able to adapt testing and technologies at the FAA William J. Hughes Technical Center in New Jersey to limit in-person interaction to keep making progress on some major programs. Even with these unprecedented disruptions leading to a constant focus on potential effects to budgets

[1] The NextGen Annual Report, Fiscal Year 2020 can be downloaded at the following link: https://www.faa.gov/nextgen/media/NextGenAnnualReport-FiscalYear2020.pdf

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and schedules, the underlying justifications supporting NextGen operationalization remain firm and the FAA continues to focus on completion of our agreed upon NAC NextGen priorities. She concluded by saying continuing on the path to operationalizing NextGen is still a top priority. Ms. Whitley then handed off to Mr. Mims.

Mr. Mims then handed off to Ms. Teri Bristol, FAA Air Traffic Organization Chief Operations Officer, for ATO updates.

Ms. Bristol began by emphasizing that the ATO has been exploring every potential creative possibility to lean forward even more to bolster in-person modernization efforts at field facilities. She said they continue to work closely with the experts from the FAA Office of Aerospace Medicine and with NATCA partners to review existing pandemic public health advice, policies, and mandates. To that end, in collaboration with aerospace medicine and NATCA, they are revisiting criteria and associated guidelines for facility access for personnel supporting NAS modernization activities. As a result the ATO is now developing revised plans for moving forward with programs and will be sharing those very soon.

She continued by saying she will introduce several issues that ATO would like to provide either an update on or provide an FAA response to recent NAC advice, followed by further details from ATO subject matter experts later in the meeting during the FAA Topics section.

First, Ms. Bristol said her team will provide an update on how the FAA continues to use the NAC's advice from the PBN Clarification tasking, including what was accepted as part of the scope of the task and what the team has been able to accomplish to date. This will be followed by a quick update of the PBN NAS Navigation Strategy and the Airspace Modernization Roadmap, which will function as airspace modernization guides from now until well into the future. After that she said they will provide the NAC with an update to the Section 547 advice. She clarified that this congressional mandate was part of the 2018 FAA Reauthorization Act and specified in Section 547. With the NAC's advice provided last spring, ATO was able to implement three pilot programs and begin collecting data based on Congress' timeline. She said they will continue to provide the NAC with updates as they advance through the two-year test period. She said the final topic from her team will be the initial FAA response to the advice they received from the NAC on ADS-B In. This advice is very important to the FAA's understanding of where operators might be going on avionics to ensure the investments they are making today support where the NAC organizations might be going in the near future.

She then provided an update on a NAS Aeronautical Information Management Enterprise System (NAIMES) outage, which was a follow-up to a NAC Member request for an update at the June 2021 NAC meeting. She said that she would be brief as most NAC Members participate in the VP +1 current operations forum where this issue has already been discussed. As quick background, she said the FAA experienced an outage of the NOTAM system that occurred due to impacts from a very heavy rain event during a critical phase of facility construction. Since it occurred, she said ATO has employed dozens of mitigations to prevent such a situation from occurring again. These mitigations include better monitoring and hardening of the power, cooling, and environmental protections of the facility. Also, she said they recently completed a major building construction effort that included critical roof construction. She mentioned that the FAA also hosted a tabletop exercise with many NAC Members and their teams to gather useful feedback about the event that helped them in many ways, indicating that she would highlight two ways.

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First, Ms. Bristol said the FAA developed improved disaster fall over procedures, reducing the estimated time for transition from a 6-hour estimated outage down to 2 hours. This was then measured and verified in a procedure walk-through. Second, she said in the event of an outage, the FAA will take action to provide access to NOTAM data for users and even publish new NOTAMs during the outage. She said they are finishing design and necessary security approvals of that workaround, along with working with the FAA teams and unions to make sure the workforce can use that workaround if needed. She said when that is finished, they will brief NAC Member teams on dispatch and emergency procedures and training products they can integrate into business processes for a disaster mitigation. She encouraged the NAC Members' teams to continue to engage with the FAA teams in relevant forums.

Before concluding, Ms. Bristol introduced and welcomed Mr. Rich Santa (NATCA), who was elected as the seventh president of NATCA on September 1, 2021. She said he is a veteran air traffic controller from Washington Center, having served most recently on NATCA's National Executive Board as Eastern Regional Vice President from 2018-2021. She also introduced and welcomed Mr. Dave Spero (PASS), who was elected as the new PASS President effective October 1. Ms. Bristol said he previously served as the Region 2 Vice President on PASS's Executive Board since 2003.

Ms. Bristol then handed off to Mr. Mims. Next, Mr. Mims introduced Mr. Chris Rocheleau, Acting Associate Administrator for Aviation Safety.

Mr. Rocheleau began by quickly returning to Mr. Mims' remarks on the congressional mandate that may result in re-organizing parts of the FAA. He said that some of the NAC Member technical staffs asked the FAA questions about what this mandate might mean for Aviation Safety's (AVS) mission. He assured the NAC that the core mission of AVS will remain the same and it will continue to lead the flight standards, aircrew and aircraft certification, aerospace medicine, aircraft investigation and accident prevention, air traffic oversight, and the aviation safety rulemaking missions. AVS will also remain a strong partner to the NAC and it looks forward to working closely with the NAC as it seeks advice on a host of important topics.

He continued by saying that the Minimum Capabilities List (MCL) Ad Hoc Team requested that AVS provide more information on upcoming decisions involving the selling off of part of the radio spectrum. He said this potential action involving 5G services might impact aircraft systems that are reliant on information provided by radar altimeters. He said AVS has agreed to the request and will provide more information later in the agenda during the FAA Topics agenda item.

Mr. Rocheleau also said his team will be providing the initial FAA response to the NAC's advice on the Vertical Navigation (VNAV) tasking. He said that in line with what the Administrator mentioned earlier and what the NAC advice points out, avionics equipage can solve this issue but it must be viewed from the larger MCL-level, requiring that the community overcomes barriers to an avionics upgrade solution. He added that these barriers are especially prevalent in the regional aircraft fleets. Mr. Rocheleau then handed off to Mr. Mims.

Mr. Mims concluded the FAA Report and handed off to Mr. Childs.

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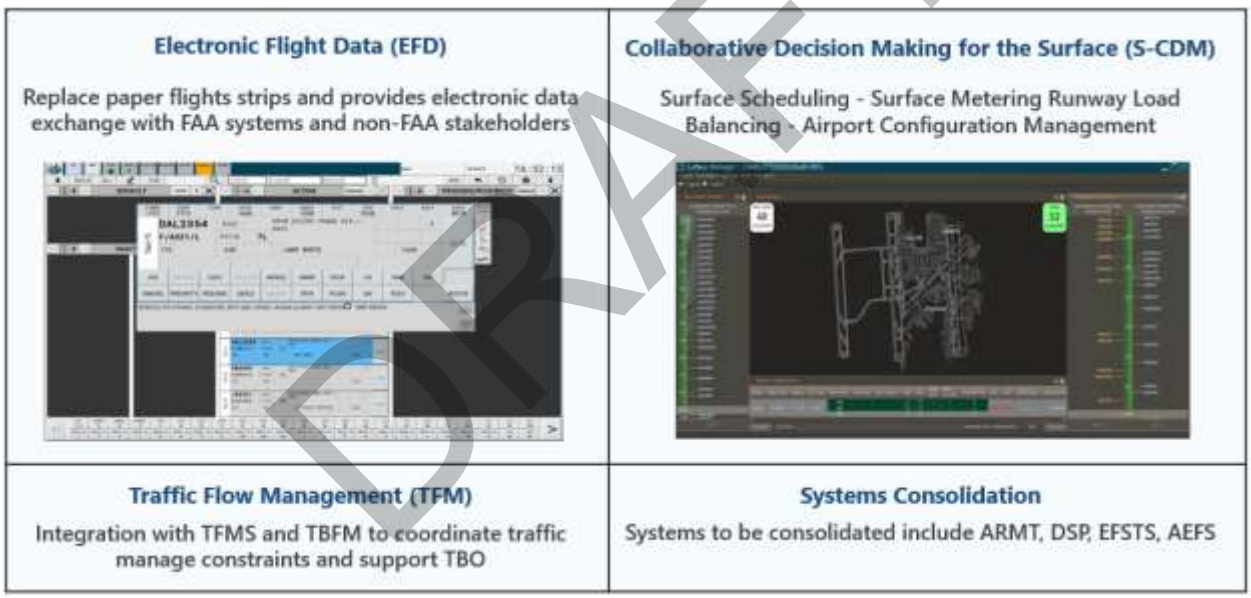
Chairman's Roundtable

Mr. Childs thanked Mr. Mims and introduced the Chairman's Roundtable agenda item. He said the Chairman's Roundtable is intended to be a continuation of a concept the NAC is building upon from the last three NAC meetings. He reminded the NAC that this is the time for committee members to explore ideas and issues with the benefit of fellow NAC Member expertise. For today's topic, he said the NAC will hear from a team that will provide insight into the FAA's Terminal Flight Data Manager (TFDM), which is a surface management tool the FAA is deploying. Mr. Childs said he believes there is tremendous potential, from a benefits standpoint, to the employment of this tool by operators and he wants to start the conversation early on how the NAC community views the opportunities. To level-set the discussion, he said he asked FAA Surface and Data Sharing Subject Matter Expert (SME) Mr. Doug Swol (FAA) to provide a brief, high-level overview of the technology and the TFDM program that will leverage it. After that introduction, he said the NAC will hear from a few operator and airport technical experts that will offer some domain-specific context on how these tools can be utilized. Mr. Childs then handed off to Mr. Swol.

Mr. Swol began by providing an overview of the ATD-2 tech transfer, which is implemented via TFDM. He reviewed some of the TFDM capabilities detailed in the graphic below.



Mr. Swol reviewed planned TFDM sites, depicted in the graphic below.

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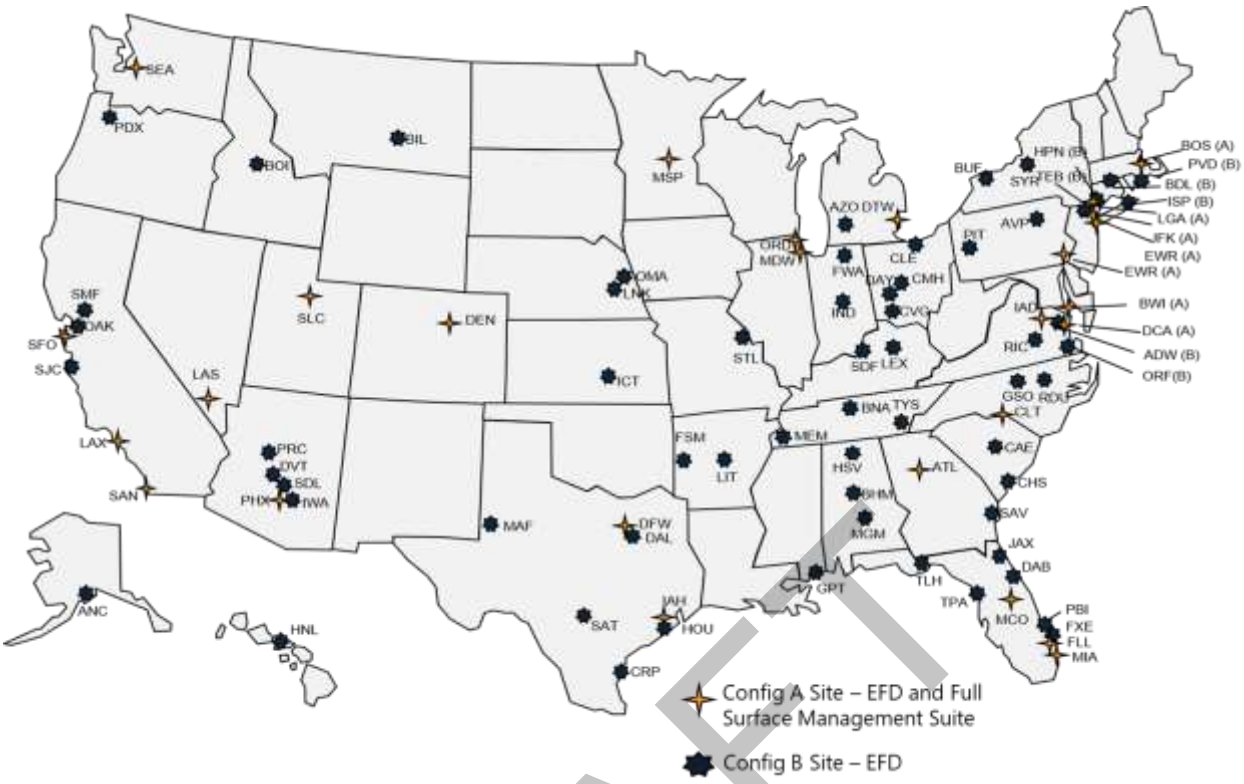
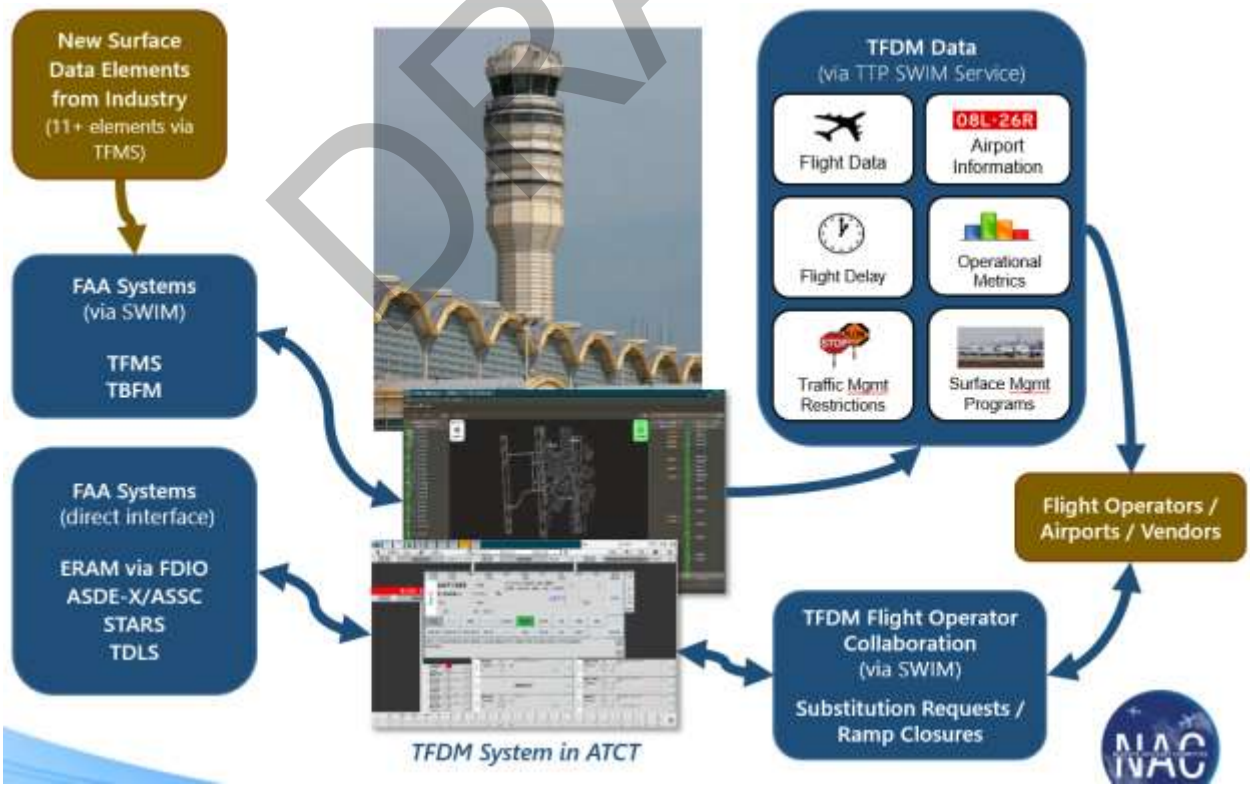


Mr. Swol said that data exchange is key and reviewed the touchpoints depicted in the graphic below.



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Mr. Swol said that the FAA has collaborated hand-in-hand with NASA for many years. He said they have taken the lessons learned from ATD-2 and incorporated them in the TFDM system. He then reviewed the potential benefits of TFDM, including the following:

- Surface Queue Management – moves queueing delay from taxiway to gate/ramp
    - Reduces fuel burn and emissions
- Ability to prioritize flights
    - Shift delay from higher priority flights to lower priority flights pre-departure
- Shift Call-For-Release/En-Route delay from taxiway to gate
    - Reduces fuel burn and emissions
- Improved Runway Load Balancing
    - Small increases in throughput by better balancing departure demand across departure runways
    - Improved Schedule Predictability

He continued by saying that outreach and collaboration are the keys to the success of the program. He reviewed the following opportunities to continue collaboration:

- Surface NIWG and Surface – CDM Teams
- Collaborative Site Implementation Team (CSIT) (led by AJR)
    - Establishes surface working group at each Config A site (27 total) to prepare stakeholders for TFDM
    - Provides Surface-CDM users guides, data guides
    - Conducts tech talks to prepare industry
- TFDM Testbed
    - Early opportunity for flight operators/vendors to test data connections with TFDM before deployment
- ATD-2 to TFDM Transition Meetings (specific to CLT only)
- SWIM Industry-FAA Team (SWIFT)
    - Engage industry on the use of TFDM data via SWIM

Mr. Swol then handed off to Mr. Rob Goldman (Delta).

Mr. Goldman said that TFDM had not gotten this much attention in the NAC since 2016, noting that it has come a long way since then. He said that TFDM is looked at as a surface management tool, but that it is much more. He described it as a critical piece of time based trajectories that assists with managing the traffic flow where data exchange is a key enabler. He said it optimizes capacity and throughput, which improves airline customer service. Mr. Goldman said this efficiency improves sustainability and contributes to noise reduction due to on time and smaller queues with fewer engines running. He said the capability also supports broader community efforts and leads to safety improvements. Mr. Goldman then handed off to Mr. Rick Dalton (Southwest).

Mr. Dalton said it has been encouraging to be part of ATD-2 as it has been developed in the Charlotte and North Texas airspace. He said collaboration has been instrumental to data sharing and system integration. He described the focus of the ATD-2 project as overcoming the inefficiencies of independently developed capabilities. He described frequent Southwest Airlines discussions on lowering carbon emissions and customer delay minutes, which he said are not unique to the airline.

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Use of TFDM to reduce congestion and improve the dexterity of NAS capacity will result in order of magnitude benefits with projections of $10 million in network efficiency. Mr. Dalton then handed off to Mr. Paul Amen (American).

Mr. Amen said that ATD-2 has confirmed initial projections of TFDM resulting in more efficient and cleaner operations, referencing examples in Charlotte and Atlanta Center. He said that it is the most efficient and effective means of moving aircraft for the entire segment that improves surface congestion and the entire operation. He said that it is also beneficial to other airports that might not have TFDM, referencing the example of LAS that may be able to take on extra GA aircraft. He said there are a lot of challenges. He said that garnering as much participation as possible, especially at airports with international carriers is key, adding that airports will be a beneficial partner. He said that one of the other challenges is bringing the rest of operations up to critical management. He said that with more surface information, ground and local air traffic control will be able to make better decisions. Mr. Amen handed off to Mr. Chris Oswald (ACI-NA).

Mr. Oswald said that airports have been extremely supportive of surface programs and that they go together with PBN deployment. He said they are looking forward to the promise of reduced emissions and noise benefits. He said keeping flights on schedule and managing taxiing better are additional benefits. He said TFDM represents a good first step toward a robust surface management capability. He said that different airports have different constraints, which needs to be balanced. He said airports are looking forward to integration with gate management. He said collaboration is the lynchpin of success in TFDM deployment, which was interrupted by COVID. He said they are looking forward to re-engaging and are excited about program. Mr. Oswald concluded and handed off to Mr. Childs.

Mr. Childs thanked the briefers and initiated open discussion. He began by saying it is fascinating to hear about this. He said that from the regional perspective, they spend so much time talking about investing to the MCL and equipage concerns. He said the pandemic have made them starved for predictability, which he said is the number one word from this. He said it seems like for this type of project the yield/investment ratio is strong and that the biggest investment is collaboration, which is a great thing to get behind.

NAC Member Mr. Mark Baker (AOPA) mentioned that with strong flight schedules there is an element of unpredictability thrown in the system.

Mr. Amen said that there are tools out there that help with this process that provide a visual presentation of what is happening on the ground that helps with decision making on the ground, in addition to data that can be used later for post-event analysis. Mr. Goldman agreed that there are lot of tools available today, with many waiting for TFDM to integrate them all. He added that there might be opportunities for airports to get involved with data exchange, clarifying that the more the FAA knows where volume is, the better.

Mr. Oswald said that setting up a CDM approach at an airport is an extensive and unique process that benefits from relationships and collaboration before the tools are employed, citing the Port Authority of New York and New Jersey as one of the earliest applications of CDM in the U.S.

Mr. Childs thanked everyone for the great discussion and said he looks forward to continuing the roundtable dialogue at the next NAC meeting.

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FAA Topics

Next, Mr. Childs handed off to Mr. Mims to introduce the speakers for the topics the FAA leadership team introduced previously. Mr. Mims first handed off to Mr. Chris Hope (FAA) who provided a response to the NAC's advice on VNAV provided at the June 2021 NAC Meeting.

FAA Response to NAC Advice on VNAV

Mr. Hope began by reviewing the progression of the FAA's VNAV tasking that was altered by COVID. In the original task, the FAA requested that the NAC:

- Devise a plan to address the "equipage gap"
- Assess the impediments to full VNAV operations
- Make a plan to eliminate these impediments

Due to impacts from COVID-19, the following questions were considered:

- Relevance of a plan due to operational decline?
- New impediments from this decline?

After consideration, the FAA's tasking was clarified to request:

- Current Equipage Landscape
- Affected Models / Quantities / Retirement Plans
- Upgrade Options Available
- Impediments to Upgrading

He explained that the team was looking at non-VNAV capable aircraft without certified VNAV systems. He said the crux of the issue is that aircraft with LNAV Only guidance are not permitted to fly RNAV approach procedures when simultaneous parallel runways are in use as they require special handling that increases risk and disrupts operations. This limitation caused difficulty in implementing procedures throughout the NAS. He said that while the tasking was focused on VNAV, the team reported that it is not the only capability required to fully leverage NextGen benefits. The MCL also lists the following:

- Capability to fly curved Radius to Fix (RF) procedure segments
- Resilient position sources,
- RNP alerting and reporting features, and
- FANS 1/A over VDL Mode 2 Data Comm

To consider these requirements, the team said that executive leaders will need specific benefit data to support a successful business case favoring NextGen equipage investments. They said that more study is needed, and should examine:

- All capabilities required to maximize NextGen benefits
- How all capabilities work together, to include consideration that ensures safety at high density airports and reduces workload risks
- Operational data from current NextGen implementations
- Projected data from planned implementations

Mr. Hope reviewed the following bullets that outline the FAA's initial response to this tasking:

- Recommendations from Vertical Navigation (VNAV) Task 20-2

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    - Upgrade solutions available for fleets mostly affected but difficult to justify cost
- Improving VNAV capability alone does not encompass all the capabilities required to fully leverage NextGen benefits – which also require the full navigation MCL retrofit
    - Capability to fly curved Radius to Fix (RF) procedure segments
    - RNP position alerting and reporting features, and
    - VNAV
- PARC activity on operational concept for A-RNP approach implementation
    - Goal: Expand the utilization of close-in RF-based transitions from downwind to straight final to enhance traffic flow and save track miles (EoR ops, RNP to xLS ops, etc.)
    - Achieve similar benefit of RNP AR but add more lines of minima, e.g., LPV, LP. LNAV/VNAV, LNAV

FAA Response to NAC Advice on ADS-B In

Next, Mr. Mims handed off to Mr. Doug Arbuckle (FAA) for a response to the NAC's advice on ADS-B In that the it also provided at the June 2021 NAC meeting. Mr. Arbuckle began by reviewing the tasking. The NAC was tasked to provide the FAA with insight from the industry on their potential application acquisitions and deployment plans, including a timeline of ADS-B In commercial application technologies pursued by the aviation community. The FAA requested that the NAC advice include the following:

- A comprehensive list of ADS-B In commercial applications that NAC members either have or intend to invest in (within the next 5-10 years)
- A comprehensive list of ADS-B In commercial applications that are promising and a list of the NAC members tracking this list for future acquisitions

The NAC's advice contained seven recommendations for the FAA. The following bullets detail FAA responses to the seven NAC advice recommendations:

- Recommendation 1: Formally notify Operators and OEMs when the FAA makes investment decisions or changes previously communicated investment approaches
    - FAA will "formally notify" Operators and OEMs per this recommendation via NAC or NAC SC
    - FAA is committed to providing future updates to NAC once FAA has worked through COVID's disruptions to priority FAA programs
- Recommendation 2: Provide opportunity to interested Operators, Pilot Associations and NATCA to discuss, develop and implement procedural changes, prior to the introduction of new ADS-B In Applications into the NAS
    - NATCA is involved as part of FAA internal processes, including Safety Risk Management work required to change NAS procedures
    - NAS procedural changes are often pioneered by a lead operator or operators, and when that occurs, the associated pilot union(s) is involved
    - FAA and AAL are working towards an operational trial of several ADS-B In capabilities described in NAC Task 20-1 report under ADS-B In Retrofit Spacing (AIRS) project
    - AAL and AAL pilots' union (APA) are directly involved in this work along with ATC facilities directly involved (ZAB and D10), NATCA and appropriate Air Traffic policy and operations personnel

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    - FAA has initiated, with RTCA/EUROCAE agreement, a forum within ADS-B standards groups to discuss various ADS-B In capability topics, including activities under AIRS
    - This forum had its first meeting on 12-Oct-2021 and all RTCA/EUROCAE member organizations (including Operators, Pilot Associations and NATCA) participated; monthly meetings will continue
- Recommendation 3: Develop safety cases that show the proposed ADS-B In Applications meet or exceed an equivalent level of safety
    - Most ADS-B In applications have safety cases as documented in a RTCA/EUROCAE Safety, Performance and interoperability Requirements (SPR) document
    - Regardless, FAA will perform Safety Risk Management per ATO Safety Management System prior to introducing new ADS-B In operations into the NAS
    - FAA believes that this meets intent of this recommendation
- Recommendation 4: Develop funding support programs for Operators and OEMs participating in Operational Benefits Validation field trials
    - FAA has already provided funding to support AIRS evaluation, which is an Operational Benefits Validation field trial
    - Future FAA program/project plans have intention of providing funding for Operational Benefits Validation field trials after introducing ATC automation and procedural changes to enable various phases of Interval Management operations
    - Decisions on scope and amount of such funding will be made as part of FAA investment decision processes
- Recommendation 5: Formalize an FAA approved concept of operations for the use of Flight-deck Interval Management applications with Time-Based Management procedures such as Time of Arrival Control (ToAC) and communicate it to Operators, OEMs, pilots and air traffic controller associations, and standards developing organizations as changes occur
    - FAA's Air Traffic Strategy organization will develop a coordination draft ConOps describing FAA ADS-B In operations and complementing RTCA SC-227 avionics standards work on ToAC
    - FAA plans to have this coordination draft ConOps available by December 2022
- Recommendation 6: Create a stepped approach for MOPS, TSOs and ACs for FIM applications, concurrent with FAA investment decisions, to advance ADS-B In Applications as they evolve
    - Except for Surface Alerting applications, all other applications discussed by NAC Task 20-1 Group have existing RTCA/EUROCAE avionics standards (MOPS) and these standards are completed
    - After additional discussions with NAC Task 20-1 Group Co-Leads, it appears that industry perceives that FIM avionics standards require implementing functionality which might not be used in FAA-supported operations
    - Since these are technical discussions, FAA proposes to further engage industry on this topic via RTCA/EUROCAE forum described in response to NAC Recommendation 2
- Recommendation 7: Explore, with the Operator community, methods to provide operational incentives for Operators to equip (A two-rate Ground Delay Program (GDP) that does not penalize those who do not equip, is one possible solution)

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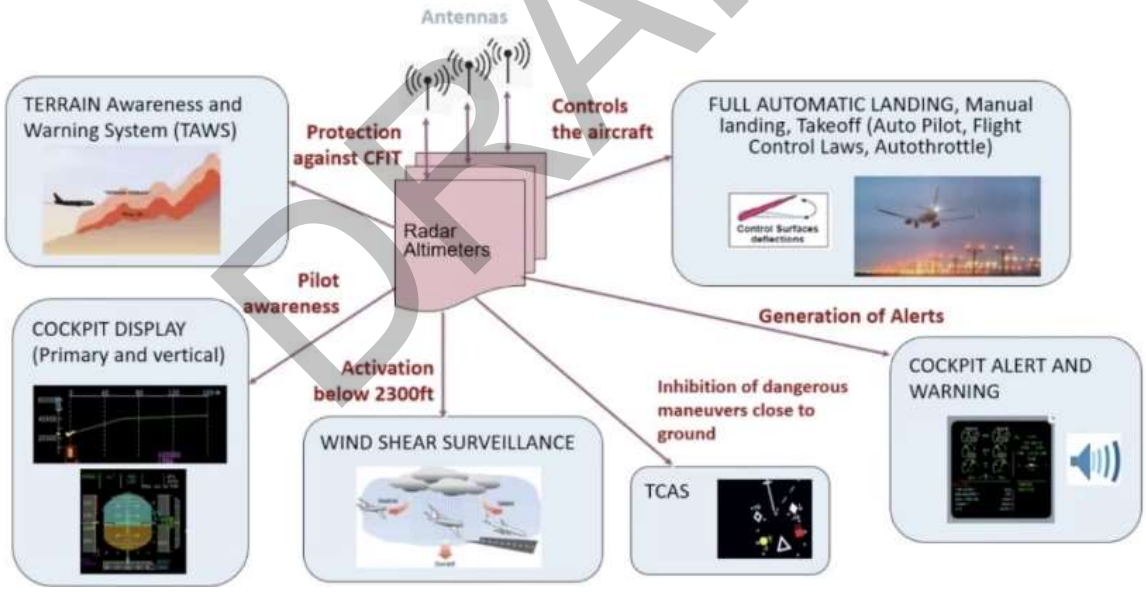
- NAC Section 547 Ad Hoc Team recommended that preferential basis for Section 547 Pilot Program should not be based on GDPs, choosing instead to focus on providing advantage to equipped operators
- Therefore, GDPs were taken out of Section 547 Pilot program
- FAA is not currently exploring options to provide operational incentives for industry to equip, but as COVID conditions improve and lessons emerge from the Section 547 trials underway, FAA will work with industry to evaluate future options

FAA Update on Radio Altimeter Adjacent Band Compatibility with 5G Network Operations

Next, Mr. Mims introduced Ms. Di Reimold who provided additional information on the MCL team's Spectrum and 5G concerns. Ms. Reimold said that in early 2021, the FCC auctioned off the 3.7–3.98 GHz frequency band spectrum for use for 5G applications. This included no additional restrictions on the 5G community with respect to power levels, antenna scan angles, or base station locations beyond what was contained in the original R&O. RTCA/SC-239 produced a report in Oct. 2020 identifying an imminent safety risk from interference to radio altimeter equipment and associated aircraft safety systems. This interference could lead to inoperability or unreliable information. The FAA contends that the risk should be fully assessed using information on planned 5G network operations. Absent detailed data, FAA must take a conservative safety approach.

She explained that radar altimeters measure height above ground level (AGL) and feed into a number of safety critical systems, depicted in the following diagram.



She reviewed the following FAA focus Areas:

- Current avionics equipment in the presence of initial 5G deployment
  - Planned deployment – Dec 2021
  - FAA evaluating operational mitigations
  - Further information expected soon
- Standards Development (Future RADALT Designs)
  - Revise the civil radio altimeter standard to foster developing more robust equipment

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- Publication 4Q 2022
- Standard will address 5G and other current and expected potential interference threats around the radar altimeter band throughout the world

She said that the FAA is engaged with operators, manufacturers, and foreign civil aviation authorities to assess the risks associated with degraded radio altimeter performance. She reviewed the following key operational concerns:

- Airplane automated landing system performance
- Helicopter operations reliant on radio altimeters
- Other onboard safety systems

She explained that other countries are dealing with similar issues and there is a need to be concerned with airport and helicopter operations elsewhere. She said the FAA is evaluating next steps and that the goal is to keep the aviation community, including industry and the interagency, apprised. She said other stakeholders are part of solution.

Mr. Mims added that experts from all over FAA are working to figure this out and mitigate the risk. He said the FAA will continue to keep the NAC apprised in this and other forums.

Outcome: The FAA committed to keeping the NAC and aviation community informed on potential radar altimeter interference concerns and mitigations related to 5G deployment in spectrum discussions

NAC Member Mr. Pete Bunce (GAMA) asked whether the FAA is working with European counterparts that have a much more deployed 5G network in a concentrated environment. Ms. Reimold confirmed that the FAA is working with its European counterparts.

NAC Member Mr. Brian Quigley (United) thanked the FAA for bringing up this topic He said that this issues creates operational risk in that they are not going to be able to use radar altimeters for low visibility approaches. He said the operational impact is going to wreak havoc in the industry. He said everyone needs to work collaboratively to find a solution. Ms. Reimold agreed and indicated the FAA is aware of the potential scope of operational impacts and the associated economic impacts. Mr. Quigley also asked if anyone is talking to the FCC about delaying the implementation. Ms. Reimold said the FAA is working with NTIA and the FCC. Mr. Mims said this issue is on DOT's and FAA's front burner.

NAC Member Mr. Steve Ruehle (DoD) indicated that DoD is working on a joint interagency testing program and expecting results in early 2022. He committed to sharing this information with the FAA as they move forward.

FAA Response to NAC Advice PBN Clarification Activity (Update)

Next, Mr. Mims handed off to Mr. Shawn Kozica (FAA) for an update on the Performance Based Navigation (PBN) Clarification activity, as well as an update on the Airspace Modernization Roadmap. Mr. Kozica began by reviewing the following diagram that depicts the FAA's Airspace Modernization Strategy.

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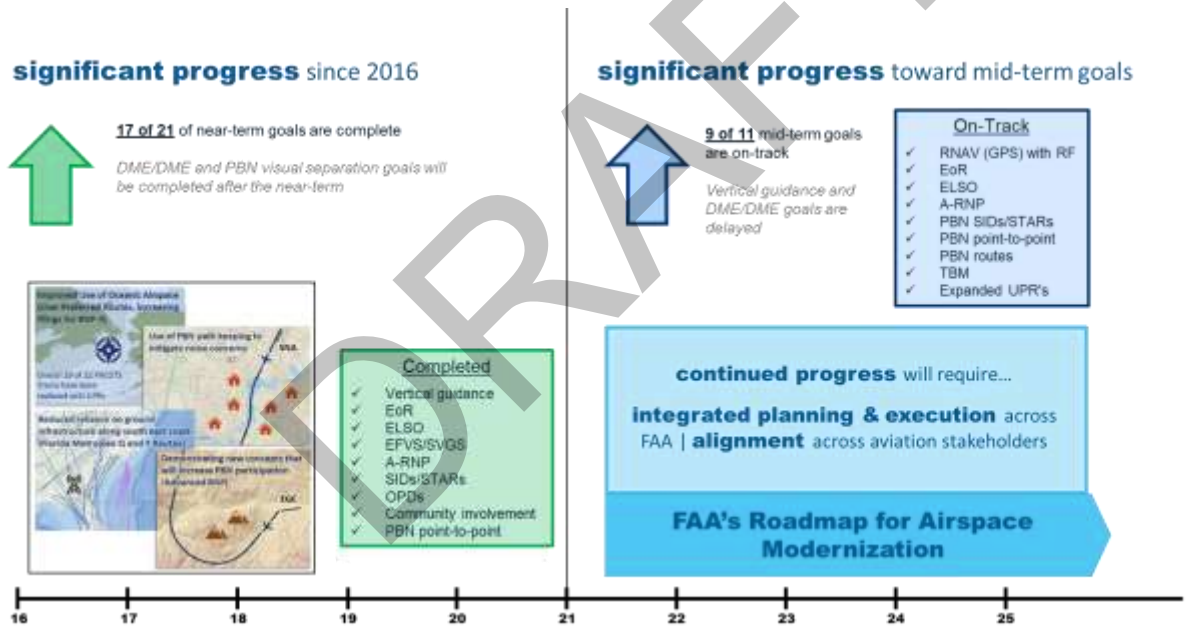
Next, he reviewed the FAA's progress on goals identified in the PBN NAS Navigation Strategy depicted in the following diagram.



With regard to the NAC's PBN Clarification advice, Mr. Kozica said that of 48 recommended procedures, the FAA identified 13 that were in scope of the original tasking and in the IFP Gateway. Of these, two items were previously analyzed and coordinated with industry as not feasible. He said the FAA has already completed multiple items within the remaining 11 items. He clarified that some recommended items have multiple procedures/analysis/design requirements. He said most of the 11 items are projected to be completed by 2025 or are aligned with the Airspace Modernization Roadmap activities. He added that some of the original recommendations that were not within the task will be addressed through the Airspace Modernization Roadmap effort.

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NAC Member Mr. Warren Christie (JetBlue) said it is great to see progress. For the remaining items and as the remainder of the roadmap is developed, he asked how industry can be helpful in guiding priorities.

Mr. Kozica said they are looking forward to more discussions with the NAC and identifying areas where they can connect industry at the regional level. He said he thinks there will be multiple conversations and this will be a collaborative effort.

FAA Update on Section 547 Activity

Next, Mr. Mims handed off to Ms. Rebecca Guy (FAA) for a status update on the Section 547 activity. Ms. Guy began by thanking the Section 547 Ad Hoc Team for its work. She reviewed the pilot program progress detailed in the table below.

Initiative	Overview	Benefits	Start Date
Simultaneous independent Established on RNP (EoR) at Los Angeles International Airport (LAX)	This initiative focuses on increasing the use of existing approach procedures at LAX by leveraging EoR separation standards and the Converging Runway Display Aid (CRDA) during west flow dual operations in IMC.	Benefits focus will be upon flight time and distance consistent with JAT methodology.	September 13, 2021
CPDLC Departure Clearance (DCL) capabilities at Orlando International Airport (MCO)	This initiative focuses on the continued use of DCL to provide DCL-equipped operators revised departure clearances prior to unequipped operators, especially beneficial for reroutes due to weather or traffic.	Benefits focus will leverage program-reported metrics (e.g., airspace user time saved, delay and emissions savings) which are consistent with JAT methodology.	Focused metric tracking beginning September 1, 2021
Automatic Dependent Surveillance-Broadcast (ADS-B) Out enabling 3 nautical mile (NM) in en route airspace for Oakland Air Route Traffic Control Center (ZOA)	This initiative focuses on utilizing the 3 NM separation below FL230 for en route airspace within ZOA to provide additional access and flight efficiencies for Bay Area operations.	Benefits focus will be refined over Q1-Q2 FY2022.	September 9, 2021

She committed to continued collaboration with industry by way of monthly FAA/Industry meetings to discuss performance and regular updates at NAC meetings through life of the program.

Mr. Mims then concluded the FAA Topics agenda item and handed off to Mr. Childs.

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NAC Subcommittee (SC) Chair's Report - NAC Taskings Status

Next, Mr. Childs handed off to NAC Subcommittee Chairman Mr. John Ladner (Alaska) who walked through the current NAC SC issues with the working group leads. He began by reviewing the NAC SC Chairman's Report topics, clarifying that the MCL team's update will be for NAC approval.

NAC Task 21-1: Minimum Capabilities List (MCL) Annual Review

First, Mr. Ladner handed off to MCL Ad Hoc Team Lead Mr. Ron Renk (United). Mr. Renk began by reviewing the original NAC advice that was approved at the November 2020 NAC Meeting. The recommendations included the following:

- The NAC may acknowledge these results in agreement that a forward fit business case is indeed plausible, and subsequently encourage its adoption by their members.
- The NAC may encourage aircraft manufacturers to adopt MCL Baseline capabilities as standard on all U.S. delivered aircraft. Some aircraft are already sold this way, and it has helped operators of those airframes to have common equipage across that fleet.
- Finally, the Working Group recommends that if the MCL is successfully adopted, that it be regarded and maintained as a living document

Since the advice was approved, Mr. Renk said that mainline carriers are committed to the plan and that there are ongoing discussions occurring around regional equipage. He said more work is needed to be sure OEMs can provide baseline items on new orders, referencing A220 Data Comm and B737 MAX – Core 16 as examples.

Mr. Quigley said that there is a lot of great work here. He said that it is difficult to go to finance and executives to request funds since they need to see benefit. He said United is seeing the benefit and that Core 16 upgrades are on the United invest list for 2022. He added that United is working on forward fitting to be MCL compliant. He said when he hears about operationalizing, the industry has to press to equip airplanes and utilize RNP approaches where possible, adding that EoR is a better way of doing business. Mr. Renk said he is excited that the board of directors know about equipage and MCL.

NAC Member Mr. Patrick Burns (Delta) said this is front and center. Delta is committing to acquiring advanced aircraft, adding that it aligns with the Delta and FAA goal of sustainability.

Mr. Renk then reported that the MCL created energy for seeking assistance in retrofitting via a House Infrastructure Bill, including a recognition of challenges associated with mixed equipage. He said that while this is off the table for now, he recommended continuing to push on this where possible and that it is a testament that the conversation has even gotten this far.

Next, Mr. Renk reviewed the following updates specific to NAC Task 21-1:

- Assumptions that need re-evaluation
    - How does MCL support over-arching industry goals like schedule reliability, capacity, and delay reduction?
    - New entrants into the NAS like supersonic jets, electric aircraft and UAS. How do they fit into MCL?
    - NAS Sustainability – Alternative fuels, ATC routing efficiencies, fuel savings, emissions and noise mitigations

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- Quick refresher of available technology or ops specs and any new technologies announced by industry
    - Possibility of some ADS-B In technologies moving from supplemental to baseline
    - SATCOM as a supplemental item
    - DME Based RNP Resiliency - MOPS/MASPS almost complete
    - Radio Frequency Interference (RFI) concerns:
        - Radar Altimeters
        - GPS (resiliency and Complimentary PNT)
- Changes in scope or changes in views of retrofit by industry
    - No changes for 2021 but will review more in depth for 2022 report
- Any recommendations on steps to further drive MCL adoption and commitments to equip aircraft with the associated capabilities
    - More work to be done with OEMs to incorporate baseline items
- Any updates to cost/benefit data provided by the NAC
    - MITRE did an excellent job tabulating cost data for MCL. Would like to start now and leverage the same team to look at specific benefit dollars for MCL
    - Smaller operators need more help building positive ROIs for business case. This is especially true when looking at retrofit

Mr. Renk concluded by saying that the MCL has started many conversations and has given industry a common goal. He said that there is a need for continued focus on congressional support that may induce retrofit opportunities. He said that over the next year, the MCL team needs to incorporate new technologies and review new airspace entrants; to have more robust OEM discussions to push towards making baseline items standard and ensuring baseline items can be delivered on new aircraft purchases; and have a better benefits analysis to make sure operators can close their business cases on forward fit

Mr. Ladner recommended the NAC approve the MCL Ad Hoc Team's update as NAC advice to the FAA for their consideration in response to NAC Task 21-1. Mr. Childs called for a motion to approve the update as advice to the FAA, which the NAC passed.

Outcome: The NAC passed a motion to approve the *Minimum Capabilities list (MCL) Ad Hoc Update* recommendations as advice to the FAA

Northeast Corridor (NEC)

Next, Mr. Ladner introduced the Northeast Corridor team with Mr. Wilkins, Mr. Narvid, and Ms. O'Connor from the FAA and industry co-chairs Mr. Ralph Tamburro (Port Authority of New York and New Jersey) and Ms. Lee Brown (JetBlue). Mr. Tamburro reviewed the timeline of activity for both the LGA Rwy 31 Approach and the TEB/HPN High Performance Routes depicted in the following diagram.

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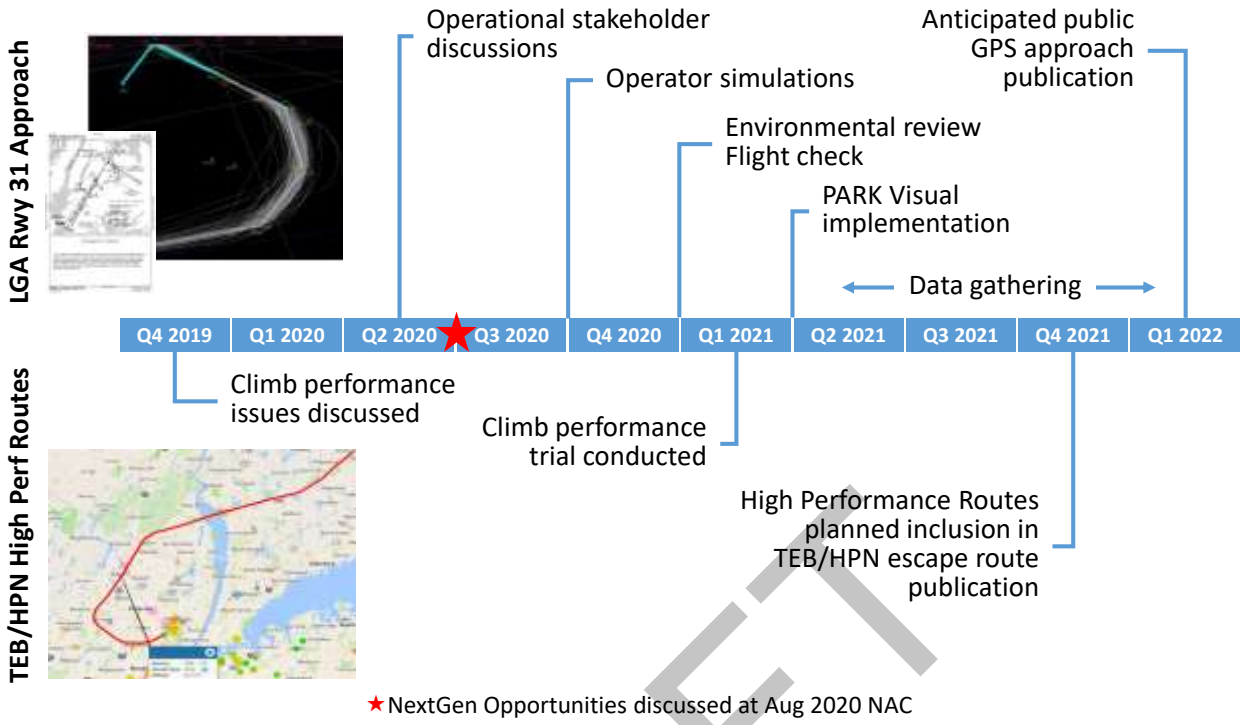

The team reviewed the following NEC focus areas:

- Advancing NAC-recommended "NextGen Opportunities"
- Completing milestones and operationalizing commitments
    - Improved time-based metering for PHL and EWR by Q4 2023
        - Infrastructure, Departure Scheduling, and Airborne Metering
    - Improved airspace efficiency with Atlantic Coast Routes by Q4 2022
        - High altitude sector in Washington Center
        - Additional Q-routes and procedures
- Understanding and contributing to initiatives that impact NEC commitments
    - Other relevant TBO implementations
    - NEC VOR MON efforts
    - MARS and dependent EoR safety studies
    - PANYNJ Part 150 studies and Fly Quiet Program

Ms. Brown then provided an outlook overview of 2021 commitments detailed in the following graphic.

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Type	Commitment/Milestone	Mar 2021 NAC	Jun 2021 NAC	Current Dates
Implementation*	Improved departure management for flights destined for LGA	TBD	TBD	TBD**
Implementation*	DSP enhancements	TBD	Q4 CY2021	Q4 CY2021
Implementation*	Atlantic Coast Routes	Q4 CY2021	TBD	Q4 CY2022
Implementation*	PDRR/ABRR Enhancements	TBD	Q4 CY2021	Q4 CY2021
Implementation*	Arrival time-based metering (TBFM) for PHL and EWR	Q4 CY2023	Q4 CY2023	Q4 CY2023
Industry	GBAS installation start at LGA	TBD	Q1 CY2023	Q1 CY2023
Industry	GBAS installation start at JFK	TBD	Q1 CY2023	Q1 CY2023
Industry	Evaluate multi-route TOS	Q4 CY2021	Q4 CY2021	Q4 CY2021
Industry	Additional tower space for TFDM at BOS***	TBD	TBD	TBD

Multiple Runway Operations (MRO)

Next, Mr. Ladner introduced the MRO team, including Mr. Natee Wongsangpaiboon and Mr. Raul Zamora from the FAA and industry co-chairs Mr. Phil Santos (FedEx) and Mr. Scott Dehart (Southwest Airlines). The team reviewed the following accomplishments:

- Completed/Closeout 1 FAA Milestone
    - Separation Standards for Closely Spaced Parallel Operations (CSPO) with High Update Rate Surveillance (HUR) - Q2CY2021
- Completed CWT standards conversion at A80/ATL

The team also reviewed the following future outlook items:

- Additional CWT implementation/conversion
    - N90/EWR – November 2021
    - D01/DEN – January 2022

Surface and Data Sharing

Next, Mr. Ladner introduced the Surface and Data Sharing team including Mr. Doug Swol and Mr. Ayaz Kagzi from the FAA and industry co-chair Mr. Rob Goldman (Delta). Mr. Goldman briefed the following:

- ATD-2 Tech transfer from NASA to FAA
    - ATD-2 satisfied the original NIWG recommendation for a departure queue management demonstration, and delivered much more
    - Emphasized the need for an integrated and trajectory-based traffic flow system inclusive of technology, process and people
    - Highlighted importance of data exchange as foundational to integration and has led to the formation of SWIFT which has also opened the door to better use of analytics and machine learning

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    - Illustrated the benefits of agile development for future systems development
- Terminal Flight Data Manager (TFDM) implementation
    - Substantial benefits - but must be deployed to be realized
    - Industry will continue to partner with the FAA and work on ways to expedite implementation
- What's Next?
    - Continued disruption – respectful, of course
    - Build off the premise that data exchange is an enabler for an integrated traffic flow NAS (plus process and people)
        - Trajectory based operations (TBO), Flow Management Data Services (FMDS), Future Flow Management (FFM)
        - Leverage NASA's ATM-X Digital Information Platform (DIP)
        - Make sure new entrants (i.e. AAM) are part of the integration conversation
    - Every minute of throughput efficiency equates to lower fuel and sustainability

Mr. Swol then briefed the following TFDM program status:

- Key Site: PHX (dual IOC planned with IND)
    - Accomplishments
        - Completed Build 1.3 software testing (Sept 1)
        - Build 1.4 (IOC Build) Software Delivered to FAA (Sept 15th)
    - Planned Activities
        - Informal risk reduction testing (remotely) October-November 2021
        - Formal 1.4 operational testing at the WJHTC in September 2021 (postponed)
        - Formal 1.4 operational testing at PHX in October-November 2021 (postponed) (NAC milestone)
    - Risk – All travel to TFDM sites and the WJHTC has been stopped due to increase in COVID rates exceeding gating criteria
- Key Site: CLT
    - Accomplishments
        - Completed Build 2.0 Formal software testing at vendor facility
        - Started Build 2.0 Formal software testing at WJHTC
        - Build 2.1 completed software development
        - Conducted Kick Off on TFDM Testbed for airline partner
    - Planned Activities
        - Complete Build 2.0 Formal software testing in December
        - Delivery of Build 2.1 software February 2022
        - On ramp partners to TFDM testbed
        - Two partners planned to onramp

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Mr. Swol then reviewed the following milestone update:

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

* Not formal NJIP dates - new dates dependent on ability to travel, access FAA facilities, conduct training, conduct testing and other FAA program dependencies. If dependencies are not met, the program will not meet these dates.

Performance Based Navigation (PBN)

Next, Mr. Ladner introduced the PBN team including Mr. Juan Narvid, Mr. Aaron Wilkins, and Ms. Wendy O'Connor from the FAA and industry co-chairs Mr. Brian Townsend (APA) and Mr. Bill Whyte (RAA). Mr. Townsend said the team is focused on a refresh of the PBN NIWG. He reviewed the following key September 21 PBN/NEC NIWG Joint Meeting issues and provided additional context on each: LAS Metroplex Post-Implementation, Barriers to Established on RNP (EoR), NAS NAV Strategy, iTBO – Initial Trajectory Based Operations, PBN Clarification, and VOR Minimum Operations Network (MON).

- LAS Metroplex
  - Initial Per Flight benefits estimates
    - Arrivals – 2.6 gallons saved; 2 miles distance reduction; 18 seconds less time
    - Departures – 2.0 gallons saved; .3 miles distance reduction; 24 seconds less time
    - Annualized Estimated Savings of 1.0M gal. ($2.8M) based on 2019 traffic levels
  - Operators will meet soon to validate findings and bring their analysis to the table for the Industry Report milestone
- Barriers to EoR
  - FAA is completing national standards work specific to Dual and Triple operations along with Independent Widely Spaced operations
  - IAH continues work on adding two additional runways for EoR
  - Successful implementation of LAX EoR on September 14
    - Post-implementation meetings and analysis continue
  - PBN NIWG continues to look for opportunities to further the Barriers to EoR recommendations

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- NAS NAV Strategy
    - FAA continues working internally to advance the strategy and will brief industry at the next PBN Industry Day
- iTBO
    - Remote testing underway for Terminal Sequencing & Spacing (TSAS) at Atlantic City Technical Center
    - Deployment is on track for December 2022 if there is access to the facilities
    - Next TBO Industry Day is November 4
- PBN Clarification
    - FAA is working to improve the Instrument Flight Procedures (IFP) Gateway
    - Regional PBN Teams will manage procedures development and deployment with oversight and support from the Service Areas
- VOR MON
    - 23% of the total decommissioned VORs are in the Northeast Corridor
    - Numerous improvements are being made to routes and airspace

Mr. Townsend said that as the community slowly emerges from the pandemic impacts, they are encouraged to see the level of activity underway and look forward to continued opportunities of engagement and collaboration.

Data Communications (Data Comm)

Next, Mr. Ladner introduced the Data Comm team with Mr. Jesse Wijntjes from the FAA and industry co-chairs Mr. Chris Collings (L3Harris) and Mr. Ed Evans (Southwest Airlines). The team reviewed the following Data Comm Accomplishments:

- Data Comm services are operational at 62 airports and the first 3 En Route Centers
- Business/General aviation and DoD communities addressing avionics issues and resuming En Route participation
- Localized air-to-ground interop issues are being fault isolated & addressed

Mr. Collings reviewed the following 2021 Data Comm NIWG/Avionics Ad Hoc Focus Items:

- Resume En Route Center Data Comm deployment
    - Industry requesting the FAA to restart and complete the En Route Data Comm deployment as quickly and efficiently as possible
    - Resuming deployment will build momentum across the industry to realize operational benefits
- Complete installation of Data Comm avionics updates for retrofit and newly delivered aircraft
    - Focus on Airbus ATSU CSB7.5, Collins CMU 900 Core 16, and Boeing 757/767 Pegasus 1 Latent Message Fix
- Track progress against plan for En Route STAR in Free Text mitigation
    - Recommendation accepted at March 2021 NAC
- Continue to track progress against NextGen Joint Implementation Plan (NJIP) milestones
    - Progress against FAA and industry Data Comm milestones

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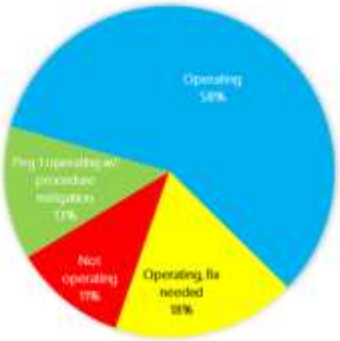
The team then provided an overview of avionics updates detailed in the following slide:

Data Comm Avionics Updates Fleet Status

Aircraft operating in Data Comm en route – no pending actions

Operator & Fleet Actions Complete		Status
Alaska Airlines: A321		Operating en route, no action required
American Airlines: A321, B777, B787		Operating en route, no action required
FedEx: B777, MD11		Operating en route, no action required
Southwest Airlines: B737		Operating en route, no action required
United: B787		Operating en route, no action required
UPS: B744, MD11		Operating en route, no action required
Avionics Action	**Operator/Fleet**	**Status**
Aircraft operating in Data Comm En Route with Crew Procedure Mitigation		
Boeing 757/767 Pegasus 1	FedEx, UPS	Aircraft operating under procedure mitigation Avionics Fix: Q3 2022
Aircraft operating in Data Comm En Route with Open Avionics Actions		
Collins CMU 900 Core 16	Alaska, American, Delta, United	Install delayed (COVID), aircraft operating
Airbus A320 ATSU CSB 7.5	Delta, JetBlue	Fix released Dec 2020, aircraft operating, installs 60% complete; investigating technical issue
Boeing 777 AIMS 2 BP17B	United	Planned by end of 2021, aircraft operating
Boeing 747-8 ATN-203	UPS	Planned – Q4 2022, aircraft operating
Aircraft not operating in en route due to Open Avionics Actions		
Avionics Action	**Operator/Fleet**	**Status**
Collins VDR Update	Alaska, United	Install delayed (COVID), aircraft removed
Boeing 757/767 Pegasus 1	United	Pending Peg 1 Avionics Fix: Q3 2022
Airbus A220	Delta, JetBlue	Aircraft removed from en route, need fix plan
Airbus A350	Delta	Aircraft removed from en route, need fix plan



Operating, no action required | Operating fix needed | Peg 1 operating with mitigation | Not operating

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Mr. Collings then reviewed the following Data Comm Avionics Ad Hoc Open Actions:

- Awaiting Airbus milestone for A220 avionics fix
  - Airbus working on plan to address all open items – IMA Build 8.0A3 expected Q3 2023
  - CMU: Airbus attempting to secure a plan with supplier for VDL Mode 2 "Core 16" enhancements
- Awaiting Airbus milestone for A350 avionics fix
  - Airbus developing a plan and due dates – expected Q4 2021
  - Correction is considered through ACR non customizable database update
- Awaiting Airbus milestone for A320 retrofit for ATSU older H/W
  - ATSU CSB 7.5.1 is planned, SB available Q2 2022
  - RDAF (Repair and Design Approval) to be released prior to the SBs availability to speed up retrofit
- Awaiting Boeing milestone for CMU900 Core 16 production cut-in for B737MAX
  - Boeing plans to add Core 16 to TC for NLT end 2022 production introduction
  - Detailed planning in progress
- Awaiting Boeing milestones for Nav Database revisions to mitigate en route STAR in free text for Pegasus II, B787, and B747 NG FMC
  - Boeing does not have firm milestones – B787 NDB work in progress

- B747 NG FMC will require an update in addition to NDB changes

Mr. Christie said that he understands some of these resolutions are pretty far out, and they are only an interim solution not a full solution. He said when Industry agreed to the MCL they envisioned it as baseline capabilities. He recommended doubling down to try improving these timelines so everyone can benefit. Mr. Childs echoed these sentiments.

The team then reviewed the following milestone update detailed in the following graphic.

Milestone	FAA or Industry	Milestone Date Q/CY	Status
Airlines to Equip 1,900+ Aircraft	Industry	4Q2019	Complete
Deploy Tower Services to an additional seven towers	FAA	3Q2019	Complete
Baseline additional Data Comm capabilities for En Route utilizing the existing FANS message set	FAA Industry	~~3Q2021~~ 3Q2024	Agreement reached with ANG to defer to 2024 to align with deployment of initial and full en route services and funding constraints. Need to close with NIWG on the decision
IOC for Initial En Route Services at all CONUS ARTCCs	FAA	~~4Q2019~~ ~~4Q2021~~ ~~4Q2022~~ 4Q2023	Milestone impacted by COVID-19; Remainder of waterfall to be replanned.
~~Resolution of avionics/Pegasus 1 interoperability issue~~	~~Industry~~	~~4Q2021~~	**Milestone OBE: March 2021 NAC recommendation to allow Pegasus 1 En Route STAR in Free Text for remainder of service life.**

With the impacts from COVID-19, these milestones will likely need to be further adjusted based on when the program can restart/complete the initial services waterfall

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Closing Comments and Adjourn

Next, Mr. Childs handed off to Mr. Mims for any closing comments. Mr. Mims thanked the NAC for the excellent reports and updates. He said he commended the NAC and that he marvels at the things they are doing for the FAA and what they are doing overall. He added that he predicts the next NAC will be in person. He also re-emphasized the FAA's commitment in the area of Diversity, Equity, and Inclusion, and his commitment to fulfilling this promise to the future workforce. He then handed off to Mr. Childs.

Mr. Childs said that he would like Mr. Mims' support in planning for a discussion on electric propulsion at the next NAC meeting. He said this technology in commercial passenger and commercial cargo operations appears to be on a glide path to begin test operations in the next 12-24 months. He believes it is timely for OEMs, airports, operators and regulators to pursue a common understanding of this rapidly emerging technology. Mr. Mims supported the request.

Action: The NAC Chairman and NAC DFO committed to an electric propulsion agenda item at the Spring NAC Meeting

Mr. Childs said that he and Mr. Mims would like to thank NAC Members for their time and participation. Mr. Childs said as 2021 comes to an end, he wants to thank everyone for continuing to devote time and effort to advising the FAA on NextGen. He said he will carry on with the tradition of sending a year-end letter to the Secretary of Transportation focused on the NAC's accomplishments. He said the NAC should be proud of its accomplishments especially remembering that all of this occurred under the constant uncertainty of impacts due to the pandemic.

Mr. Childs then adjourned the meeting.

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Attachment 1

NAC Meeting

October 19, 2021

Opening of Meeting

Chip Childs, NAC Chairman

President & CEO, SkyWest, Inc.

PUBLIC MEETING ANNOUNCEMENT

NextGen Advisory Committee

October 19, 2021

This is the public meeting announcement for the NextGen Advisory Committee meeting convening today, October 19th, 2021.

This meeting is being held pursuant to a notice published in the Federal Register on September 17th. The agenda for the meeting was also included in the notice. The FAA Deputy Administrator, Brad Mims, is the designated federal officer responsible for compliance with the Federal Advisory Committee Act, under which this meeting is being conducted.

Just a reminder, the U.S. Secretary of Transportation has chartered the NAC to receive advice on NextGen relating to the future of the Air Traffic Management System and the integration of new technologies.

For today's meeting, the NAC is open to the public, and members of the public may address the NAC with prior permission of the Chairman. The public may provide written comments in advance if they wish them to be considered by the Chairman for inclusion into the record of the meeting.

In addition, the Chairman may entertain public comment if, in his judgment, doing so will not disrupt the orderly progress of the meeting and will not be unfair to any other person.

Public Statements

Members of the Public

Chairman's Report

Chip Childs, NAC Chairman

President & CEO, SkyWest, Inc.

Motion for NAC Approval

- June 21, 2021 – NAC Meeting Summary Package Draft

Chairman's Report

Chip Childs, NAC Chairman

President & CEO, SkyWest, Inc.

FAA Report

Brad Mims, FAA Deputy Administrator

NAC Designated Federal Officer

Chairman's Roundtable

Chip Childs, NAC Chairman

President & CEO, SkyWest, Inc.

Surface & Data Sharing:
TFDM Program Update

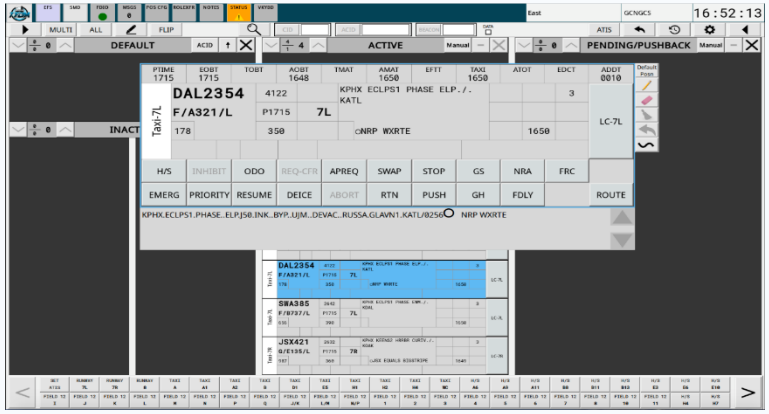
Doug Swol, FAA

What is Terminal Flight Data Manager (TFDM)?

- FAA's NextGen Surface Management Solution for the NAS – deploying to 89 ATCTs across the NAS starting in FY22

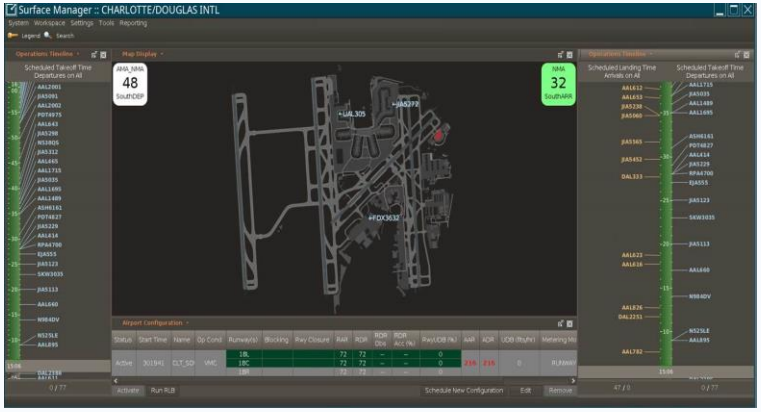
Electronic Flight Data (EFD)

Replace paper flights strips and provides electronic data exchange with FAA systems and non-FAA stakeholders



Collaborative Decision Making for the Surface (S-CDM)

Surface Scheduling - Surface Metering Runway Load Balancing - Airport Configuration Management



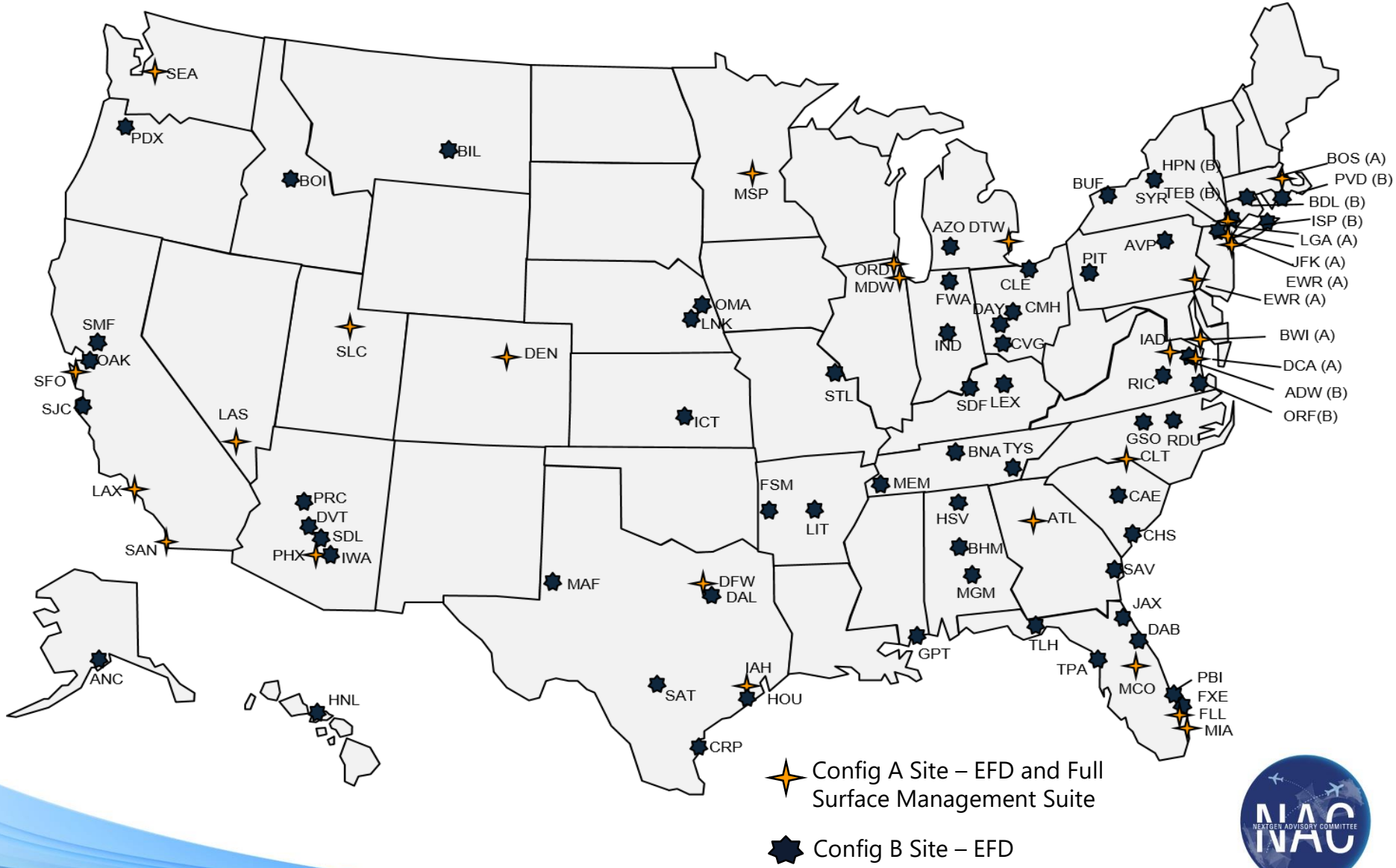
Traffic Flow Management (TFM)

Integration with TFMS and TBFM to coordinate traffic manage constraints and support TBO

Systems Consolidation

Systems to be consolidated include ARMT, DSP, EFSTS, AEFS

Planned TFDM Sites



Data Exchange: At the Core of TFDM

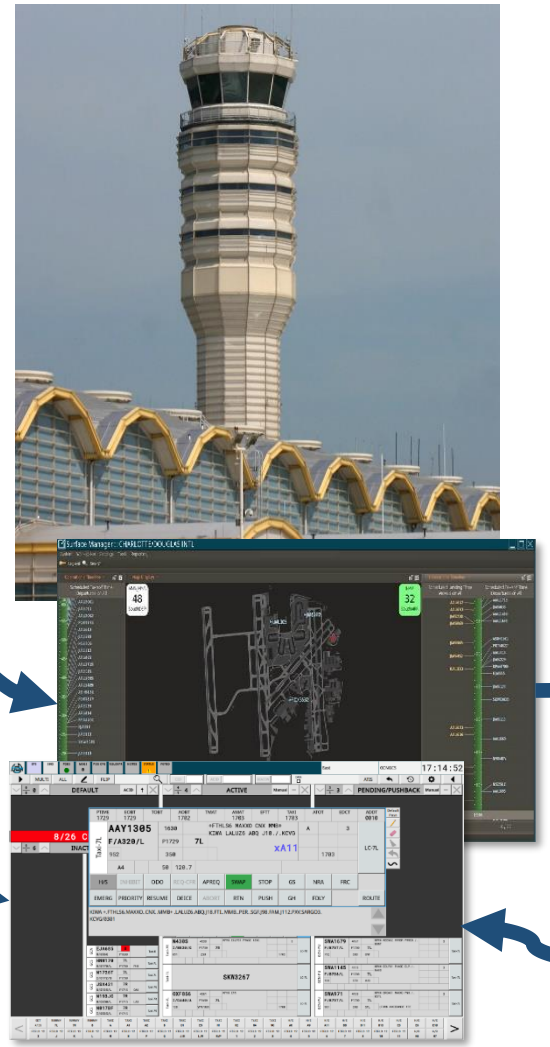
New Surface Data Elements from Industry
(11+ elements via TFMS)

FAA Systems
(via SWIM)

TFMS
TBFM

FAA Systems
(direct interface)

ERAM via FDIO
ASDE-X/ASSC
STARS
TDLS



TFDM System in ATCT

TFDM Data
(via TTP SWIM Service)

- Flight Data
- 08L·26R Airport Information
- Flight Delay
- Operational Metrics
- Traffic Mgmt Restrictions
- Surface Mgmt Programs

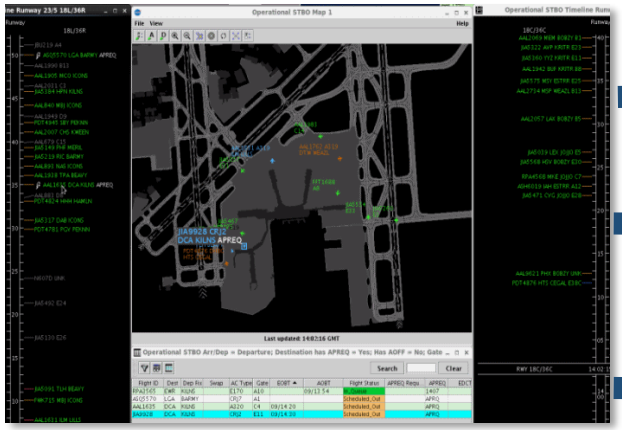
Flight Operators / Airports / Vendors

TFDM Flight Operator Collaboration
(via SWIM)

Substitution Requests / Ramp Closures

Applying Lessons Learned from ATD-2 to TFDM

- ATD-2 was a pathfinder for the FAA – proving out many of TFDM's concepts and providing technical solutions to be incorporated into TFDM

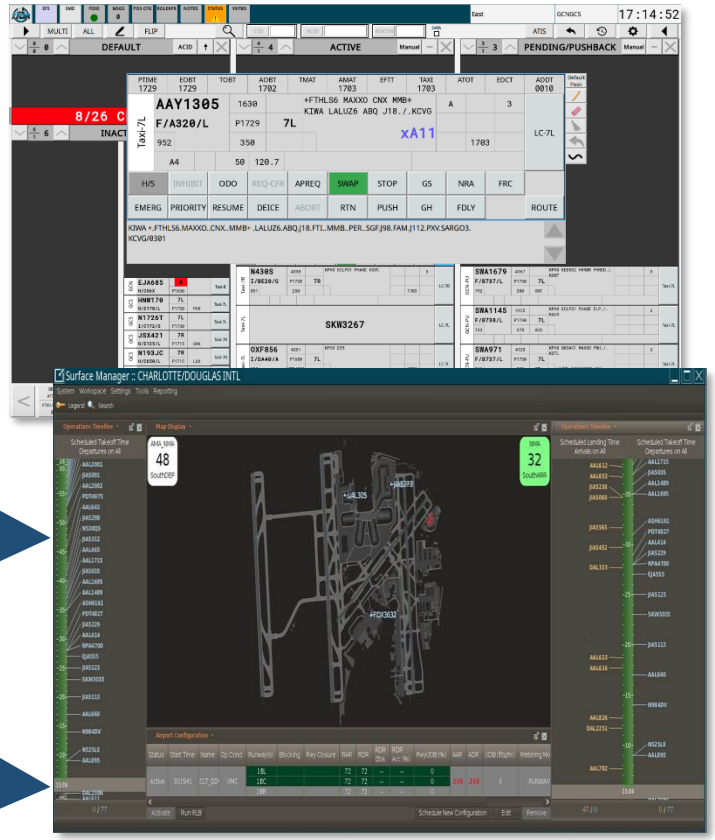


Source: NASA

Data Management:
TTP improvements,
CDM data processing

User Interface Improvements:
Gate Conflicts,
Operational Timeline

Algorithm Improvements:
TMI mgmt, Duplicate Flight Data logic, Queue mgmt



TFDM
Terminal Flight Data Manager

Benefits of TFDM

- **Surface Queue Management – moves queueing delay from taxiway to gate/ramp**
  - Reduces fuel burn and emissions
- **Ability to prioritize flights**
  - Shift delay from higher priority flights to lower priority flights pre-departure
- **Shift Call-For-Release/En-Route delay from taxiway to gate**
  - Reduces fuel burn and emissions
- **Improved Runway Load Balancing**
  - Small increases in throughput by better balancing departure demand across departure runways
- **Improved Schedule Predictability**

TFDM Outreach & Collaboration with Industry

- **Surface NIWG and Surface – CDM Teams**

- **Collaborative Site Implementation Team (CSIT) (led by AJR)**
  - Establishes surface working group at each Config A site (27 total) to prepare stakeholders for TFDM
  - Provides Surface-CDM users guides, data guides
  - Conducts tech talks to prepare industry

- **TFDM Testbed**
  - Early opportunity for flight operators/vendors to test data connections with TFDM before deployment

- **ATD-2 to TFDM Transition Meetings (specific to CLT only)**

- **SWIM Industry-FAA Team (SWIFT)**
  - Engage industry on the use of TFDM data via SWIM

Questions?

Rob Goldman

Delta Air Lines

Rick Dalton

Southwest Airlines

Paul Amen

American Airlines

Chris Oswald

Airports Council International - North America (ACI-NA)

Chairman's Roundtable

Chip Childs, NAC Chairman

President & CEO, SkyWest, Inc.

FAA Topics

Brad Mims, FAA Deputy Administrator

NAC Designated Federal Officer

20-2: Vertical Navigation (VNAV)

Chris Hope, FAA

Tasking & Clarification

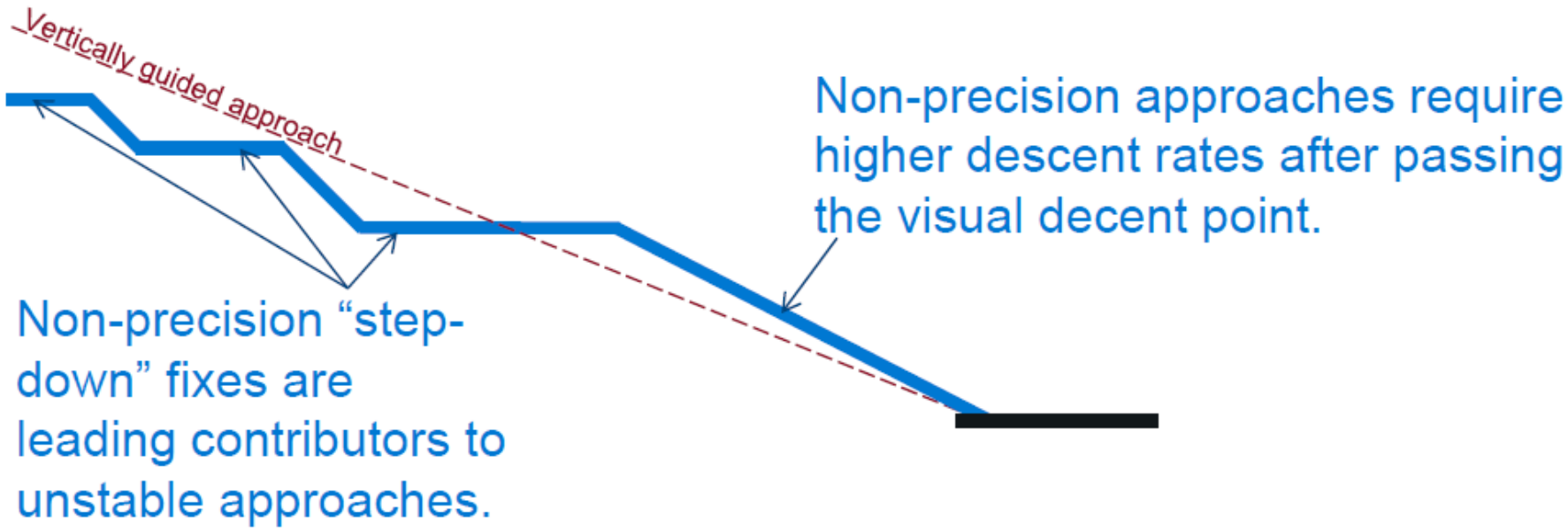
- **Original FAA Tasking Requested the Following**
  - Devise a plan to address the "equipage gap"
  - Assess the impediments to full VNAV operations
  - Make a plan to eliminate these impediments

- **Clarification due to COVID-19 Impact**
  - Relevance of a plan due to operational decline?
  - New impediments from this decline?

- **20-2: Vertical Navigation – Updated Tasks**
  - Current Equipage Landscape
  - Affected Models / Quantities / Retirement Plans
  - Upgrade Options Available
  - Impediments to Upgrading

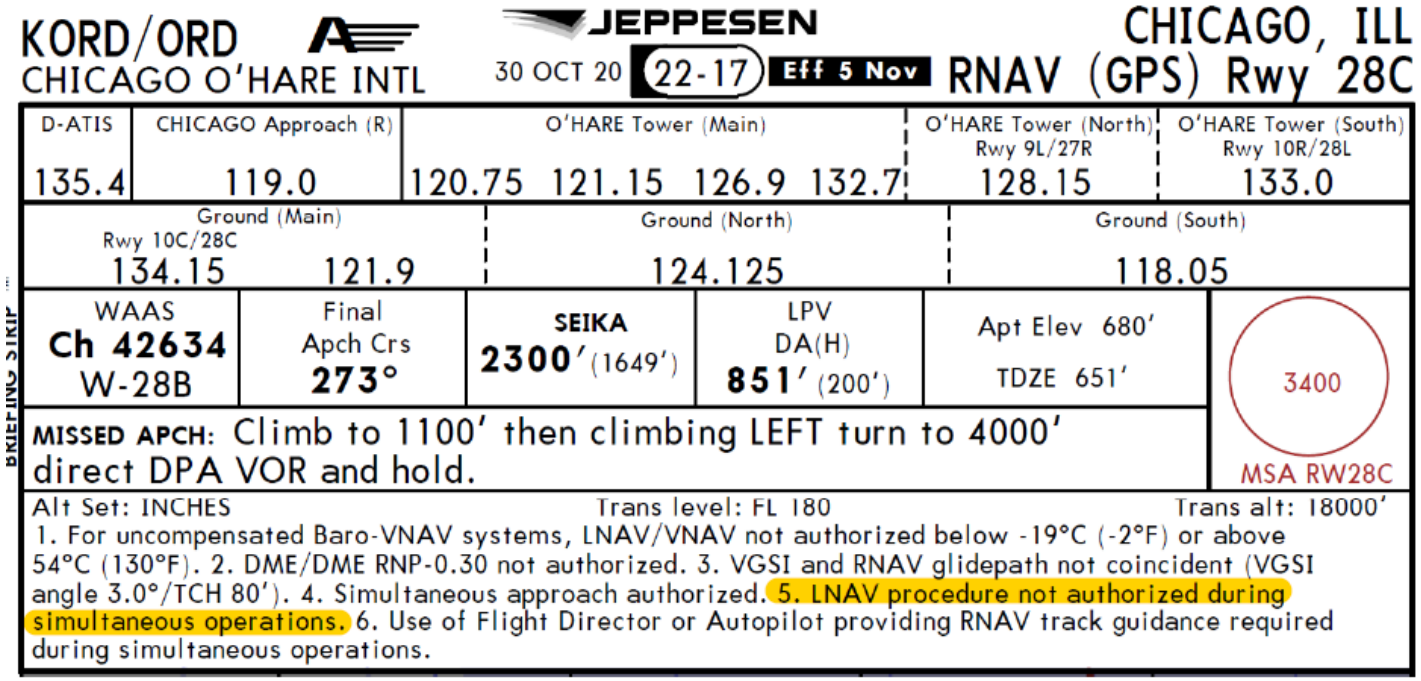
Quick Review: Why Vertical Navigation Is Good

- **Calculates constant angle, or "smoothed," guidance on descents with altitude/airspeed constraints (avoids step-downs)**
  - More stable (safer!)
  - More fuel efficient (power back at idle longer)
  - More accurate (compliance)



Quick Review: The Issue

- **Aircraft with LNAV Only guidance are not permitted to fly RNAV approach procedures when simultaneous parallel runways are in use**
  - "Special handling" required (Read: more work for ATC)
  - Creates "friction:" increases risk, disrupts operations



KORD/ORD
CHICAGO O'HARE INTL

JEPPESEN
30 OCT 20 22-17 Eff 5 Nov

CHICAGO, ILL
RNAV (GPS) Rwy 28C

D-ATIS	CHICAGO Approach (R)	O'HARE Tower (Main)	O'HARE Tower (North) Rwy 9L/27R	O'HARE Tower (South) Rwy 10R/28L
135.4	119.0	120.75 121.15 126.9 132.7	128.15	133.0

Ground (Main) Rwy 10C/28C		Ground (North)	Ground (South)
134.15	121.9	124.125	118.05

WAAS	Final Apch Crs	SEIKA	LPV DA(H)	Apt Elev 680′
Ch 42634 W-28B	273°	2300′ (1649′)	851′ (200′)	TDZE 651′

MISSED APCH: Climb to 1100′ then climbing LEFT turn to 4000′ direct DPA VOR and hold.

3400
MSA RW28C

Alt Set: INCHES Trans level: FL 180 Trans alt: 18000′

1. For uncompensated Baro-VNAV systems, LNAV/VNAV not authorized below -19°C (-2°F) or above 54°C (130°F). 2. DME/DME RNP-0.30 not authorized. 3. VGSI and RNAV glidepath not coincident (VGSI angle 3.0°/TCH 80′). 4. Simultaneous approach authorized. 5. LNAV procedure not authorized during simultaneous operations. 6. Use of Flight Director or Autopilot providing RNAV track guidance required during simultaneous operations.

Final NAC Ad hoc Comments

- **Tasking was focused on Vertical Navigation; specifically requested assessment of impediments to full VNAV operations**

HOWEVER…

- **Improving VNAV capability alone is not the only capability required to fully leverage NextGen benefits. The MCL also lists the following:**
  - Capability to fly curved Radius to Fix (RF) procedure segments
  - Resilient position sources,
  - RNP alerting and reporting features, and
  - FANS 1/A over VDL Mode 2 Data Comm

Final NAC Ad hoc Comments (cont.)

- **To consider these requirements, executive leaders will need <u>specific benefit data</u> to support a successful business case favoring NextGen equipage investments.**
  - **<u>More study is needed,</u> and should examine:**
    - All capabilities required to maximize NextGen benefits
    - How all capabilities work together, to include consideration that ensures safety at high density airports and reduces workload risks,
    - Operational data from current NextGen implementations, and
    - Projected data from planned implementations

VNAV – FAA Initial Response

- **Recommendations from Vertical Navigation (VNAV) Task 20-2**
  - Upgrade solutions available for fleets mostly affected but difficult to justify cost

- **Improving VNAV capability alone does not encompass all the capabilities required to fully leverage NextGen benefits – which also require the full navigation MCL retrofit**
  - Capability to fly curved Radius to Fix (RF) procedure segments
  - RNP position alerting and reporting features, and
  - VNAV

- **PARC activity on operational concept for A-RNP approach implementation**
  - Goal: Expand the utilization of close-in RF-based transitions from downwind to straight final to enhance traffic flow and save track miles (EoR ops, RNP to xLS ops, etc.)
  - Achieve similar benefit of RNP AR but add more lines of minima, e.g., LPV, LP. LNAV/VNAV, LNAV

20-1: ADS-B In Commercial Application Technologies

Doug Arbuckle, FAA

Task 20-1: ADS B In Commercial Application Technologies

- The NAC is tasked to provide the FAA with insight from the industry on their potential application acquisitions and deployment plans, including a timeline of ADS-B In commercial application technologies pursued by the aviation community

- **The NAC advice should include the following:**
  - A comprehensive list of ADS-B In commercial applications that NAC members either have or intend to invest in (within the next 5-10 years)
  - A comprehensive list of ADS-B In commercial applications that are promising and a list of the NAC members tracking this list for future acquisitions

- **On 21-Jun-2021, the NAC approved the Task 20-1 report as advice to the FAA, which contained seven recommendations for the FAA**

Recommendation 1 (of 7)

Formally notify Operators and OEMs when the FAA makes investment decisions or changes previously communicated investment approaches

- FAA will "formally notify" Operators and OEMs per this recommendation via NAC or NAC SC
- FAA is committed to providing future updates to NAC once FAA has worked through COVID's disruptions to priority FAA programs

Recommendation 2 (of 7)

Provide opportunity to interested Operators, Pilot Associations and NATCA to discuss, develop and implement procedural changes, prior to the introduction of new ADS-B In Applications into the NAS

- NATCA is involved as part of FAA internal processes, including Safety Risk Management work required to change NAS procedures
- NAS procedural changes are often pioneered by a lead operator or operators, and when that occurs, the associated pilot union(s) is involved

- FAA and AAL are working towards an operational trial of several ADS-B In capabilities described in NAC Task 20-1 report under ADS-B In Retrofit Spacing (AIRS) project
- AAL and AAL pilots' union (APA) are directly involved in this work along with ATC facilities directly involved (ZAB and D10), NATCA and appropriate Air Traffic policy and operations personnel

- FAA has initiated, with RTCA/EUROCAE agreement, a forum within ADS-B standards groups to discuss various ADS-B In capability topics, including activities under AIRS
- This forum had its first meeting on 12-Oct-2021 and all RTCA/EUROCAE member organizations (including Operators, Pilot Associations and NATCA) participated; monthly meetings will continue

Recommendation 3 (of 7)

Develop safety cases that show the proposed ADS-B In Applications meet or exceed an equivalent level of safety

- Most ADS-B In applications have safety cases as documented in a RTCA/EUROCAE Safety, Performance and interoperability Requirements (SPR) document

- Regardless, FAA will perform Safety Risk Management per ATO Safety Management System prior to introducing new ADS-B In operations into the NAS
- FAA believes that this meets intent of this recommendation

Recommendation 4 (of 7)

Develop funding support programs for Operators and OEMs participating in Operational Benefits Validation field trials

- FAA has already provided funding to support AIRS evaluation, which is an Operational Benefits Validation field trial
- Future FAA program/project plans have intention of providing funding for Operational Benefits Validation field trials after introducing ATC automation and procedural changes to enable various phases of Interval Management operations
- Decisions on scope and amount of such funding will be made as part of FAA investment decision processes

Recommendation 5 (of 7)

Formalize an FAA approved concept of operations for the use of Flight-deck Interval Management applications with Time-Based Management procedures such as Time of Arrival Control (ToAC) and communicate it to Operators, OEMs, pilots and air traffic controller associations, and standards developing organizations as changes occur

- FAA's Air Traffic Strategy organization will develop a coordination draft ConOps describing FAA ADS-B In operations and complementing RTCA SC-227 avionics standards work on ToAC
- FAA plans to have this coordination draft ConOps available by December 2022

Recommendation 6 (of 7)

Create a stepped approach for MOPS, TSOs and ACs for FIM applications, concurrent with FAA investment decisions, to advance ADS-B In Applications as they evolve

- Except for Surface Alerting applications, all other applications discussed by NAC Task 20-1 Group have existing RTCA/EUROCAE avionics standards (MOPS) and these standards are completed

- After additional discussions with NAC Task 20-1 Group Co-Leads, it appears that industry perceives that FIM avionics standards require implementing functionality which might not be used in FAA-supported operations
- Since these are technical discussions, FAA proposes to further engage industry on this topic via RTCA/EUROCAE forum described in response to NAC Recommendation 2

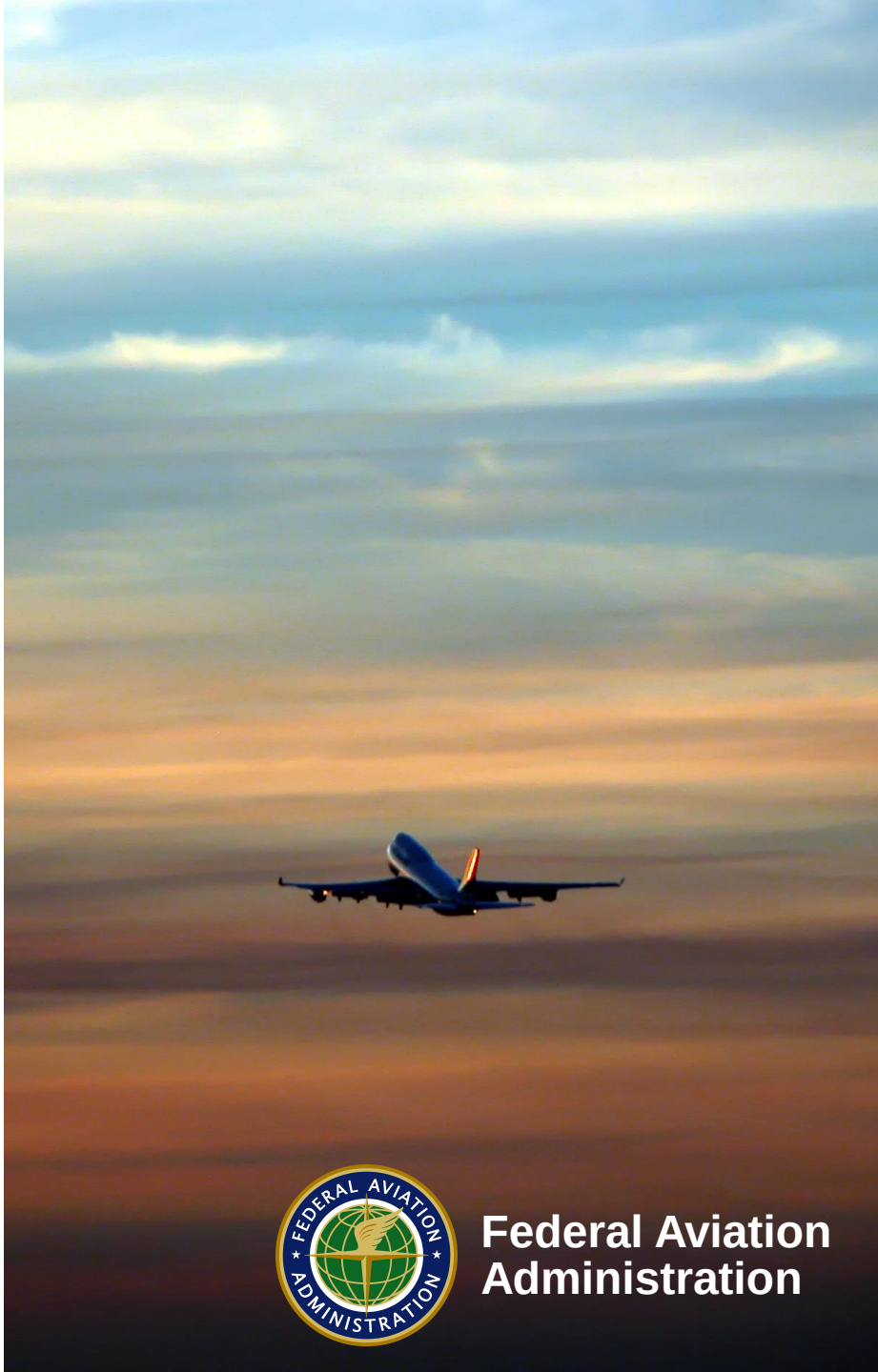
Recommendation 7 (of 7)

Explore, with the Operator community, methods to provide operational incentives for Operators to equip (A two-rate Ground Delay Program (GDP) that does not penalize those who do not equip, is one possible solution)

- NAC Section 547 Ad Hoc Team recommended that preferential basis for Section 547 Pilot Program should not be based on GDPs, choosing instead to focus on providing advantage to equipped operators
- Therefore, GDPs were taken out of Section 547 Pilot program

- FAA is not currently exploring options to provide operational incentives for industry to equip, but as COVID conditions improve and lessons emerge from the Section 547 trials underway, FAA will work with industry to evaluate future options

Radio Altimeter Adjacent Band Compatibility with 5G Network Operations

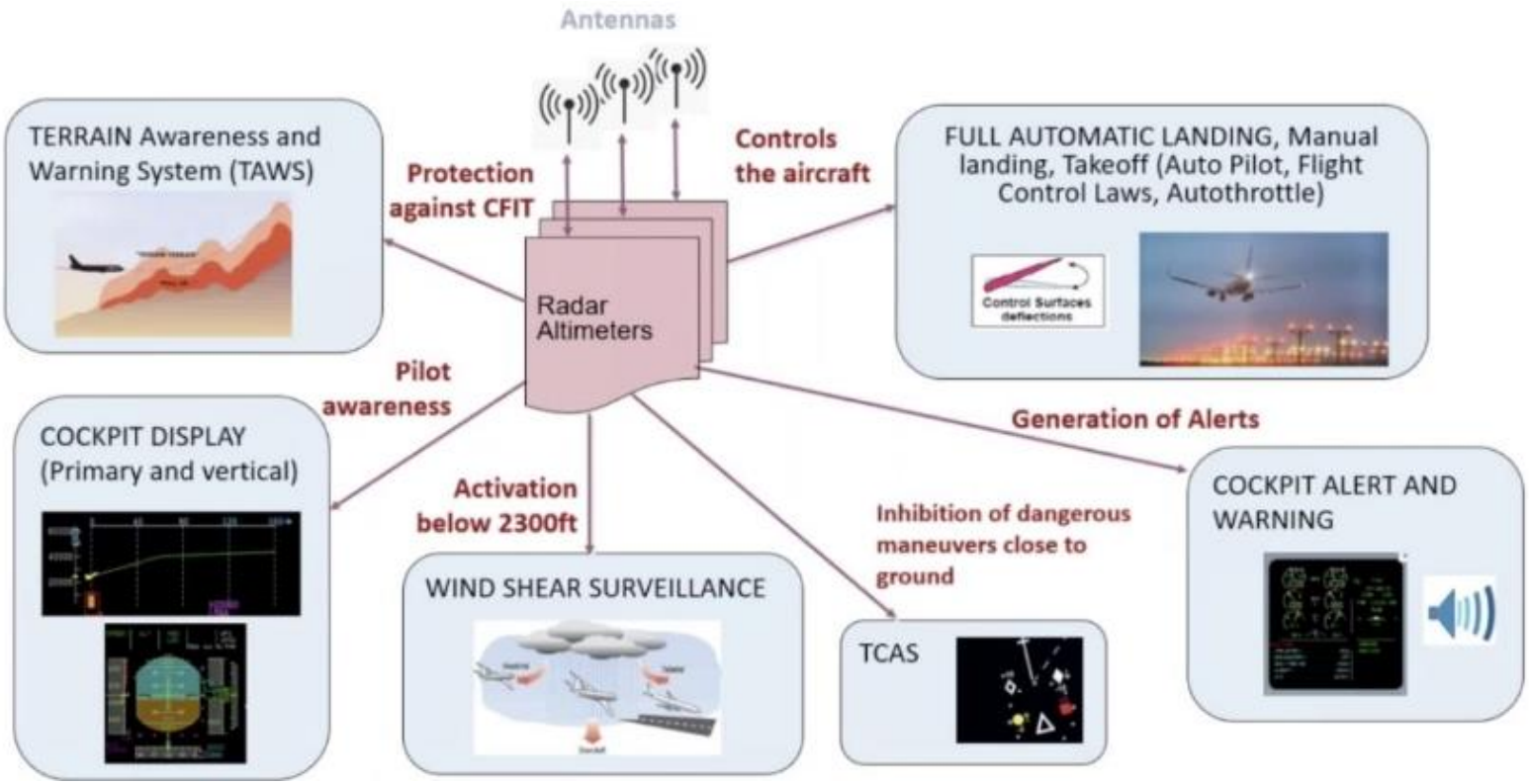


Federal Aviation Administration

Overview of Issue

- **Early 2021, FCC auctioned off 3.7–3.98 GHz frequency band spectrum for use for 5G application**
  - No additional restrictions on the 5G community with respect to power levels, antenna scan angles, or base station locations beyond what was contained in the original R&O
- **RTCA/SC-239 produced a report in Oct. 2020 identifying an imminent safety risk from interference to radio altimeter equipment and associated aircraft safety systems**
  - Interference could lead to inoperability or unreliable information
- **Risk should be fully assessed using information on planned 5G network operations**
  - Absent detailed data, FAA must take a conservative safety approach.

Radar Altimeters Measure Height *Above Ground Level* (AGL) and Feed into a Number of Safety Critical Systems



Source RTCA

Focus Areas

Current avionics equipment in the presence of initial 5G deployment

- **Planned deployment – Dec 2021**
- **FAA evaluating operational mitigations**
- **Further information expected soon**

Standards Development (Future RADALT Designs)

- **Revise the civil radio altimeter standard to foster developing more robust equipment**
  - Publication 4Q 2022
  - Standard will address 5G and other current and expected potential interference threats around the radar altimeter band throughout the world

Continued Operational Safety

- FAA is engaged with operators, manufacturers, and foreign civil aviation authorities to assess the risks associated with degraded radio altimeter performance.
- Key operational concerns:
  - Airplane automated landing system performance
  - Helicopter operations reliant on radio altimeters
  - Other onboard safety systems
- FAA evaluating next steps

Questions?

Airspace Modernization Update

Shawn Kozica, FAA

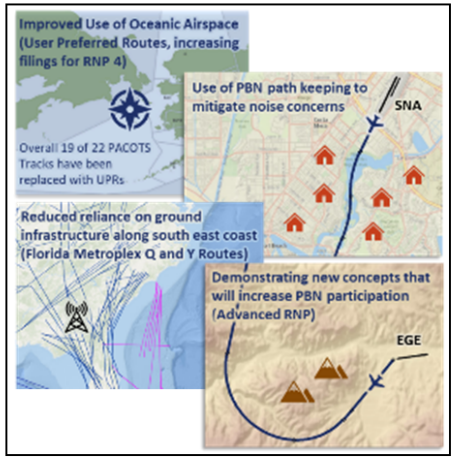
Airspace Modernization Strategy –
New way: Integrated, Sustainable, Agile

Progress towards the PBN NAS Navigation Strategy

significant progress since 2016

17 of 21 of near-term goals are complete

DME/DME and PBN visual separation goals will be completed after the near-term



Completed

- ✓ Vertical guidance
- ✓ EoR
- ✓ ELSO
- ✓ EFVS/SVGS
- ✓ A-RNP
- ✓ SIDs/STARs
- ✓ OPDs
- ✓ Community involvement
- ✓ PBN point-to-point

significant progress toward mid-term goals

9 of 11 mid-term goals are on-track

Vertical guidance and DME/DME goals are delayed

On-Track

- ✓ RNAV (GPS) with RF
- ✓ EoR
- ✓ ELSO
- ✓ A-RNP
- ✓ PBN SIDs/STARs
- ✓ PBN point-to-point
- ✓ PBN routes
- ✓ TBM
- ✓ Expanded UPR's

continued progress will require…

integrated planning & execution across FAA | **alignment** across aviation stakeholders

FAA's Roadmap for Airspace Modernization

16 17 18 19 20 21 22 23 24 25

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

Current status of the 11 items in IFP Gateway

- **13 items were identified as being within task and in the IFP Gateway**
  - 2 items were previously analyzed and coordinated with industry as not feasible

- **FAA has already completed multiple items within the remaining 11 items**
  - Some recommend items have multiple procedures/analysis/design requirements
  - Most of the 11 items are projected to be completed by 2025 or aligned with the Airspace Modernization Roadmap activities

- **Some of the original recommendations that were not within the task will be addressed through the Airspace Modernization Roadmap (EoR, MARS,…)**

Section 547

Rebecca Guy, FAA

Section 547 Pilot Program Initiatives

Initiative	Overview	Benefits	Start Date
Simultaneous independent Established on RNP (EoR) at Los Angeles International Airport (LAX)	This initiative focuses on increasing the use of existing approach procedures at LAX by leveraging EoR separation standards and the Converging Runway Display Aid (CRDA) during west flow dual operations in IMC.	Benefits focus will be upon flight time and distance consistent with JAT methodology.	September 13, 2021
CPDLC Departure Clearance (DCL) capabilities at Orlando International Airport (MCO)	This initiative focuses on the continued use of DCL to provide DCL-equipped operators revised departure clearances prior to unequipped operators, especially beneficial for reroutes due to weather or traffic.	Benefits focus will leverage program-reported metrics (e.g., airspace user time saved, delay and emissions savings) which are consistent with JAT methodology.	Focused metric tracking beginning September 1, 2021
Automatic Dependent Surveillance-Broadcast (ADS-B) Out enabling 3 nautical mile (NM) in en route airspace for Oakland Air Route Traffic Control Center (ZOA)	This initiative focuses on utilizing the 3 NM separation below FL230 for en route airspace within ZOA to provide additional access and flight efficiencies for Bay Area operations.	Benefits focus will be refined over Q1-Q2 FY2022.	September 9, 2021

- **Continued Collaboration:**
  - Monthly FAA/Industry meetings to discuss performance
  - Regular updates at NAC meetings through life of the program

NAC Subcommittee (SC) Chairman's Report

John Ladner, NAC Subcommittee Chair (Alaska Airlines)

21-1: Minimum Capabilities List (MCL) Update

Ron Renk, United Airlines

Review

NAC Task 19-1: Minimum Capability List (MCL) Accepted on November 17, 2020

Adoption Recommendations:

1. The NAC may acknowledge these results in agreement that a forward fit business case is indeed plausible, and subsequently encourage its adoption by their members
2. The NAC may encourage aircraft manufacturers to adopt MCL Baseline capabilities as standard on all U.S. delivered aircraft. Some aircraft are already sold this way, and it has helped operators of those airframes to have common equipage across that fleet.
3. Finally, the Working Group recommends that if the MCL is successfully adopted, that it be regarded and maintained as a living document

What Has Happened Since?

- Mainline carriers are committed to the plan
- Discussions occurring around regional equipage
- More work needed to be sure OEMs can provide baseline items on new orders
  - A220 Data Comm
  - B737 MAX – Core 16

E175 RNP AR at LAX

Airlines for America
We Connect the World

FedEx Express

RAA
Regional Airline Association

UNITED

jetBlue

ups

American Airlines

DELTA

Southwest

NAC
NEXTGEN ADVISORY COMMITTEE

What Has Happened Since? (cont.)

- **The MCL created energy for seeking assistance in retrofitting via a House Infrastructure Bill; including a recognition of challenges associated with mixed equipage**

Aircraft Modernization Equipage Fund*:

Key impediment to the success of the NextGen implementation and the realization of environmental and efficiency benefits is the varied avionics capabilities of aircraft, particularly in the legacy aircraft operator fleet, commonly referred to as "mixed equipage." Congress should authorize and appropriate $1.5 billion to an Aircraft Modernization Equipage Fund to permit an aircraft operator to use an equipage grant for the purchase and installation of avionics and equipment necessary to satisfy the May 2020 NextGen Advisory Committee Minimum Capability List (MCL) report, specifically the Baseline Capacities and Supplemental Capabilities identified in the MCL.

** Original bill language and subject to change*

Specific Tasking for 21-1 Update

- **Assumptions that need re-evaluation**
  - How does MCL support over-arching industry goals like schedule reliability, capacity, and delay reduction
  - New entrants into the NAS like supersonic jets, electric aircraft and UAS. How do they fit into MCL
  - NAS Sustainability – Alternative fuels, ATC routing efficiencies, fuel savings, emissions and noise mitigations

- **Quick refresher of available technology or ops specs and any new technologies announced by industry**
  - Possibility of some ADS-B In technologies moving from supplemental to baseline
  - SATCOM as a supplemental item
  - DME Based RNP Resiliency - MOPS/MASPS almost complete
  - Radio Frequency Interference (RFI) concerns:
    - Radar Altimeters
    - GPS (resiliency and Complimentary PNT)

Specific Tasking for 21-1 Update (cont.)

- **Changes in scope or changes in views of retrofit by industry**
  - No changes for 2021 but will review more in depth for 2022 report

- **Any recommendations on steps to further drive MCL adoption and commitments to equip aircraft with the associated capabilities**
  - More work to be done with OEMs to incorporate baseline items

- **Any updates to cost/benefit data provided by the NAC**
  - MITRE did an excellent job tabulating cost data for MCL. Would like to start now and leverage the same team to look at specific benefit dollars for MCL
  - Smaller operators need more help building positive ROIs for business case. This is especially true when looking at retrofit

Conclusion

- **MCL has made many conversations and has given industry a common goal**

- **We need continued focus on congressional support that may induce retrofit opportunities**

- **Over the next year we need:**
  - Incorporate new technologies and review new airspace entrants
  - More robust OEM discussions to push towards making baseline items standard and ensuring baseline items can be delivered on new aircraft purchases
  - Better benefits analysis to make sure operators can close their business cases on forward fit

Motion for NAC Approval as Advice to the FAA

- Task 21-1: Minimum Capabilities List (MCL) Update Recommendations

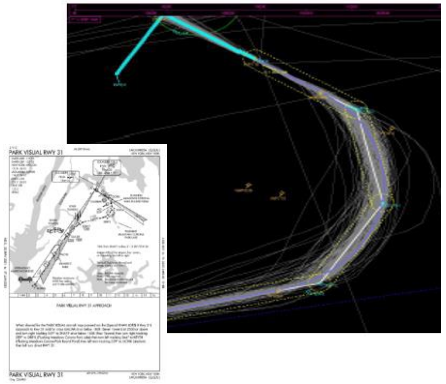
Northeast Corridor (NEC)

Aaron Wilkins (FAA), Juan Narvid (FAA), & Wendy O'Connor (FAA)

Ralph Tamburro (PANYNJ) & Lee Brown (JetBlue)

Northeast Corridor Accomplishments –
Moving forward on Opportunities Recommendations

LGA Rwy 31 Approach



Operational stakeholder discussions

Operator simulations

Environmental review
Flight check

PARK Visual implementation

Anticipated public GPS approach publication

Data gathering

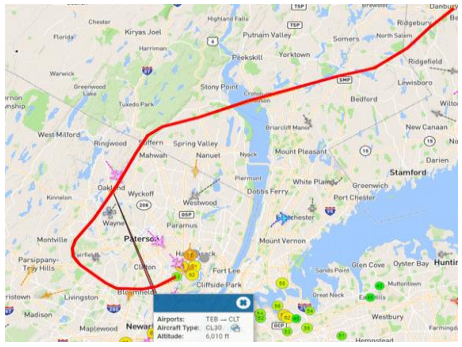
Q4 2019	Q1 2020	Q2 2020 ★	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022

TEB/HPN High Perf Routes

Climb performance issues discussed

Climb performance trial conducted

High Performance Routes planned inclusion in TEB/HPN escape route publication



★NextGen Opportunities discussed at Aug 2020 NAC

Northeast Corridor Focus Areas

- **Advancing NAC-recommended "NextGen Opportunities"**

- **Completing milestones and operationalizing commitments**
  - Improved time-based metering for PHL and EWR by Q4 2023
    - Infrastructure, Departure Scheduling, and Airborne Metering
  - Improved airspace efficiency with Atlantic Coast Routes by Q4 2022
    - High altitude sector in Washington Center
    - Additional Q-routes and procedures

- **Understanding and contributing to initiatives that impact NEC commitments**
  - Other relevant TBO implementations
  - NEC VOR MON efforts
  - MARS and dependent EoR safety studies
  - PANYNJ Part 150 studies and Fly Quiet Program

Outlook for 2021 Commitments

Type	Commitment/Milestone	Mar 2021 NAC	Jun 2021 NAC	Current Dates
Implementation*	Improved departure management for flights destined for LGA	TBD	TBD	TBD**
Implementation*	DSP enhancements	TBD	Q4 CY2021	Q4 CY2021
Implementation*	Atlantic Coast Routes	Q4 CY2021	TBD	Q4 CY2022
Implementation*	PDRR/ABRR Enhancements	TBD	Q4 CY2021	Q4 CY2021
Implementation*	Arrival time-based metering (TBFM) for PHL and EWR	Q4 CY2023	Q4 CY2023	Q4 CY2023
Industry	GBAS installation start at LGA	TBD	Q1 CY2023	Q1 CY2023
Industry	GBAS installation start at JFK	TBD	Q1 CY2023	Q1 CY2023
Industry	Evaluate multi-route TOS	Q4 CY2021	Q4 CY2021	Q4 CY2021
Industry	Additional tower space for TFDM at BOS***	TBD	TBD	TBD

* Implementation and milestones are jointly shared by FAA and Industry for the NEC efforts
** LGA traffic still only 60% of pre-COVID levels, so milestone remains TBD until sufficient volume returns
*** Dependent on TFDM implementation waterfall adjustment

Multiple Runway Operations (MRO)

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

Phil Santos (FedEx) & Scott Dehart (Southwest Airlines)

Accomplishments (since June 2021 NAC) **and Look Ahead**

Accomplishments:

- Completed/Closeout 1 FAA Milestone
  - Separation Standards for Closely Spaced Parallel Operations (CSPO) with High Update Rate Surveillance (HUR) - Q2CY2021
- Completed CWT standards conversion at A80/ATL

Look Ahead:

- Additional CWT implementation/conversion
  - N90/EWR – November 2021
  - D01/DEN – January 2022

Surface & Data Sharing

Doug Swol (FAA) & Ayaz Kagzi (FAA)

Rob Goldman (Delta Air Lines)

Surface & Data Sharing

- **ATD-2 Tech transfer from NASA to FAA**
  - ATD-2 satisfied the original NIWG recommendation for a departure queue management demonstration, and delivered much more
  - Emphasized the need for an integrated and trajectory-based traffic flow system inclusive of technology, process and people
  - Highlighted importance of data exchange as foundational to integration and has led to the formation of SWIFT which has also opened the door to better use of analytics and machine learning
  - Illustrated the benefits of agile development for future systems development

- **Terminal Flight Data Manager (TFDM) implementation**
  - Substantial benefits - but must be deployed to be realized
  - Industry will continue to partner with the FAA and work on ways to expedite implementation

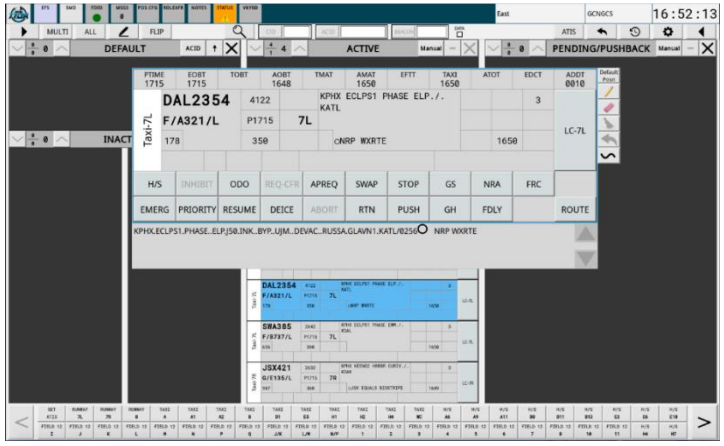
Surface & Data Sharing (cont.)

- **What's Next?**
  - Continued disruption – respectful, of course
  - Build off the premise that data exchange is an enabler for an integrated traffic flow NAS (plus process and people)
    - Trajectory based operations (TBO), Flow Management Data Services (FMDS), Future Flow Management (FFM)
    - Leverage NASA's ATM-X Digital Information Platform (DIP)
    - Make sure new entrants (i.e. AAM) are part of the integration conversation
  - Every minute of throughput efficiency equates to lower fuel and sustainability

TFDM Build 1 Program Status

Key Site: PHX (dual IOC planned with IND)

- **Accomplishments**
  - Completed Build 1.3 software testing (Sept 1)
  - Build 1.4 (IOC Build) Software Delivered to FAA (Sept 15th)
- **Planned Activities**
  - Informal risk reduction testing (remotely) October-November 2021
  - Formal 1.4 operational testing at the WJHTC in September 2021 (postponed)
  - Formal 1.4 operational testing at PHX in October-November 2021 (postponed) (NAC milestone)
- **Risk – All travel to TFDM sites and the WJHTC has been stopped due to increase in COVID rates exceeding gating criteria**

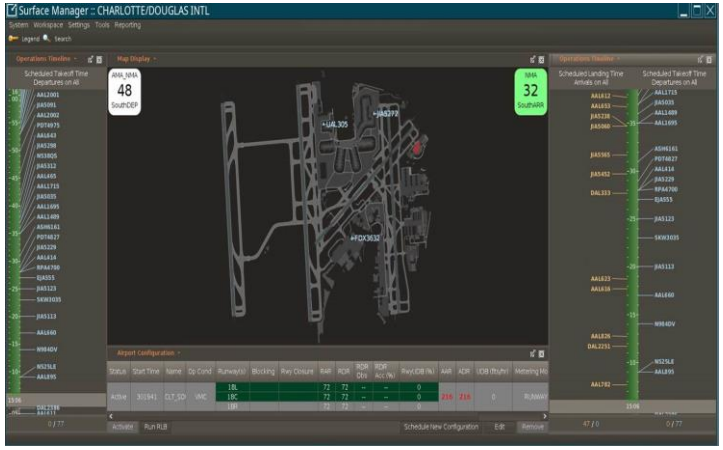


TFDM Build 1 Electronic Flight Strips Display

TFDM Build 2 Program Status

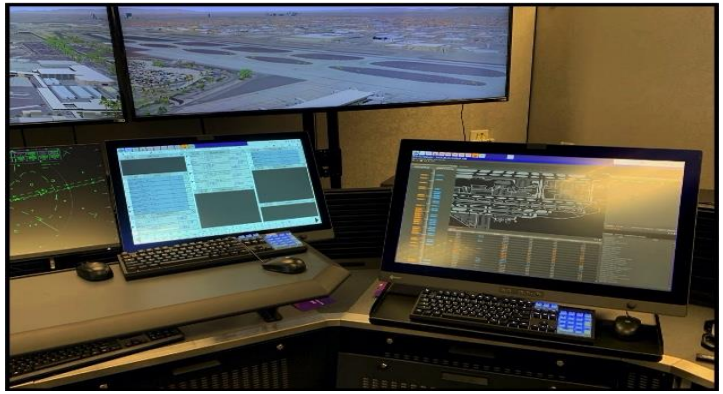
Key Site: CLT

- **Accomplishments**
  - Completed Build 2.0 Formal software testing at vendor facility
  - Started Build 2.0 Formal software testing at WJHTC
  - Build 2.1 completed software development
  - Conducted Kick Off on TFDM Testbed for airline partner



TFDM Build 2 Surface Management Display

- **Planned Activities**
  - Complete Build 2.0 Formal software testing in December
  - Delivery of Build 2.1 software February 2022
  - On ramp partners to TFDM testbed
    - Two partners planned to onramp



TFDM Test Systems with EFS and SM Displays

NAC Milestone Impact

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

*** Not formal NJIP dates - new dates dependent on ability to travel, access FAA facilities, conduct training, conduct testing and other FAA program dependencies. If dependencies are not met, the program will not meet these dates.**

Performance Based Navigation (PBN)

Juan Narvid (FAA), Aaron Wilkins (FAA), & Wendy O'Connor (FAA)

Brian Townsend (APA) & Bill Whyte (RAA)

Key Issues & Activity –
PBN/NEC NIWG Joint Meeting (September 21, 2021)

- **Key Issues**
  - LAS Metroplex Post-Implementation
  - Barriers to Established on RNP (EoR)
  - National Airspace System Navigation (NAS NAV) Strategy
  - iTBO – Initial Trajectory Based Operations
  - PBN Clarification
  - VOR Minimum Operational Network (MON)

Activity

- **LAS Metroplex**
  - Initial Per Flight benefits estimates
    - Arrivals – 2.6 gallons saved; 2 miles distance reduction; 18 seconds less time
    - Departures – 2.0 gallons saved; .3 miles distance reduction; 24 seconds less time
    - Annualized Estimated Savings of 1.0M gal. ($2.8M) based on 2019 traffic levels
  - Operators will meet soon to validate findings and bring their analysis to the table for the Industry Report milestone

- **Barriers to EoR**
  - FAA is completing national standards work specific to Dual and Triple operations along with Independent Widely Spaced operations
  - IAH continues work on adding two additional runways for EoR
  - Successful implementation of LAX EoR on September 14th
    - Post-implementation meetings and analysis continue
  - PBN NIWG continues to look for opportunities to further the Barriers to EoR recommendations

- **NAS NAV Strategy**
  - FAA continues working internally to advance the strategy and will brief industry at the next PBN Industry Day

Activity (cont.)

- **iTBO**
  - Remote testing underway for Terminal Sequencing & Spacing (TSAS) at Atlantic City Technical Center
  - Deployment is on track for December 2022 if there is access to the facilities
  - Next TBO Industry Day is November 4th

- **PBN Clarification**
  - FAA is working to improve the Instrument Flight Procedures (IFP) Gateway
  - Regional PBN Teams will manage procedures development and deployment with oversight and support from the Service Areas

- **VOR MON**
  - 23% of the total decommissioned VORs are in the Northeast Corridor
  - Numerous improvements are being made to routes and airspace

Summary

- As we slowly emerge from the pandemic impacts, we're encouraged to see the level of activity underway and look forward to continued opportunities of engagement and collaboration.

Data Comm

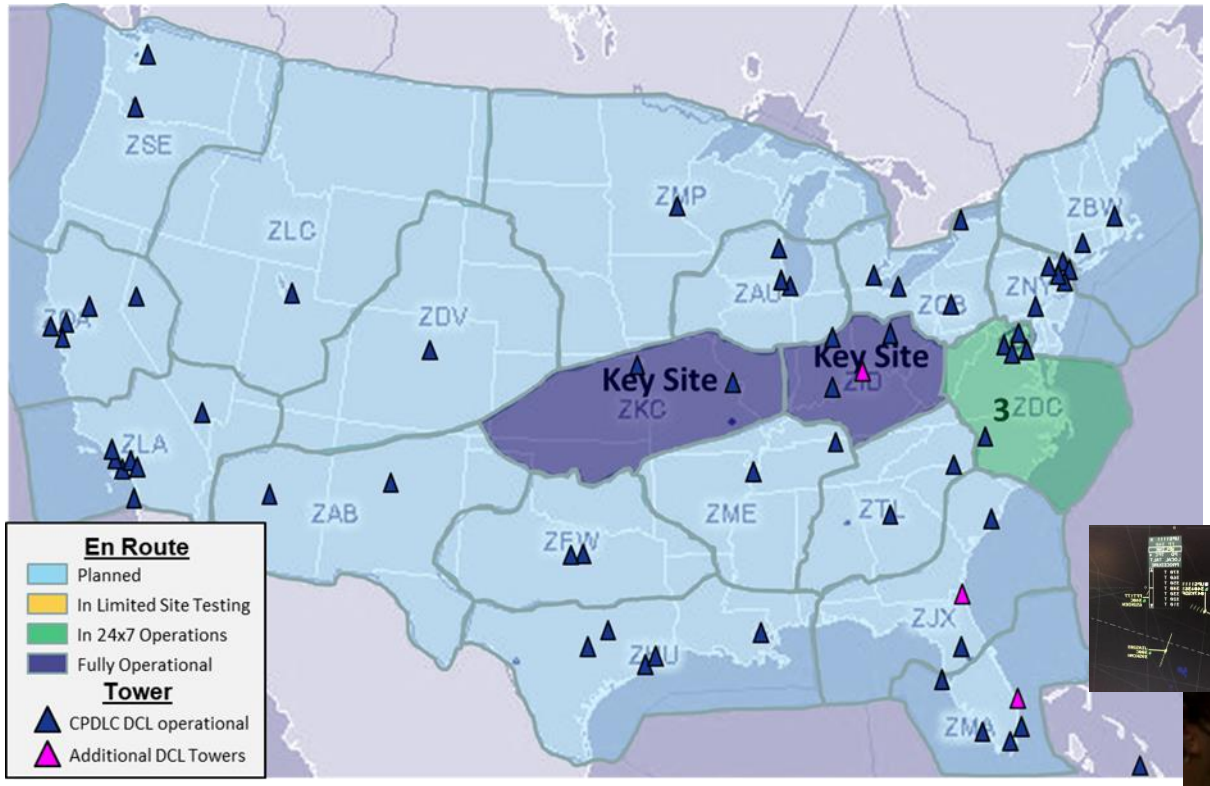
Jesse Wijntjes (FAA)

Chris Collings (L3Harris) & Ed Evans (Southwest Airlines)

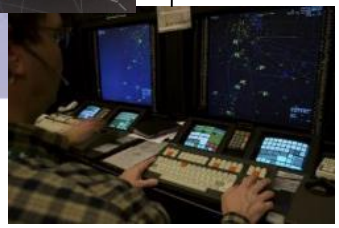
Data Comm Accomplishments

- Data Comm services are operational at 62 airports and the first 3 En Route Centers
- Business/General aviation & DOD communities addressing avionics issues and resuming En Route participation
- Localized air-to-ground interop issues are being fault isolated & addressed

Data Comm Operational Status



Air-to-Ground Network



En Route

Tower

Data Comm operational at 62 Towers

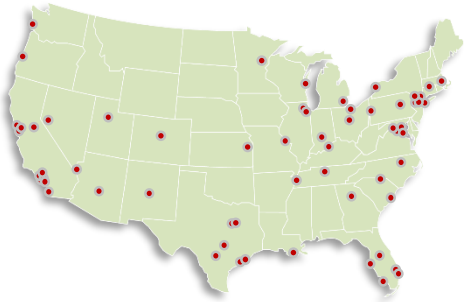
CVG, PBI, & JAX approved for Tower CPDLC DCL services

Data Comm operational at 3 En Route Centers

Data Comm Benefits

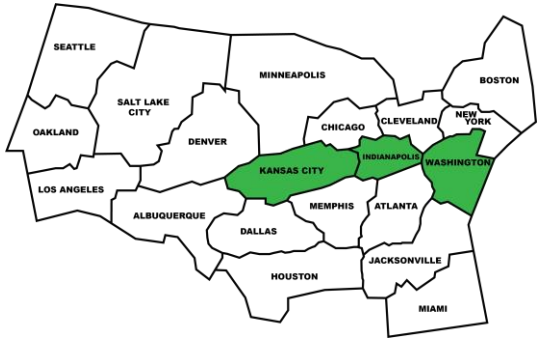
Since 2016, CPDLC DCL…

- Served 19 US Air Carriers and 70 Non-US commercial and cargo operators
- Cleared 10,743,890+ flights
- Saved 1,966,230+ minutes of air space user time
- Saved 2.80M+ minutes of radio time
- Prevented 23.42M Kgs of CO_2 Emissions
- Prevented 142,880+ readback errors



Since 2019, En Route Data Comm…

- Served 17 operators
- Cleared 1,287,717 flights
- Saved 571,605+ minutes of radio time
- Prevented 151,293 readback errors



2021 Data Comm NIWG/Avionics Ad Hoc Focus Items

1. **Resume En Route Center Data Comm deployment**

   Industry requesting the FAA to restart and complete the En Route Data Comm deployment as quickly and efficiently as possible.

   Resuming deployment will build momentum across the industry to realize operational benefits.

2. **Complete installation of Data Comm avionics updates for retrofit and newly delivered aircraft**

   Focus on Airbus ATSU CSB7.5, Collins CMU 900 Core 16, and
   Boeing 757/767 Pegasus 1 Latent Message Fix

3. **Track progress against plan for En Route STAR in Free Text mitigation**

   Recommendation accepted at March 2021 NAC

4. **Continue to track progress against NextGen Joint Implementation Plan (NJIP) milestones**

   Progress against FAA and industry Data Comm milestones

Data Comm Avionics Updates Fleet Status

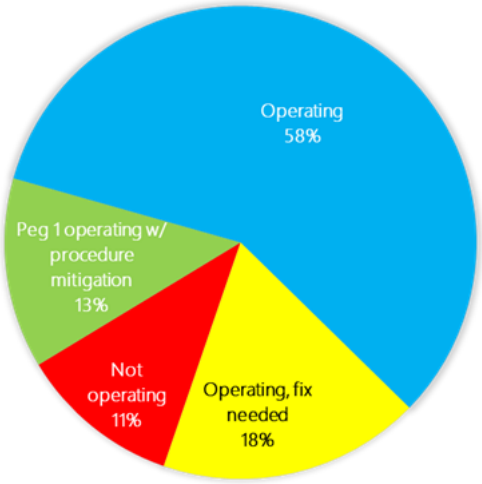
Aircraft operating in Data Comm en route – no pending actions

Operator & Fleet Actions Complete	Status
Alaska Airlines: A321	Operating en route, no action required
American Airlines: A321, B777, B787	Operating en route, no action required
FedEx: B777, MD11	Operating en route, no action required
Southwest Airlines: B737	Operating en route, no action required
United: B787	Operating en route, no action required
UPS: B744, MD11	Operating en route, no action required

Avionics Action	Operator/Fleet	Status
Aircraft operating in Data Comm En Route with Crew Procedure Mitigation		
Boeing 757/767 Pegasus 1	FedEx, UPS	Aircraft operating under procedure mitigation Avionics Fix: Q3 2022
Aircraft operating in Data Comm En Route with Open Avionics Actions		
Collins CMU 900 Core 16	Alaska, American, Delta, United	Install delayed (COVID), aircraft operating
Airbus A320 ATSU CSB 7.5	Delta, JetBlue	Fix released Dec 2020, aircraft operating, installs 60% complete; investigating technical issue
Boeing 777 AIMS 2 BP17B	United	Planned by end of 2021, aircraft operating
Boeing 747-8 ATN-203	UPS	Planned – Q4 2022, aircraft operating

Aircraft not operating in en route due to Open Avionics Actions

Avionics Action	Operator/Fleet	Status
Collins VDR Update	Alaska, United	Install delayed (COVID), aircraft removed
Boeing 757/767 Pegasus 1	United	Pending Peg 1 Avionics Fix: Q3 2022
Airbus A220	Delta, JetBlue	Aircraft removed from en route, need fix plan
Airbus A350	Delta	Aircraft removed from en route, need fix plan



Operating, no action required	Operating fix needed	Peg 1 operating with mitigation	Not operating

Data Comm NAC Open Action:
Boeing & Airbus to provide milestones for needed fixes

1. **Awaiting Airbus milestone for A220 avionics fix**
   - ✓ Airbus working on plan to address all open items – IMA Build 8.0A3 expected Q3 2023
   - > CMU: Airbus attempting to secure a plan with supplier for VDL Mode 2 "Core 16" enhancements
2. **Awaiting Airbus milestone for A350 avionics fix**
   - > Airbus developing a plan and due dates – expected Q4 2021
   - > Correction is considered through ACR non customizable database update
3. **Awaiting Airbus milestone for A320 retrofit for ATSU older H/W**
   - ✓ ATSU CSB 7.5.1 is planned, SB available Q2 2022
   - ✓ RDAF (Repair and Design Approval) to be released prior to the SBs availability to speed up retrofit
4. **Awaiting Boeing milestone for CMU900 Core 16 production cut-in for B737MAX**
   - ✓ Boeing plans to add Core 16 to TC for NLT end 2022 production introduction
   - > Detailed planning in progress
5. **Awaiting Boeing milestones for Nav Database revisions to mitigate en route STAR in free text for Pegasus II, B787, and B747 NG FMC**
   - > Boeing does not have firm milestones – B787 NDB work in progress
   - > B747 NG FMC will require an update in addition to NDB changes

Data Comm – NJIP CY19-21 Milestones (1 of 2)

Milestone	FAA or Industry	Milestone Date Q/CY	Status
Airlines to Equip 1,900+ Aircraft	Industry	4Q2019	Complete
Deploy Tower Services to an additional seven towers	FAA	3Q2019	Complete
Baseline additional Data Comm capabilities for En Route utilizing the existing FANS message set	FAA Industry	~~3Q2021~~ 3Q2024	Agreement reached with ANG to defer to 2024 to align with deployment of initial and full en route services and funding constraints. Need to close with NIWG on the decision
IOC for Initial En Route Services at all CONUS ARTCCs	FAA	~~4Q2019~~ ~~4Q2021~~ ~~4Q2022~~ 4Q2023	Milestone impacted by COVID-19; Remainder of waterfall to be replanned.
~~Resolution of avionics/Pegasus 1 interoperability issue~~	~~Industry~~	~~4Q2021~~	**Milestone OBE: March 2021 NAC recommendation to allow Pegasus 1 En Route STAR in Free Text for remainder of service life.**

With the impacts from COVID-19, these milestones will likely need to be further adjusted based on when the program can restart/complete the initial services waterfall

Data Comm – NJIP CY19-21 Milestones (2 of 2)

Milestone	FAA or Industry	Milestone Date Q/CY	Status
Recommendation for target equipage rates for follow-on capabilities	FAA Industry	~~1Q2019~~ 2Q2019	Complete
Recommendation for the equipage strategy for Regional Jet equipage	Industry	~~1Q2019~~ 2Q2019	Complete
Loadability Solution for Runway SID~~/STAR~~	FAA	3Q2019	Complete – Plan developed for future TFDM implementation
Solution for Full Automation for the Confirm Assigned Route Capability	FAA	3Q2019	Removed

Review of Action Items & Other Business

Greg Schwab, NAC Committee Manager (FAA)

Upcoming Meetings

- **NAC**
  - Spring 2022 – Late February
  - Summer 2022 – Late June
  - Fall 2022 – Late October

Closing Comments

Brad Mims, FAA Deputy Administrator

NAC Designated Federal Officer

Closing Comments & Adjourn

Chip Childs, NAC Chairman

President & CEO, SkyWest, Inc.

Attachment 2

NextGen Advisory Committee (NAC)
October 19, 2021 Attendance List

Last Name	First Name	Affiliation
Adcock	Tom	National Air Traffic Controllers Association
Aguirre	Carlos	Professional Aviation Safety Specialists
Allen	Jack	Airlines for America
Allen	Daniel	FedEx Express
Amato	Anthony	Professional Aviation Safety Specialists
Amen	Paul	American Airlines
Arbuckle	Doug	Federal Aviation Administration
Armstrong	Merrill	Federal Aviation Administration
Aron	Ludovic	European Union Aviation Safety Agency
Arrighi	Jim	Federal Aviation Administration
Ayelomi	Precious	Federal Aviation Administration
Bagstad	Brian	Federal Aviation Administration
Baker	Mark	Aircraft Owners and Pilots Association
Batchelor	David	SESAR Joint Undertaking
Bee	Lisa	Inmarsat
Bertapelle	Joe	Aireon
Binder	David	Federal Aviation Administration
Bolen	Ed	National Business Aviation Association
Borden	Michael	Science Applications International Corporation
Boyle	Virginia	Federal Aviation Administration
Bristol	Teri	Federal Aviation Administration
Brown	Lee	JetBlue Airways

Last Name	First Name	Affiliation
Bunce	Pete	General Aviation Manufacturers Association
Burns	Patrick	Delta Air Lines
Butler	Steven	Federal Aviation Administration
Buttie	Steve	Department of Defense
Cebula	Andy	Airlines for America
Challan	Peter	L3Harris
Childs	Chip	SkyWest Airlines
Chow	Martha	U.S. Government Accountability Office
Christiansen	Cindy	Public
Christie	Warren	JetBlue Airways
Cochran	Walt	Leidos
Collings	Chris	L3Harris
Cook	Chuck	JetBlue Airways
Dalton	Rick	Southwest Airlines
DeHart	Scott	Southwest Airlines
DeNicuolo	Mark	Federal Aviation Administration
DePete	Joe	Air Line Pilot Association
Dickson	Steve	Federal Aviation Administration
Dillman	Don	FedEx Express
Donohue	Denis	Raytheon
Dowd	Jody	Federal Aviation Administration
Drew	Craig	Public
Duffy	Kent	Federal Aviation Administration
Egentowich	John	Federal Aviation Administration
Evans	Ed	Southwest Airlines
Fanning	Eric	Aerospace Industries Association

Last Name	First Name	Affiliation
Flynn	Bob	United Airlines
Ford	JoAnn	Federal Aviation Administration
Glenn-Chase	Abigail	Air Traffic Control Association
Goldman	Robert	Delta Air Lines
Gorsky	John-Paul	Honeywell Aerospace Avionics
Griffin	Shannetta	Federal Aviation Administration
Gupta	Vipul	Honeywell Aerospace Avionics
Gusky	Amy	Federal Aviation Administration
Gutierrez	Ivan	Federal Aviation Administration
Guy	Rebecca	Federal Aviation Administration
Hahn	Edward	Air Line Pilot Association
Hargreaves	Cody	Alaska Airlines
Hennig	Jens	General Aviation Manufacturers Association
Heron	Dave	Department of Defense
Hicok	Dan	Federal Aviation Administration
Hill	Fran	Leidos
Hope	Chris	Federal Aviation Administration
Ince	Ilhan	PASSUR Aerospace, Inc.
Ireland	Robert	Airlines for America
Ivers	Ben	Boeing
Jenkins	Mara	Federal Aviation Administration
Jennings	Michael	Federal Aviation Administration
Jim	Eck,	L3Harris
Johnson	Antionette	Federal Aviation Administration
Joly	Pascal	Airbus
Kagzi	Ayaz	Federal Aviation Administration

Last Name	First Name	Affiliation
Kamyab	Ahmad	Federal Aviation Administration
Kasher	Alan	Southwest Airlines
Kauffman	Don	Honeywell Aerospace Avionics
Knorr	Dave	Federal Aviation Administration
Kohut	Anne	Airport Noise Report
Kotler	Scott	Lockheed Martin
Kovalcik	Luanne	Leidos
Kozica	Shawn	Federal Aviation Administration
Kubitz	Kermit	Public
Ladner	John	Alaska Airlines
Lamparello	Sandy	Federal Aviation Administration
Landon	Joseph	Lockheed Martin
Lawrence	Huntley	Port Authority of New York and New Jersey
Leone	Gregg	MITRE
Ley	Aloha	Federal Aviation Administration
Loring	Christopher	Federal Aviation Administration
Madera	Chico	Federal Aviation Administration
Maffei	John	Federal Aviation Administration
McCarthy	Kieran	U.S. Government Accountability Office
McCullough	Angela	Federal Aviation Administration
McGraw	Candace	Cincinnati/Northern Kentucky International Airport
Menchion	Chris	JetBlue Airways
Merkle	Michele	Federal Aviation Administration
Merlo	Philippe	EUROCONTROL
Miller	Brad	Honeywell Aerospace Avionics
Mims	Brad	Federal Aviation Administration

Last Name	First Name	Affiliation
Mitchell	Tiffany	Federal Aviation Administration
Mitra	Trin	Mitra Aviation Consulting
Moloney	John	Boeing
Morse	Glenn	Public
Nadarski	Nick	U.S. Government Accountability Office
Narvid	Juan	Federal Aviation Administration
Noonan	Kimberly	Federal Aviation Administration
O'Connor	Wendy	Federal Aviation Administration
O'Kelly	Caitlin	Federal Aviation Administration
Olson	Loren	Minneapolis Government
Olson	Lee	NASA
Oswald	Chris	Airports Council International - North America
Patel	Azmal	JetBlue Airways
Perez	Karina	Aerospace Industries Association
Pfingstler	Susan	United Airlines
Pierce	Brad	National Organization to Insure a Sound-Controlled Environment (N.O.I.S.E.)
Quigley	Bryan	United Airlines
Reimold	Dorothy	Federal Aviation Administration
Renk	Ron	United Airlines
Rice	Colin	Port of Seattle
Rinaldi	Paul	National Air Traffic Controllers Association
Rocheleau	Chris	Federal Aviation Administration
Ruehl	Steve	Department of Defense
Santa	Rich	National Air Traffic Controllers Association
Santos	Philip	FedEx Express
Schwab	Greg	Federal Aviation Administration

Last Name	First Name	Affiliation
Sequeira	Chris	Science Applications International Corporation
Shafa	Eric	Department of Defense
Shull	Mark	Public
Sinnett	Mike	Boeing
Smith	Ryan	United Airlines
Spero	Dave	Professional Aviation Safety Specialists
Spurio	Kip	Raytheon
Stevenson	Dawn	Federal Aviation Administration
Sullivan	Jim	JetBlue Airways
Surridge	David	American Airlines
Swol	Douglas	Federal Aviation Administration
Tamburro	Ralph	Port Authority of New York and New Jersey
Thoma	Don	Aireon
Toerber	Tim	Port of Seattle
Townsend	Brian	Allied Pilots Association
Trevisan	Amy	Federal Aviation Administration
Valcich	Jeremy	American Association of Airport Executives
Vincent	Jeffrey	Federal Aviation Administration
Waggoner	Edgar	NASA
Wendling	Kelle	L3Harris
White	Beth	Federal Aviation Administration
Whitley	Pamela	Federal Aviation Administration
Whyte	Bill	Regional Airline Association
Wijntjes	Jesse	Federal Aviation Administration
Wilkins	Aaron	Federal Aviation Administration
Willey	Doug	Air Line Pilot Association

Last Name	First Name	Affiliation
Williams	Heidi	National Business Aviation Association
Wongsangpaiboon	Natee	Federal Aviation Administration
Woods	Jeff	National Air Traffic Controllers Association
Yaplee	Darlene	Public
Yates	Vaughn	Federal Aviation Administration
Yates	Vaughn	Federal Aviation Administration
Zamora	Raul	Federal Aviation Administration

Attachment 3

Darlene Yaplee
Co-founder of the Aviation-Impacted Communities Alliance (AICA) and Concerned Citizens of Palo Alto

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Be inclusive, not exclusive

When the NAC resumes to in-person meetings, please allow public statements to be made over the phone and in person. It is not inclusive to require a public commenter to fly to Washington and speak at the NAC for 2 minutes.

Be inclusive, not exclusive

In the spirit of adequate and inclusive NAC membership, we urge the FAA and NAC to increase or change the makeup of its membership with representatives from communities to ensure that it includes a broad range of perspectives for the next NAC renewal date - June 15, 2022. And yes, we can get technically qualified public representatives.

Currently the NAC membership has a single “Environment” domain representative. For this domain:

- There are no representatives who are directly impacted by NextGen single site or metroplex projects, or are impacted from an FAA Core 30 airport.
- There are no members representing the public from community groups.
- Yet, the NAC has 7 representatives employed by airlines - understandably you want a broad range of perspectives -- regional, cargo and international airlines.
- The Environment domain needs more than one representative on the NAC.

Be transparent.

On page 69 of the NES report the FAA states it is making sets of data available for further analyses by others. Unfortunately, the FAA has released sets of data that are not complete because they omit important data such as "additional factors", which include the noise metric NAbove 50, an important supplemental metric that was recently highlighted in the GAO September 2021 report. There is no privacy protection reason to omit data like NAbove50. We ask the FAA to be transparent and remove this barrier so that independent analysis can be performed using the NES sets of data.

Thank you for your consideration.

Cindy L. Christiansen, PhD
Co-founding member of the National Aviation-Impacted Communities Alliance and BOS Fair Skies

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Two recent reports, the Neighborhood Environmental Survey Study from earlier this year, and the recently released Government Accounting Office on "Aircraft Noise" capture fundamental flaws and deep-rooted problems with the FAA's noise policies and in the way the FAA engages with communities that are affected by the FAA's choices and this NextGen Advisory Committee's recommendations to the FAA.

I hope that you are familiar with the results of the Neighborhood Environmental Survey Study. In a nutshell, it shows that the DNL metric and its threshold for significance does not capture the true burden of aviation noise, especially now with Performance Based Navigation. In measurement theory, we say that DNL is not a valid metric for this purpose.

The GAO report on Aircraft Noise, released just last month, states that "Since no single metric can convey different noise effects, using additional metrics – such as changes in number of flights overhead – in designing proposed flight paths could help FAA identify and address potential noise concerns." This GAO suggestion for additional noise metrics is consistent with the Aviation Safety and Noise Abatement Act passed by Congress in 1979. Congress asked for a **single system, not necessarily a single metric**, one that has a **highly reliable relationship between projected noise and people's reactions to noise**.

Upon review of the GAO report, Philip McNamara, the Assistant Secretary for Administration at the US Department of Transportation wrote:

> the Department concurs with the three recommendations to identify appropriate supplemental noise metrics, update guidance to incorporate additional communication tools, and provide clearer information to airports and communities on post-implementation.

There seems to be agreement from all stakeholders that the DNL metric fails in its use for aviation noise policy, even the science shows that too. There is community and other stakeholder agreement that additional and alternative noise metrics must be used when assessing how Performance Based Procedures are affecting people on the ground. My question to the NAC is what will your role be in correcting this aspect of NextGen? Will you recommend a community-based subcommittee to suggest a framework for valid assessment of aviation noise?

Kermit Kubitz
Member of the public. Not representing any organization.

Given the disproportionate effects of air travel on greenhouse gas emissions per person mile traveled, climate change effects of decisions about air travel need to be considered in every decision about air transport. Carbon emissions from the airline industry grew by 75 percent from 1990 to 2012. If allowed to continue to grow at this rate, they could consume a quarter of the available carbon budget for limiting temperature rise to 1.5 degrees Centigrade.

Given these significant impacts, I have three recommendations for the FAA NextGen Advisory Committee.

1. Analyze, take into account, and report on climate change impacts of any NextGen recommendations or programs.
2. Utilize climate change impacts as criteria for evaluating and making decisions about NextGen Programs and alternatives.
3. Consider more broadly alternatives, including alternatives
   To aircraft use or air travel, which may mitigate or reduce
   The climate change impacts of air travel.

The FAA NextGen program for modernizing the air traffic control and management infrastructure is to be congratulated for steps which reduce fuel burns, time in the air, and ground taxi time. I have reviewed the NextGen priority tasks, including Tasks 18-4 and 18-5, regarding Multiple Runway Operations, Performance Based Navigation, and the Northeast Corridor. However, I believe the a broader view of climate change impacts and alternatives to reduce those impacts should be discussed, considered, and adopted where feasible and economic.

The FAA and airlines are to be congratulated for steps like the Digital Communications Tower Services to be implemented at 55 airports which will reduce or eliminate 17.1 million kg of carbon dioxide emissions. Similarly, Required Navigation Performance (RNP) monitoring by satellite or ground will improve flight performance and reduce fuel use. Automatic Dependent Surveillance-Broadcast (ADS-B), Time Based Flow Management (TBFM) and Multiple Runway Operations (MRO) will have similar effects. However, further alternatives should be considered.

In the Northeast Corridor, consideration should be give to transportation alternatives, such as ground based travel by train or other efficient means, as an alternative to air travel, and given the shorter distances between airports in this corridor, electrification of air travel should be considered, supported, and implemented when feasible.

In addition, consideration should be given to landing and takeoff priority given to more fully loaded aircraft than underutilized passenger flights, where the emissions per passenger are much higher than fully loaded planes. Indeed, underutilized low capacity flights should be canceled and combined with other flights. Given that the total carbon impact of a single flight is so high that just one trip can be equivalent to going gasoline-car free for a year, minimizing flights should be considered throughout the NextGen program.

As recommended above, analyze and utilize climate change impacts in all NextGen decisions and include broad alternatives including alternatives to air travel. These recommendations apply to current issues such as Tasks 18-4, 18-5 and 21-1.

Mark Shull
Member of the public (Palo Alto, CA)

Hello, my name is Mark Shull from Palo Alto California.

California has a huge wildfire problem, made worse because people live close to wildlands. The same is true for airports; people live close to them.

At SFO for example, a large housing development is being planned near the end of the primary runways. The airport has objected, but affordable housing here is so scarce that it is almost certain to be built. Even in cities with lots of open land, airports draw businesses and housing to them like a magnet. And for those living further out, new concentrated procedures and lower arrival altitudes have brought the airport to them.

It is in no one's interest to ignore this reality. So how do we better live with it. For one, the FAA's charter should extend to people and costs on the ground, but that aside, there are plenty of opportunities to do what can be done.

For example, SFO has worked closely with communities as it implements GBAS, specifically using Eurocontrol's BADA model to analyze procedures. United has also run simulations. These flagged long-standing over-energy problems that trigger speed brakes, but instead of causing an uproar, the data was viewed as a step towards refining the procedure. SFO's transparent approach has not generated public opposition. In fact, the community is asking that the more advanced GBAS procedures be accelerated.

In contrast, we are perplexed over less transparency on issues like why over- the-bay arrivals vs. over-the-peninsula arrivals have decreased so much since NextGEN, and even more during the Pandemic when overall traffic is down 40%. Operations at SFO haven't grown much because of cross runway issues, so NextGEN and GPS should have increased use of the bay, rather than decreased it, particularly during the Pandemic or at 3:00 AM when there is little traffic. We hope that GBAS will help increase use of the bay over the next several years, and that situational awareness technologies like digital towers will eventually help SFO and Oakland share the bay, rather than use it as separation space. But whatever the technology, what we are really asking is that this community be as creative and engaged in mitigating impact, as it is in conjuring new ways to increase throughput.

Specifically:

1) Look for and fix fixable problems, like our over-energy Speed brake zone,
2) Trust transparency, and provide reasonably technical explanations on really important issues like use of the bay, and
3) Be open to new technologies – such as SFO's proposed enhanced GBAS procedures – that if accepted and used by your community, can also help our community, the public.

Thank you