Federal Aviation Administration

NextGEN

NEXTGEN ADVISORY COMMITTEE
TASKINGS – AD HOC STATUS REPORT
SEPTEMBER 2021

DISCLAIMER

This document is a consolidation of content drawn from NextGen Advisory Committee (NAC)-approved reports, approved NAC meeting summaries, and NAC tasking letters. All original materials are available on the NAC Public Website at: https://www.faa.gov/about/office_org/headquarters_offices/ang/nac/.

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Introduction

Beginning in 2019, the FAA started a series of focused engagements with the NextGen Advisory Committee (NAC) to explore potential mitigations to specific barriers to successful NextGen implementation. These engagements are in addition to the NextGen Priority focus area jointly agreed upon initiatives detailed in the NextGen Joint Implementation Plan (NJIP)[1] between the FAA and the NAC. These mitigation-focused and time-limited Ad Hoc taskings provide a mechanism for the FAA, in partnership with the NAC, to quickly address emerging issues. To date, the FAA has received advice from the NAC via Ad Hoc Teams in the areas of Minimum Capabilities List (MCL), Section 547 (Congressionally mandated pilot program specified in the 2018 FAA Reauthorization Act), Performance Based Navigation (PBN), ADS-B In, and Vertical Navigation (VNAV). This document provides information on each Ad Hoc tasking since October 2019 when the FAA assumed committee management responsibilities for the NAC.

NOTE: This document will be updated on an annual basis

19-1/20-4: NAS Aircraft Minimum Capability List (MCL)

Date Issued: October 2019

Original Tasking Language:

The NAC is asked to identify steps for further socialization and engagement strategies, to include additional stakeholders, to drive acceptance, use, and common understanding of benefits associated with the MCL.

This NAC advice should include, but not be limited to, the following:

> Collaborative analysis of current fleet equipage with respect to the MCL capabilities;
> Socialization of the MCL with additional stakeholder groups, including aircraft and
> equipment manufacturers and regional airlines not involved in discussions to-date; and
> Recommendations on steps to drive MCL adoption and commitments to equip aircraft with the associated capabilities.

This strategy should be provided on the following schedule:

> Fall 2019: NAC provides an interim progress report on the MCL efforts; and
> Summer 2020: NAC provides a report on the MCL efforts.

FAA Tasking Letter:
https://www.faa.gov/sites/faa.gov/files/about/office_org/headquarters_offices/ang/20191004_NAC_Tasks_19-1_19-2.pdf

20-4 (Task 19-1 Extension): NAS Aircraft Minimum Capabilities List (MCL)

Date Issued: September 2020

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[1] Reference https://www.faa.gov/about/office_org/headquarters_offices/ang/nac/ for more information on the NJIP and other NAC-related materials

Tasking Extension Language:

This tasking was originally issued prior to the emergence of the COVID-19 pandemic and its resulting economic impact on the aviation community. The FAA is cognizant of the need for the NextGen Advisory Committee (NAC) members to remain focused on restarting industry operations as an essential part of the national recovery. This tasking is extended through Fall 2020.

The NAC is asked to identify steps for further socialization and engagement strategies, to include additional stakeholders, to drive acceptance, use, and common understanding of benefits associated with the MCL.

The NAC advice should include the following:

> Collaborative analysis of current fleet equipage with respect to the MCL capabilities;
> Socialization of the MCL with additional stakeholder groups, include aircraft and equipment manufacturers and regional airlines not involved in discussions to-date; and
> Recommendations on steps to drive MCL adoption and commitments to equip aircraft with the associated capabilities, including developing cost / benefit and scoping cases – as proposed by the NAC.

This advice should be provided on the following schedule:

> Fall 2020: NAC provides a report on the MCL efforts.

FAA Tasking Letter:
https://www.faa.gov/sites/faa.gov/files/about/office_org/headquarters_offices/ang/20200930_NAC_Task_20-4_20-5.pdf

Summary of NAC Advice presented at November 17, 2020 NAC Meeting:

For more than a decade, it has been recognized that successful implementation of the Federal Aviation Administration (FAA) NextGen air traffic control modernization initiative requires an appropriate level of aircraft equipage that enables the use of core NextGen capabilities. Initially, the Northeast Corridor NextGen Implementation Work Group identified avionics mixed equipage as a NextGen. The FAA formally tasked the NextGen Advisory Committee (NAC) on October 4, 2019 with developing a recommendation for a Minimum Capability List (MCL) to mitigate the mixed equipage risk to NextGen.

The MCL is based on a review of current fleet operator avionics equipage levels and identifies the core capabilities necessary for future NextGen operations. It can be simply described as, "what avionics requirements would enable an aircraft being ordered today that will be brought into operation in 2025 and beyond to utilize NextGen FAA ATC capabilities?"

The core Aircraft Enabling Capabilities support the following major areas of ATC modernization in FAA's NextGen program:

> Communications - Data Comm, which gives air traffic controllers and pilots the ability to transmit flight plans, clearances, instructions, advisories, flight crew requests, and other essential messages via text, rather than voice.
> Navigation - Performance Based Navigation (PBN) procedures, combining Area Navigation (RNAV) and Required Navigation Performance (RNP), enable an aircraft to navigate using performance standards on any desired flight path within the coverage of ground- or space-based navigational aids and provides the ability to closely monitor performance during an operation.

> Surveillance - Automatic Dependent Surveillance – Broadcast (ADS-B) that relies on GPS satellites to identify the location of an aircraft more precisely than radar.

Representatives from all segments of the manned aircraft operator community, and aircraft and avionics manufacturers, supported by research from MITRE Corporation, conducted the analysis that led to the development of the comprehensive list. The MCL identifies the "baseline" capabilities, as well as other supplemental capabilities that operators may choose based on needs for access, efficiency or other reasons associated with making equipage decisions.

An important principle of the recommendation is the intent that the MCL is for prospective application, not a retrofit requirement. However, it is recognized that there may be business case driven decisions that will foster the installation of aircraft equipage in the current aircraft fleet.

The consensus contained in this report provides critical policy guidance as decisions are made by the aviation community and the government in modernization of the National Airspace System (NAS).

Full NAC Report:

https://www.faa.gov/sites/faa.gov/files/about/office_org/headquarters_offices/ang/MCL_Report_NAC_Final_4Nov20.pdf

MCL Matrix:

https://www.faa.gov/sites/faa.gov/files/about/office_org/headquarters_offices/ang/MCLFwdFitEquipage-NACFinal04Nov20.xlsx

FAA Response:

The FAA provided its response to the MCL report at the March 18, 2021 NAC Meeting.

Ms. Pamela Whitley, FAA Assistant Administrator for NextGen, said that she thinks the MCL will be recorded as one of the most important recommendations the FAA has received from the NAC. Equipping to the MCL level ensures NAS operators derive the maximum benefit from the FAA NextGen investments by specifying the minimum avionics equipment necessary to derive these benefits. She said the MCL work is foundational to the joint FAA and NAC understanding of aircraft equipage in relation to operationalizing NextGen and future airspace modernization efforts. She added that it informs NextGen implementation, as well as how the FAA operationalizes NextGen across the NAS. She said the MCL work is finding its way in to many very important discussions on Vertical Navigation and ADS-B In application forecasts. The FAA will also use it to inform strategic conversations on the viability of a PBN-centric NAS if operators cannot meet the MCL guidelines.

Ms. Whitley said that after careful review of the NAC MCL report and thorough consideration on its advice, the FAA intends to use the MCL as a living document to inform conversations going forward. Consequently, she recommended to the NAC Designated Federal Officer (DFO) to issue an FAA tasking to the NAC to periodically update the MCL with any new findings or any necessary changes over time to the document's underlying assumptions so that the document remains useful. She clarified that the tasking will request that the NAC review the MCL document once a year and report any findings and whether any changes need to be made to the original report. Ms. Whitley said that the FAA appreciates the work that went into developing the MCL. She added that it will be central to the FAA's ability to achieve the goal of a PBN-centric NAS and operationalizing NextGen.

19-2: Enhanced Air Traffic Services (EATS)/20-3: FAA Reauthorization Act of 2018, Section 547

Date Issued: October 2019

Tasking Language:

The NAC is asked to provide advice to the FAA in accordance with FAA Reauthorization Act of 2018, Section 547. To include, but not limited to the following elements:

> Interim: Identify Potential Airports and Candidate Applications

   o By Fall 2019, identify a short list of potential candidate airports and applications (airport, aircraft capability, and concept) for the pilot program
   o For airports, while the legislation points to providing preferential basis at airports with Ground Delay Programs, the FAA seeks a recommendation from Industry if this is appropriate or other airports are preferred and why
   o Describe potential and targeted benefits of most value to industry
   o Identify any watch items, especially system impacts, for consideration in the final phase

> Final: Down Select Candidate Airports and Applications

   o By Spring 2020, down select to three pilot program candidates
   o Define how implementing each of the pilot program candidates will lead to measurable benefits
   o For each pilot program candidate proposed, identify one or more operator sponsor(s) with commitment of aircraft and training

FAA Tasking Letter:
https://www.faa.gov/sites/faa.gov/files/about/office_org/headquarters_offices/ang/20191004_NAC_Tasks_19-1_19-2.pdf

20-3 (Task 19-2 Extension): FAA Reauthorization Act of 2018, Section 547

Date Issued: August 2020

Tasking Extension Language:

The NAC is asked to continue its efforts with providing advice to the FAA in accordance with FAA Reauthorization Act of 2018, Section 547. This tasking was originally issued prior to the emergence of the COVID-19 pandemic and its resulting economic impact on the aviation community. The FAA is cognizant of the need for the NAC members to remain focused on restarting industry operations as an essential part of the national recovery. This tasking is extended through Spring 2021 to ensure the FAA is able to fulfill the congressional request contained in Section 547.

The NAC advice should include the following:

> A short list of recommended candidate airports and applications (airport, aircraft capability, and concept) for the pilot program
> For airports, while the legislation points to providing preferential basis at airports with Ground Delay Programs, the FAA seeks a recommendation from industry if this is appropriate or if other airports are preferred and why

> Describe potential and targeted benefits of most value to industry.

Scope:

> FAA will provide the NAC team an update on current and near-term forecast of NAS operations.
> FAA will provide the NAC team an update of current FAA/NAC initiatives that might be considered in fulfillment of any part of Section 547 requirements.

FAA Tasking Letter:

https://www.faa.gov/sites/faa.gov/files/about/office_org/headquarters_offices/ang/20200810_NAC_Tasks_20-1_20-2_20-3.pdf

Summary of NAC Advice presented at March 18, 2021 NAC Meeting:

In October 2019, the Federal Aviation Administration (FAA) tasked the NextGen Advisory Committee (NAC) with providing advice on Section 547 of the FAA Reauthorization Act of 2018. This report documents the efforts of a NAC-level Ad Hoc Team and presents recommendations for the Enhanced Air Traffic Services pilot program.

The Ad Hoc Team has identified a short list of eight Section 547 pilot program candidates and recommends that preferential basis for the pilot program should not be based on Ground Delay Programs (GDPs), but on ability to provide advantage to equipped operators. Of the eight candidates, the three that provide a definitive gain for equipped operators and best meet the Ad Hoc Team's definition for preferential basis are:

> Simultaneous independent Established on Required Navigation Performance (EoR) at Los Angeles International Airport (LAX),
> Simultaneous dependent approaches to closely spaced parallel runways (FAA Order 7110.308) for General Edward Lawrence Logan International (BOS),
> Controller Pilot Data Link Communications (CPDLC) Departure Clearance (DCL) capabilities at Orlando International (MCO).

The FAA has stated that the procedures for BOS may not be feasible until mid-2022 due to ongoing environmental review and training considerations. A staggered start for the pilot program would support inclusion of this application at BOS.

The staggered start could also promote consideration for the remaining four candidates, particularly because they provide targeted benefits and showcase emerging technologies. A commitment to enabling activities could allow for the inclusion of these valuable candidates sometime in 2022:

> Advanced Required Navigation Performance (A-RNP) approach procedures for Ski Country airports, Missoula International Airport (MSO), Bozeman Yellowstone International Airport (BZN) or Eagle County Regional Airport (EGE),
> Simultaneous dependent EoR at Portland International Airport (PDX),
> Simultaneous dependent EoR at Dallas Love Field (DAL), and
> Simultaneous dependent EoR at Nashville International Airport (BNA).

While not directly meeting the preferential basis description, the Automatic Dependent Surveillance Broadcast (ADS-B) Out application enabling 3 nautical mile (nm) separation in en route airspace for Seattle Tacoma International Airport (SEA)/Seattle Air Route Traffic Control Center (ZSE) is expected to

provide access and throughput benefits, via equipping with ADS-B Out, and may be feasible by September 2021.

Full NAC Report: https://www.faa.gov/sites/faa.gov/files/2021-11/NAC-Task-20-3-Report.pdf

FAA Response:

The FAA provided its response to the Section 547 report at the June 21, 2021 NAC Meeting.

Ms. Teri Bristol, FAA Chief Operating Officer for the Air Traffic Organization, thanked the NAC for the advice on Section 547 provided at the March 18, 2021 NAC Meeting. She said the FAA was able to select three of the eight pilot program recommendations. The three selected initiatives were assessed as executable within the time period Congress stipulated (September 2021 through September 2023) and took into account the operational challenges the pandemic caused. She reviewed the following selections based on Congressional criteria and known program opportunities:

> PBN at Los Angeles International Airport (LAX): This pilot program will focus on reducing flying distances by offering Established on RNP (EoR) approach services at LAX
> ADS-B Out at Oakland Center: This pilot program will focus on increasing airspace capacity by offering reduced in trail separation, 5 nautical miles (NM) down to 3 NM, in portions of Oakland Center's airspace
> Data Comm at Orlando International Airport: This pilot program will focus on expediting reroute clearance deliveries via Controller-Pilot Data Link Communication (CPDLC) – Departure Clearance (DCL) during adverse weather events when departing Orlando

She clarified that although the remaining five recommendations were not selected as part of the Section 547 Pilot Program, the FAA is committed to their continued progress and they will remain on the Airspace Modernization Group's radar as part of their national strategic oversight. She also committed to providing periodic updates on the performance of the three selected initiatives.

19-3: Northeast Corridor: Joint Analysis Team (JAT) Assessment of Phase 2 Improvements

Date Issued: December 2019

Tasking Language:

The NAC is asked to continue the JAT, to reach an industry consensus on the performance impacts and benefits in the NEC resulting from implementation of Phase 2 commitments.

> The JAT will present updated findings on a semiannual basis or approximately every other NAC meeting. These updates will continue until nine months after the last NEC milestone implementation.

Summary of NAC Advice: N/A; task work still in progress.

FAA Response: N/A

FAA Tasking Letter:

https://www.faa.gov/sites/faa.gov/files/about/office_org/headquarters_offices/ang/20191219_NAC_Task_19-3.pdf

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19-4/20-5: Performance Based Navigation (PBN) Clarification

Date Issued: December 2019

Tasking Language:

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

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

Scope:

> FAA will provide MITRE data;
> Limited to three NAC and three FAA participants; and
> Complete work within three months of start.

FAA Tasking Letter:
https://www.faa.gov/sites/faa.gov/files/about/office_org/headquarters_offices/ang/20191210_NAC_Task_19-4.pdf

20-5 (Task 19-4 Extension): Performance Based Navigation (PBN) Clarification

Date Issued: September 2020

Tasking Extension Language:

This tasking was originally issued prior to the emergence of the COVID-19 pandemic and its resulting economic impact on the aviation community. The FAA is cognizant of the need for the NAC members to remain focused on restarting industry operations as an essential part of the national recovery. This tasking is extended through Fall 2020.

It has been several years since the publication of the 2016 Performance Based Navigation National Airspace System Navigation Strategy. Now is an appropriate time to gain further advice from the NAC to ensure the aviation community and FAA remain synchronized in the delivery and use of PBN capabilities and in achieving operational benefits. The FAA requests further definition and advice from the NAC in the form of this task.

The NAC advice should include the following:

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

Scope:

> FAA will provide the NAC team an update on current and near-term forecast of NAS operations.
> FAA will provide the NAC team an update of current FAA/NAC initiatives that might be considered in fulfillment of any part of PBN Clarification requirements.

This advice should be provided on the following schedule:

> Fall 2020: NAC provides a report on the PBN Clarification efforts

FAA Tasking Letter:
https://www.faa.gov/sites/faa.gov/files/about/office_org/headquarters_offices/ang/20200930_NAC_Task_20-4_20-5.pdf

Summary of NAC Advice presented at November 17, 2020 NAC Meeting:

In December 2019, the NextGen Advisory Committee received a tasking to provide the FAA (Federal Aviation Administration) with an assessment of a PBN (Performance Based Navigation) baseline, a definition of a PBN NAS (National Airspace System), and the identification of specific PBN desired outcomes at the Core 30 airports (minus HNL, plus TEB).

The PBN Ad Hoc Team's report provides details on PBN baseline capabilities consistent with the equipage outlined in the NextGen Minimum Capabilities List (MCL) and continues to endorse the 2016 PBN National Airspace System Navigation Strategy as the definition of a PBN NAS. The desired PBN outcomes are presented as a set of 48 prioritized PBN proposals. These proposals can serve as the fundamentals needed to achieve the objectives, address requirements, and meet expectations of the NAS NAV Strategy. More immediately, these priorities can be used to refresh the PBN production process and help the FAA move forward on the backlog of procedure requests in the Instrument Flight Procedures (IFP) Gateway.

The PBN Ad Hoc Team wishes to thank the FAA for this tasking and believes that this coordinated effort will provide a pathway forward for the continued implementation of PBN in the NAS and encourages further collaboration to support acceleration of the benefits of PBN to the NAS and its users.

Full NAC Report:
https://www.faa.gov/sites/faa.gov/files/about/office_org/headquarters_offices/ang/Updated_PBN_Clarification_Final_Report_for_NAC_Distro-Nov_2020.pdf

FAA Response:

The FAA provided its response to the PBN Clarification report at the March 18, 2021 NAC Meeting.

Ms. Teri Bristol, FAA Chief Operating Officer of the Air Traffic Organization (ATO), said that in a year of responding to unimaginable challenges facing the aviation community and the Nation, the NAC remarkably leaned into the challenges of airspace modernization by deliberating and delivering advice on a series of groundbreaking issues to address long-standing barriers to fully operationalizing NextGen. She said that the FAA has heard them and it takes NAC advice from the PBN Clarification, MCL, Section 547, Industry Avionics, and the "Opportunities" efforts very seriously.

She said the ATO Strategy office, led by Ms. Angela McCullough, ATO Vice President of Mission Support Services (AJV), is working the next steps in the evolution of airspace modernization. She said the team is poring over the results of the PBN Clarification, MCL, and opportunities advice.

Mr. Shawn Kozica, ATO AJV lead for airspace modernization, said that the shared vision for the NAC is currently laid out in the PBN NAS Navigation Strategy, which is a vision document that lays-out a desired end state and high-level commitments through 2030. He said the focus now is putting the "how" down on paper as the Metroplex program closes. This will be a national roadmap to continuously evaluate and/or modernize the airspace infrastructure and processes. He described that FAA Headquarters will provide leadership and direction on strategic priorities, integration, resources, and messaging. The regions will focus on the regional prioritization, collaboration, and resource deployment based on local considerations, and aligned with the national strategy. He said this will empower regional leadership teams to take ownership of work and prioritization in the service areas and set the course of where they want to go with their region.

He then reviewed the roadmap's key themes:

> Integrated
  o Future airspace modernization efforts integrated with existing projects and programs
  o Holistic, long-term planning around major airports to reduce repeated visits, ensure resource availability, and efficiently transition to a satellite-based NAS
  o Mr. Kozica described that this is ensuring HQ connectivity with one clear strategy that is also making sure to consider what is coming down the pipe tomorrow

> Sustainable
  o Improved/streamlined business processes to ensure continuous/sustainable review, refresh, and modernization
  o An inclusive stakeholder collaboration/governance to enable consistent connectivity and integration
  o Mr. Kozica mentioned that this includes using the good advice from activities like the MCL and PBN Clarification work to inform efforts moving forward

> Agile
  o Processes, structures, and resources that allow for scalability based on evolving technologies, new entrants, shifting priorities, and changing environments
  o Long-term strategic planning balanced with the ability to be agile without becoming tactical

FAA Response (Update):

At the October 2021 NAC meeting, the FAA provided an update to their initial response given at the March 2021 NAC meeting.

With regard to the NAC's PBN Clarification advice, Mr. Shawn Kozica (FAA) 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.

20-1/21-2: ADS-B In Commercial Application Technologies

Date Issued: August 2020

Tasking Language:

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.

Scope:

> FAA will provide the SMEs.
> MITRE may be used as a trusted clearing house for data (considered sensitive in nature to the operators).
> Complete work and provide a final recommendation report no later than the Spring 2021 NAC meeting.

FAA Tasking Letter:

https://www.faa.gov/sites/faa.gov/files/about/office_org/headquarters_offices/ang/20200810_NAC_Tasks_20-1_20-2_20-3.pdf

21-2 (Task 20-1 Extension): ADS-B In Commercial Application Technologies

Date Issued: March 2021

Tasking Extension Language:

The NAC is tasked to provide the FAA with insight from 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.

Scope:

> FAA will provide the SMEs.

> MITRE may be used as a trusted clearing house for data (considered sensitive in nature to the operators).

> Complete work and provide a final recommendation report no later than the Summer 2021 NAC meeting.

FAA Tasking Letter:

https://www.faa.gov/sites/faa.gov/files/about/office_org/headquarters_offices/ang/20210317_NAC_Task_21-1_21-2.pdf

Summary of NAC Advice presented at June 21, 2021 NAC Meeting:

NAC Task 20-1 requested for industry to report to the NAC regarding the interest of ADS-B In Commercial Application Technologies (referred to as ADS-B In Applications herein) for FAA understanding and future decision processes concerning funding for ADS-B In programs. An ad-hoc group comprised of Airlines, Aircraft and Avionics OEMs, and industry association representatives was formed through the NAC SC Chairman and vetted through the Department of Transportation. The Task Group met with FAA SMEs on several occasions to discuss and evaluate ADS-B In Applications and benefits. Industry was particularly interested in understanding how ADS-B In Applications might improve the National Airspace System (NAS) – with an emphasis on carbon emission reductions and improved customer satisfaction.

The Task Group focused on identifying how ADS-B In Applications address the core values with which airlines would agree. After discussing the benefits of ADS-B In Applications, discussions began on the challenges to equipage and how the FAA could assist airlines in evaluating future equipage decisions.

What Airlines Value

Airlines do share core values independent of specific marketing strategies. Reduction in delay within the NAS is a priority for all users. Part of reducing block times includes eliminating block variability when possible. Consumers value a product that includes timely flights with few to no disruptions. Focus on reduction in flight time, block variability, and system disruptions generate high value for every airline and have significant advantages in improving consumer satisfaction.

Analysis of airport metrics shows airline and customer values that drive schedules. Below are two graphs that illustrate the total number of aircraft arrivals (blue) and departures (orange) per quarter- hour coming in and out of ATL (Figure 1-1) and MEM (Figure 1-2). The Task Group explored the question– can ADS-B In Applications allow the controller to perform their duties more efficiently to better manage airline marketing strategies?
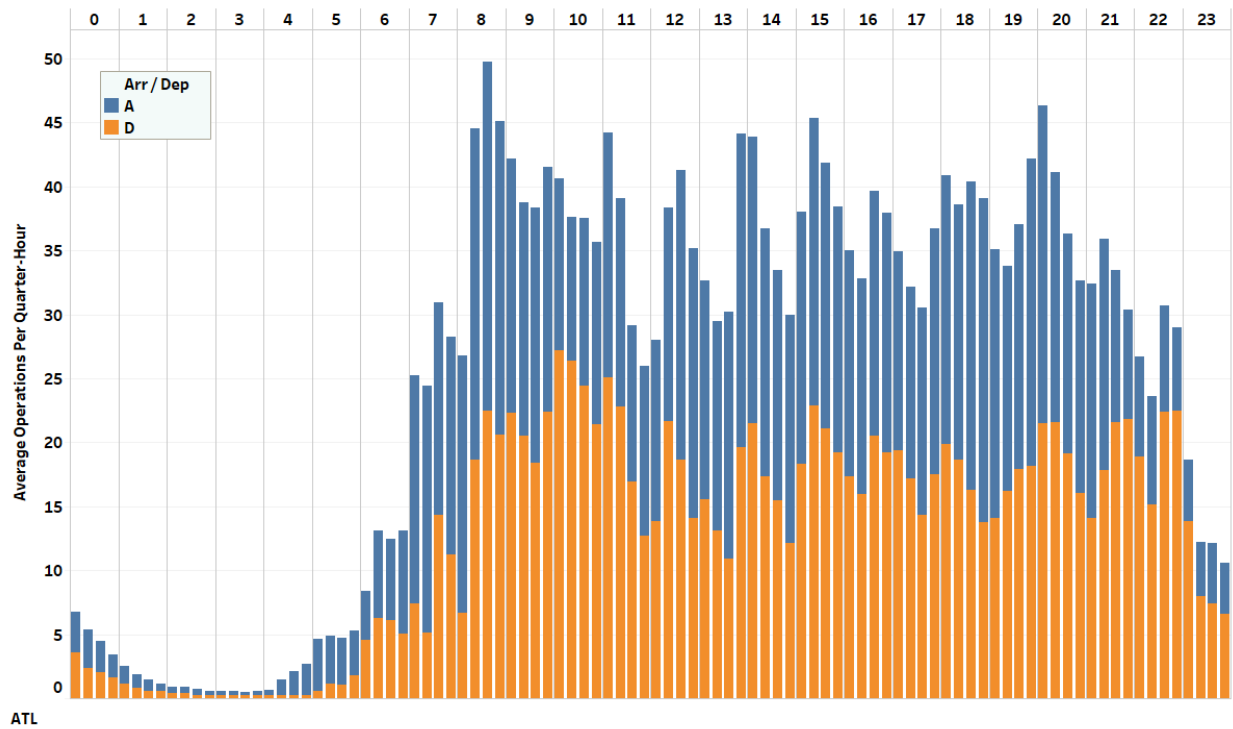
Figure 1-1: ATL CY2019 Average Operations By Local Quarter-Hour Figure generated by the MITRE Corporation
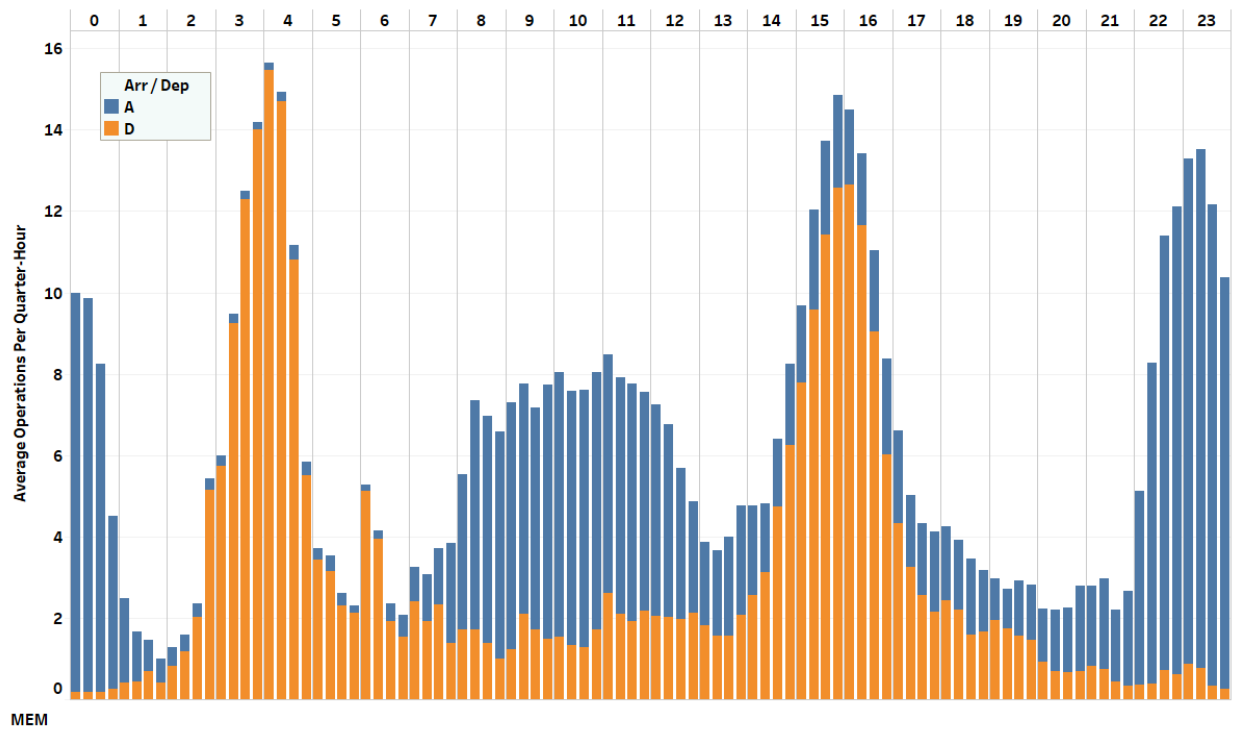

Figure 1-2: MEM CY2019 Average Operations By Local Quarter-Hour Figure generated by the MITRE Corporation

ADS-B In Applications and How They Meet Operator Values

The Task Group spent the preponderance of time evaluating ADS-B In Application benefits of reducing delay and flight time variability due to environmental factors. The ADS-B In Applications that the Task Group considered are summarized in Appendix C.

Airline interests included a focus on terminal efficiencies created using the Cockpit Display of Traffic Information (CDTI) Assisted Separation (CAS) as it applied to reducing variability in airport arrival rates given differing ceiling and visibility conditions. Applications that allowed for runway arrival rates to be maintained when visibility dropped below traditional approach visual rules received the most interest for the airlines. CAS was widely accepted as providing a strong business case for airlines desiring to invest in ADS-B In Applications. Flight-deck Interval Management and In-Trail Procedures closely followed CAS as ADS-B In Applications that could help airline metrics.

Considering airline values of reducing delay and schedule variations caused by environmental factors, ADS-B In Applications have the ability to improve airspace efficiencies through consistent aircraft spacing performance and also provide greater pilot situational awareness. Use of these improved performance applications could be a factor in airline investment decision going forward.

Given the difficulties in approval for additional runways, improved airspace efficiencies are needed to accommodate forecasted growth. Furthermore, as efficiencies in airspace occur, carbon reductions will be realized due to reduced track miles. Improved final spacing will contribute to increased airspace efficiency.

Barriers to Investment

In conversations with the airline community represented on this task, it was clear that the impacts of COVID-19 will result in a delay on any short-term investments for all projects. Given the economic impact and rising debt of the industry, this was not a surprise to anyone in the group. Even still, industry representatives are interested in future NextGen technologies and how those technologies will benefit their respective airline.

Long Term barriers are not as clear, and the range of reasons varies based on each airline. But central to the airline and OEM conversations were rooted in the criticality for the FAA to make the future investments allowing controllers to identify aircraft equipped with the appropriate ADS-B In Applications avionics packages and operational approvals. FAA investment decisions for ATC automation tool enhancements will be necessary for airlines and OEMs to commit to future ADS-B In equipage.

Pilots, whether they were technical pilots representing their respective airline or representing their association, saw issues regarding policy and procedures related to these new applications affecting their crews that need to be addressed. They want separations responsibilities to remain as they are in current day operations.

This report summarizes the approach and methodology that the Task Group used to arrive at their recommendations. Next, the report summarizes responses that Operators, Aircraft and Avionics OEMs, and several associations provided in response to questionnaires prepared by the Task Group. Finally, the report concludes with Section 5, Recommendations, which provides detailed recommendations for the FAA, Operators, Pilot Associations and Aircraft and Avionics OEMs, and NATCA to mitigate risks that could impact successful deployment of ADS-B In Applications. The Task Group recommendations for the FAA include:

> Formally notify Operators and OEMs when the FAA makes investment decisions or changes previously communicated investment approaches
> 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
> Develop safety cases that show the proposed ADS-B In Applications meet or exceed an equivalent level of safety
> 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) (also known as Required Time of Arrival [RTA]) and communicate it to Operators, OEMs, pilots and air traffic controller associations, and standards developing organizations as changes occur
> 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
> Explore, with the Operator community, methods to provide operational incentives for Operators to equip

Full NAC Report:

https://www.faa.gov/sites/faa.gov/files/about/office_org/headquarters_offices/ang/NAC_Task_20-1_Final_Report_20210604.pdf

FAA Response:

The FAA provided its response to the ADS-B In Commercial Application Technologies report at the October 19, 2021 NAC Meeting.

Mr. Doug Arbuckle (FAA) 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

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

> <u>Recommendation 2</u>: 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

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

> <u>Recommendation 3</u>: Develop safety cases that show the proposed ADS-B In Applications meet or exceed an equivalent level of safety

   o Most ADS-B In applications have safety cases as documented in a RTCA/EUROCAE Safety, Performance and interoperability Requirements (SPR) document
   o Regardless, FAA will perform Safety Risk Management per ATO Safety Management System prior to introducing new ADS-B In operations into the NAS
   o FAA believes that this meets intent of this recommendation

> <u>Recommendation 4</u>: Develop funding support programs for Operators and OEMs participating in Operational Benefits Validation field trials

   o FAA has already provided funding to support AIRS evaluation, which is an Operational Benefits Validation field trial
   o 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
   o Decisions on scope and amount of such funding will be made as part of FAA investment decision processes

> <u>Recommendation 5</u>: 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

   o 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
   o 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

  o 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
  o 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
  o 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)

  o 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
  o Therefore, GDPs were taken out of Section 547 Pilot program
  o 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

20-2: Vertical Navigation (VNAV)

Date Issued: August 2020

Tasking Language:

The NAC is tasked to provide the FAA an industry plan to address the existing equipage gap that prevents the full use of Required Navigation Performance (RNP) approaches for parallel operations. Currently, simultaneous operations cannot be used effectively by operators or air traffic control without a high participation rate. This change will allow the FAA to move forward and unlock larger safety and efficiency benefits associated with initiatives such as, Performance Based Navigation (PBN) paths to final approach, and Established on RNP (EoR).

The NAC advice should include the following:

> A comprehensive assessment of mainline and regional airline impediments to equipage for full VNAV operations.
> Achieve consensus on a plan to eliminate impediments to equipage for VNAV operations.
> Where complete consensus cannot be achieved, identify those operators or industry organizations which cannot come to consensus agreement and provide a minority opinion on any objections.

Scope:

> FAA will provide the SMEs.

> MITRE may be used as a trusted clearing house for data (considered sensitive in nature to the operators).
> Include other stakeholder organizations to include relevant manufacturers and pilot unions.
> Complete work and provide a final recommendation report no later than the Fall 2020 NAC meeting

FAA Tasking Letter:

https://www.faa.gov/sites/faa.gov/files/about/office_org/headquarters_offices/ang/20200810_NAC_Tasks_20-1_20-2_20-3.pdf

20-2 (Revision): Vertical Navigation (VNAV)

Date Issued: January 2021

Tasking Language:

The NAC is tasked to provide the FAA an industry plan to address the existing equipage gap that prevents the full use of Required Navigation Performance (RNP) approaches for parallel operations. Currently, simultaneous operations cannot be used effectively by operators or air traffic control without a high participation rate. This change will allow the FAA to move forward and unlock larger safety and efficiency benefits associated with initiatives such as, Performance Based Navigation (PBN) paths to final approach, and Established on RNP (EoR).

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FAA Tasking Letter:

https://www.faa.gov/sites/faa.gov/files/about/office_org/headquarters_offices/ang/20210111_NAC_Task_20-2_Revision.pdf

Summary of NAC Advice presented at June 21, 2021 NAC Meeting:

When Vertical Navigation capability (VNAV) was introduced in aircraft equipage, it brought a fundamental change to the National Airspace System (NAS). VNAV offers a host of improvements to aircraft operations, ranging from safety enhancements to improved efficiencies. By far, VNAV's greatest

benefit was the ability to fly stable, vertically guided approaches to all runway ends. Prior to VNAV, only the Instrument Landing Systems (ILS) provided vertical guidance to touchdown.

In the NextGen era, efficiency and reduction of carbon emissions are added VNAV benefits, captured by enabling idle descent paths on terminal arrival procedures and participating in Established on RNP (EoR) operations at airports with widely spaced runways. VNAV also enables more resilient low visibility approaches when an ILS facility is out of service. The presence of LNAV and VNAV on an aircraft implies that the operator is no longer dependent on a ground-based Navigation Aid infrastructure. More and more, industry has innovated new solutions through which VNAV improves airline operations.

At the time of this report, there are approximately 7,351 Title 14, Code of Federal Regulations (14 CFR) part 121 aircraft, roughly 1,245 of which lack VNAV capability. Seventy-four percent of these aircraft are regional aircraft. While regional jets were hailed as a "game-changer" for passenger comfort, being able to fly quieter and higher than the turboprops they replaced, they were also equipped with avionics similar to those turboprops, which flew low and slow.

This lack of advanced equipage left the small regional and older mainline aircraft unable to realize VNAV benefits.

While many aging mainline aircraft continue to be retired, this is not the case with the 50-seat regional jet. Many will operate through this decade and, lacking VNAV capability, continue to present a barrier to safe, stable approaches and achievement of key NextGen benefits.

Some of the key impediments to VNAV upgrades include: continual threat of aircraft retirement, cost of avionics, lack of perceived Return on Investment (ROI), and the nature of mainline/regional short-term capacity purchase contracts.

These impediments have translated to increased pilot workload, lack of efficiency, and reduced safety when ILS is out of service or not offered at an airport. It's also worth noting that while the focus of this report is on VNAV capability, many aircraft without VNAV also lack other key NextGen capabilities. This group encourages the reader to also review the NAC Tasking 19-01, Minimum Capabilities List (MCL), to better understand the impediments caused by equipage gaps.

Full NAC Report:

https://www.faa.gov/sites/faa.gov/files/about/office_org/headquarters_offices/ang/NAC_Task_20-2_Report.pdf

FAA Response:

The FAA provided its response to the Vertical Navigation (VNAV) report at the October 19, 2021 NAC Meeting.

Mr. Chris Hope (FAA) 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

   o 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

   o Capability to fly curved Radius to Fix (RF) procedure segments
   o RNP position alerting and reporting features, and
   o VNAV

> PARC activity on operational concept for A-RNP approach implementation

   o 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.)
   o Achieve similar benefit of RNP AR but add more lines of minima, e.g., LPV, LP. LNAV/VNAV, LNAV

21-1: NAS Aircraft Minimum Capabilities List (MCL) Annual Review

Date Issued: March 2021

Tasking Language:

The NAC is asked to periodically review the MCL, published by the NAC in 2020, and provide any recommendations for updates or changes on an annual basis, including but not limited to:

> - Assumptions that need re-evaluation;
> - Quick refresher of available technology or op specs and any new technologies announced by industry;
> - Changes in scope or changes in views of retrofit by industry;
> - Any recommendations on steps to further drive MCL adoption and commitments to equip aircraft with the associated capabilities; and
> - Any updates to cost/benefit data provided by the NAC

This advice should be provided on the following schedule:

> - Fall 2021: NAC provide a report on the MCL annual review
> - Fall 2022: NAC provide a report on the MCL annual review

FAA Tasking Letter:

https://www.faa.gov/sites/faa.gov/files/about/office_org/headquarters_offices/ang/20210317_NAC_Task_21-1_21-2.pdf

Summary of NAC Advice presented at October 19, 2021 NAC Meeting:

MCL Ad Hoc Team Lead, Mr. Ron Renk (United) 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
  o How does MCL support over-arching industry goals like schedule reliability, capacity, and delay reduction?
  o New entrants into the NAS like supersonic jets, electric aircraft and UAS. How do they fit into MCL?
  o 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
  o Possibility of some ADS-B In technologies moving from supplemental to baseline
  o SATCOM as a supplemental item
  o DME Based RNP Resiliency - MOPS/MASPS almost complete
  o Radio Frequency Interference (RFI) concerns:
    ▪ Radar Altimeters
    ▪ GPS (resiliency and Complimentary PNT)

> Changes in scope or changes in views of retrofit by industry
  o 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
  o More work to be done with OEMs to incorporate baseline items

> Any updates to cost/benefit data provided by the NAC
  o 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
  o 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

FAA Response: TBD