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Meeting Summary, June 5, 2015

NextGen Advisory Committee (NAC)

The fifteenth meeting of the NextGen Advisory Committee (NAC) was held on June 5, 2015 at RTCA, Inc., 1150 18th Street NW Suite 910, Washington DC. The meeting discussions are summarized below.

List of attachments:

- Attachment 1 - Attendees
- Attachment 2 - Presentations for the Committee meeting - (containing much of the detail on the content covered during the meeting)
- Attachment 3 - Approved February 26, 2015 Meeting Summary
- Attachment 4 - NAC Chairman's Report
- Attachment 5 - FAA Report from The Honorable Michael Whitaker, FAA Deputy Administrator
- Attachment 6 – NACSC Ad Hoc Metrics Group Report
- Attachment 7 – NAC Ad Hoc ADS-B Report
- Attachment 8 - FAA Response to RTCA "Blueprint for Success to Implementing Performance Based Navigation" Recommendations
- Attachment 9 – Chief NextGen Officer update to Congress 2015

Welcome and Introductions

Chairman Anderson opened the meeting at 9 a.m. by welcoming the NAC members and others in attendance. All NAC members and attendees from the general public, including those joining virtually via WebEx phone/internet, were asked to introduce themselves (attendees are identified in Attachment 1 and the presentation used during the conduct of the meeting are contained in Attachment 2).

Designated Federal Official Statement

In his role as the DFO, The Honorable Michael Whitaker (FAA Deputy Administrator) read the Federal Advisory Committee Act notice, governing the public meeting.

Approval of February 26, 2015 Meeting Summary

Chairman Anderson asked for consideration of the written Summary of the February 26, 2015 meeting. By motion, the Committee approved the Summary (Attachment 3).

Chairman's Remarks

The following is a summary of the remarks made by Chairman Anderson (Attachment 4):

Chairman Anderson thanked the FAA for its continued commitment to work with the Industry in the implementation of NextGen capabilities. He emphasized the “common motivation” of members of the community with different perspectives but with the common goal of advancing efficiency and safety of the ATC system. He commended the NextGen Integration Working Group (NIWG) for receiving the Achievement Award at the RTCA Symposium earlier in the week.

Chairman Anderson commented that prior to the NAC meeting, the NAC received a briefing from members of the National Research Council (NRC) of the National Academy of Sciences on its recent report, "A Review of the Next Generation Air Transportation System: Implications and Importance of System Architecture." This discussion put into perspective how the NAC and its predecessors at RTCA have been consistently focused on the successful implementation of NextGen, in an evolutionary manner that delivers benefits, bolsters collective confidence and encourages investments.

He stated that since the last meeting:

- The FAA and industry have been working on implementing surface capabilities of Electronic Flight Strips and Departure Metering building.
- There was progress on Wake ReCat that continues delivering “huge” benefits and in an accelerated implementation time-frame.

- The Ad Hoc Metrics group had reached consensus on six metrics for tracking performance improvements following the implementation of the top four operational capabilities.

Chairman Anderson highlighted that during the meeting, the Committee would:

- Consider a NACSC recommendation for six metrics to track the impacts of implementing capabilities in the four priority areas.
- Discuss for approval the ADS-B Ad Hoc group findings, led by General Tuck, working closely with Marke Gibson of the NextGen Institute.
- Receive a briefing and discuss the FAA's response to the NAC's Blueprint for Performance Based Navigation Procedures Implementation Report.

He emphasized the desire on the part of industry to see a comprehensive plan from the FAA for the eleven tier 1 capabilities that includes needed investments, deployment dates, and expected benefits, calling this classic project management.

FAA Report - Mike Whitaker, Deputy Administrator, FAA

The following are highlights of Mr. Whitaker's remarks. The details are contained in the official FAA report (Attachment 5).

Mr. Whitaker stated that the industry partnership has led to substantial progress in several of the key NextGen technologies, since the last NAC meeting in February.

ERAM – Mr. Whitaker thanked the National Air Traffic Controllers Association (NATCA), Professional Aviation Safety Specialists (PASS) and Lockheed Martin for helping to make ERAM fully operational at 20 En route centers. He also highlighted how ERAM is the backbone of the national ATC system serving as the platform for other NextGen technologies such as ADS-B and DataComm.

DataComm – Mr. Whitaker expressed appreciation to FedEx Express, UPS, United Airlines, Harris and Thales Cooperation, for the successful trials of DataComm at Memphis and Newark. While highlighting the game-changer that DataComm is, Mr. Whitaker also communicated to the NAC that during the summer DataComm will be rolled out at Houston's two major airports and Salt Lake City, and that 53 more airports will be added in 2016.

ADS-B – JetBlue, NATCA and PASS were recognized for conducting a successful demonstration of ADS-B coverage with JetBlue aircraft. The FAA is working closely with the Aircraft Owners and Pilots

Association (AOPA) to educate general aviation aircraft (GA) owners. He stated that a recent survey found that 56% of GA owners surveyed indicated that until the price comes down they did not plan to install ADS-B. While the aviation community does face a tough challenge in getting everyone equipped for the 2020 mandate, Mr. Whitaker assured the NAC that the FAA was working together with all the partners and the ADS-B Ad Hoc Group to identify and get past any barriers to meeting the deadline.

Benefits to everyone as we continue to build the system – Mr. Whitaker mentioned the work carried out by McKinsey Consulting that identified $1.6 billion in system-wide benefits, with more than $500 million going directly to aircraft operators. He also stated that the FAA expected NextGen capabilities to continue to produce an additional $11.4 billion over the next 15 years. Mr. Whitaker thanked the Industry for its partnership with the FAA, as it allowed for maintaining schedules in modernizing the national ATC system. Last year Houston and North Texas Metroplex plans were successfully implemented, and this year the same was done with Washington D.C. and Northern California areas. Mr. Whitaker added that while some of NextGen projects have gone on without a hitch, others continue to be controversial to the general public, and that the FAA is working hard to minimize significant impacts of the proposed changes.

Importance of the NAC partnership – Mr. Whitaker noted that the work on the NAC is an excellent example of what we can accomplish when government and industry partner on achieving common goals. Reviewing the work of the NIWG and its joint implementation plan, he stated that in 2014, 19 commitments were delivered collectively – three ahead of schedule. In order to tackle the modernization of the U.S. airspace system, he stated that they are using a pragmatic approach that matches investments with tangible benefits to airlines and passengers.

PBN Strategy – Mr. Whitaker explained that the FAA has initiated a cross-agency effort to develop a PBN strategy that identifies the key navigation capabilities and operations needed over the next 15 years. It lays out a roadmap for deploying and effectively using PBN in the NAS while ensuring safety and efficiency. He emphasized the importance for Industry and FAA to agree on a strategy that will allow for a transformation, while providing the framework that supports the broader NextGen efforts.

PBN Program Manager Josh Gustin and FAA Flight Technologies and Procedures Division Manager Bruce DeCleene led a discussion of the FAA's planned revision of the 2006 PBN Roadmap.

In response to questions and comments from several members of the Committee related to the need to maintain legacy ground based Navaids for up to 15 years (specifically VHF omnidirectional range (VORs)), the FAA representatives explained that they would still be necessary although the number would decrease over time. They also noted that it was in large part determined by the industry and that a VOR Minimum Operating Network was being finalized.

A Committee member asked if the implementation of ADS-B in 2020 changes the current system and accelerates the implementation of the VOR MON. An FAA representative noted that it will be a part of the PBN Strategy. A controller representative expressed the need for resiliency and redundancy as the system transitions and commented that a shell system of ground aids are necessary. The cost and scope will also need to be determined.

During the briefing it was noted that the transition will take 15-years; PBN is the preferred Navaid with a ground based back-up; there are various operational concepts that need to be resolved; and various levels of capabilities drive equipage.

In response to a question about the assumptions related to automation, Mr. DeCleene commented that there is a need to have an understanding of how the various platforms and capabilities fit into the plans for the PBN Strategy including the integration of DataComm. A Committee member expressed the belief that this would actually help drive the transition in the use of DataComm.

It was also noted by a Committee member that because GPS is a necessary component of ADS-B for surveillance it may also drive the equipage rates and facilitate the implementation of “GPS only” airspace. Another cautioned that the trade-offs related to any mandated access limits must be identified.

A discussion took place about the use of GPS for other than Surveillance, including Navigation. It was suggested by the FAA that although the PARC produced good work regarding this issue, if we now step back and look at the bigger NextGen integrated C, N and S, the scope of addressing the integration issues would likely need come to the NAC.

The discussion concluded with next steps, and later reaffirmed by the Committee, that the FAA’s PBN Aviation Rulemaking Committee would take the first steps in reviewing the existing policy and developing a recommendation for consideration by the NAC. The process will include representatives

from the NIWG and PBN Blueprint Task Group as well as the NAC Subcommittee to provide important industry policy input and report back to the NAC.

Steady Funding and Reauthorization – Mr. Whitaker stated that the FAA remains confident that the benefits of NextGen will only increase as more capabilities come on line, but that this will only happen if there is a continuous, reliable source of funding to deliver the next milestones. He informed the NAC that the FAA's current authorization expires on September 30, 2015, and the FAA is committed to working closely with Congress to pass a long-term bill. The reauthorization must enable the FAA and the industry to continue the progress in modernizing the air traffic system.

NextGen Integration Working Group

Priority Area Reports

Continuing the work begun last fall, the Committee received reports from the joint FAA-Industry NIWG on progress implementing the four priority areas of NextGen capabilities. The goal of the NIWG is to deliver measurable benefits by dates certain, and, thereby, increasing the community's confidence in NextGen.

The Industry Leads and the FAA Subject Matter Experts (SMEs) for each of the four focus areas presented a report on the consensus recommendations.

Surface

- FAA SMEs: Robert Varcadipane (ATO) and Nick Lento (NG)
- Industry Leads: Rob Goldman (Delta Air Lines), Steve Vail (Mosaic ATM, Inc.)

The SMEs and the Team Leads reviewed the status of the implementations and pre-implementation activities that includes airport participation in Collaborative Decision Making (CDM) and access to surface data (SWIM); Airport Surface Departure Metering; Advanced Electronic Flight Strips (AEFS); and utilizing Earliest Off Block Time (EBOT) for short range flights.

FAA Committee member Ms. Teri Bristol, Chief Operating Officer, Air Traffic Organization, also discussed the issue of obtaining accurate surveillance data for non-cooperative (non-ADS-B equipped) ground vehicles at Airport Surface Surveillance Capability (ASSC) sites. In a related action, the FAA issued guidance to aircraft operators advising them of the need to keep transponders on

until aircraft are parked. A controller representative, while stating the quality of the displays is good, expressed concern of the air traffic controller's inability to see aircraft and/or ground vehicles at ASSC sites. NACSC Co-Chair Mr. Tim Campbell, Senior Vice President Air Operations, American Airlines, also commented that his company is looking at alternatives for ground vehicles because they value the ability to have accurate surveillance data on their operations.

Mr. Ed Bolton, FAA Assistant Administrator, NextGen, announced the FAA's intent to implement a departure metering capability at Charlotte Douglas International Airport (CLT) as a result of a feasibility assessment. This is being done through a technology transfer from NASA. In response, Mr. Campbell expressed appreciation to the FAA for its work on implementing the capability at CLT.

During a discussion on access to System Wide Information Management (SWIM) data by airport operators to participate in CDM, the FAA committed to brief the NAC Subcommittee on the status of customer participation at its July meeting.

Responding to a question about the benefit of EOBT, Mr. Goldman explained that it provides the FAA with better data from "close in airports" (those located in close proximity to hub airports) of when the aircraft will be ready to leave a gate and enter into the traffic flow for the hub. It is initiated by communicating when the first boarding pass is processed. A Committee member from Europe explained that they are taking similar steps to have an expectation of when aircraft will be departing.

Performance-Based Navigation (PBN)

- FAA SMEs: Josh Gustin (ATO), Donna Creasap (NG)
- Industry Leads: Gary Beck (Alaska Airlines), Steve Fulton (Sandel Avionics)

The Team reviewed the following actions:

- Develop a National Standard for Equivalent Lateral Spacing Operations for Departures (ELSO) (2015)
- Complete Established on RNP (EoR) Special Authorization for Widely Spaced Operations at Denver (2015) – waiver has significantly increased utilization
- Develop a National Standard for EoR Widely Spaced Operations (2017)
- Complete an EoR RNP Track-to-Fix Safety Assessment (2015)

- Complete 3 additional Metroplex sites: Northern California (2015), Charlotte (2017), and Atlanta (2017)
- Complete a Las Vegas Basin Assessment (2014) – FAA is moving forward with a Metroplex initiative. The study team will be in place to give a report by the end of calendar year.

The industry team leads commented that Seattle, WA has also experienced savings in fuel consumption and emissions since EOR AR procedures were implemented in April. In addition, the procedures were important to minimize the capacity effects from a runway closure.

A Committee member stated that RNP approaches at JFK were instrumental in helping to reduce the impact on operations during runway construction projects. The member also encouraged the FAA and industry to implement NextGen in the New York area.

Multiple Runway Operations

- FAA SMEs: Tom Skiles (ATO), Paul Strande (NG)
- Industry Leads: Glenn Morse (United Air Lines), Jon Tree (The Boeing Company)

The briefing highlighted that nine Wake Recategorization (Wake ReCat) sites are "maturing" and that the FAA and industry are seeing significant benefits from this capability. It was noted that the industry is realizing benefits at Boston Logan; a safety analysis is underway at San Francisco; and Chicago will be moving forward in late June.

Chairman Anderson concluded the discussion by expressing appreciation for the FAA's response to industry request for expediting Wake ReCat implementation and encouraged continued acceleration of the capability.

DataComm

- FAA SMEs: Jessie Wijntjes (ATO), Paul Fontaine (NG)
- Industry Leads: Dan Allen (FedEx Express), John O'Sullivan (Harris Corporation)
- Tim Leonard (Southwest Airlines)

Mr. Wijntjes discussed the FAA program for Surface DataComm pre-departure clearances and En route Controller-Pilot DataLink Communications (CPDLC). He addressed questions about assessments and protections of DataComm equipment and communication from cyber-attacks resulting in a compromise of the message. This was in response to comments made by representatives of the

National Academy of Sciences during the morning briefing on its NextGen report. Mr. Wijntjes explained that the program underwent extensive security analysis and testing.

After discussion by the Committee members on the question of DataComm security, it was agreed that the FAA's Aviation Safety organization will brief the NAC and NACSC airline Chief Information Officers about steps taken to ensure the communications process and procedures for the DataComm program are secure and subject to appropriate steps to ensure safety against cyber-attacks.

Mr. Allen commented that energy was building among the airlines to equip as the FAA implements the ground infrastructure. A Committee member asked if there should be a mandated date for equipage. In response Committee members noted that DataComm proves the principle of best capable-best served; installations can be complicated by cockpit integration issues that make mandates difficult; and that the industry is typically opposed to mandates and this is a case where the market works well. In the case of En route CPDLC, the benefits alone close the business case for equipage and a mandate is not needed.

The discussion on DataComm ended after Mr. Tim Leonard, Director Compliance & Operations, FAR Part 119 Chief Pilot, Flight Operations, Southwest Airlines, provided his organization's investment information in new equipage. The investments and associated business case assessments are based on the FAA's implementation of NextGen capabilities, PBN, DataComm benefits and the pending ADS-B January 2020 compliance deadline.

Harmonization of DataComm

Steve Bradford, Chief Scientist, Architecture and NextGen Development, FAA, provided a briefing about the roadmap for interoperability between the FAA's NextGen program and Europe's SESAR. He commented that 2017 is an important milestone for determining investments necessary to fully implement the 2025 harmonization between the US and Europe.

NACSC Metrics Ad Hoc Group Report

Mr. Tim Campbell of American Airlines and Ms. Melissa Rudinger, Vice President Government Affairs, AOPA, reviewed the recommendation for NAC consideration designed to meet the following Task from the February NAC meeting:

> Building on the FAA-proposed small number of high-level performance metrics, identify a high level suite of existing metrics that measure the effect on NAS performance attributable to the deployment of the of the four key capabilities outlined in the "NextGen Priorities Joint Implementation Plan" published in October 2014.

The NACSC formed an ad hoc metrics working group consisting of air carriers, airports, business/general aviation, controllers, FAA SMEs, MITRE and RTCA. The Ad Hoc Group used a decision support tool to help determine ranked criteria to measure proposed metrics, as well as a means to ensure the metrics best mapped to all four key NextGen capabilities.

The work performed by the metrics Ad Hoc Group reinforced the need for on-going, collaborative analysis to capture the impact of NextGen capabilities in a complex and dynamic NAS. As such, the Ad Hoc Group felt it was also important to propose a process to harmonize interpretations of changes in high-level metrics as NextGen capabilities are implemented.

The Committee was presented a high level suite of metrics to measure the effect on NAS performance attributable to the deployment of the capabilities in the four priority areas:

1. Actual Block Time
2. Actual Distance Flown
3. Estimated Fuel Burn

Measured by city pairs

4. Throughput – Facility Reported Capacity Rates
5. Taxi-Out Time
6. Gate Departure Delay

Measured at airports

Following the briefing, a Committee member commented that PBN procedures may be functioning as designed, but could negatively affect block times if requisite air traffic controller metering tools are not in place to accommodate their use. Mr. Campbell responded that metrics would identify these issues that could then be addressed in follow-up work by implementation teams. He emphasized that the intent is not using metrics as "gotchas" or to embarrass the FAA but to increase efficiency.

In response to a question about whether the NAS can provide access for new technologies such as Unmanned Aircraft Systems, Mr. Campbell explained that the subsequent levels of analysis would be

needed to discern this ability. Another pointed out that UAS will increase the number of vehicles operating in the system and this must be factored into the future metrics and analysis.

Chairman Anderson observed that it may be necessary to note the reasons for the differences between published arrival rates versus the actual arrival rate. An FAA Committee member commented that it will be necessary to bring the appropriate experts together to identify how this should work.

Mr. Whitaker observed that for now, the metrics should relate to the implementation in the four priority areas. This was echoed by another FAA Committee member.

Mr. Campbell initiated a conversation about the aviation industry using a third party to create a dashboard to also track performance. Chairman Anderson explained that this could be done under the auspices of RTCA. A Committee member commented that NextGen started with efficiency, environmental and safety enhancements that provide benefits to all users and this should be covered by this effort. Another stated that there is a need to continue the dialogue between the industry and the FAA.

Chairman Anderson summarized that the purpose or collaboratively monitoring performance is not to say “gotcha”, but to gauge how we are doing with implementation and identify future opportunities. It is also important that GA sees benefits from these implementations.

Another from the FAA pointed out that the desire to monetize the metrics and to hire a firm to develop an industry dashboard is new to the FAA.

Committee Action: The Committee agreed by consensus to approve the recommendation, **NACSC Metrics Ad Hoc Group Report** (Attachment 6), containing 6 high level Performance Metrics for the 4 Focus Areas.

In addition, the NAC endorsed two follow-on activities:

1. The FAA will begin acting upon the metrics.
2. The aviation industry, through RTCA, with engagement by the FAA, will select an independent vendor to provide a dashboard and associated analytic capability to track performance in support of the NAC.

NAC ADS-B Ad Hoc Group Report

Giovanni Tuck, Brigadier General, US Air Force led the presentation, examining what implementation commitments are necessary for the 2020 ADS-B implementation mandate. The recommendation, closely coordinated with the Equip 2020 initiative, covers air carriers, business and general aviation, Unmanned Aircraft Systems (UAS) and the Department of Defense (DoD).

The presenters, issues and resolution are outlined below:

- Mainline Carriers - A4A - Paul McGraw
  Maximizing the use of existing equipage and precluding multiple aircraft retrofits; airlines will comply with mandate.
- Regional Airlines - SkyWest - Chip Childs
  Maximizing the use of existing equipage and identifying missing pieces of information needed to make decisions regarding compliance plans.
- Small Aircraft - AOPA - Mark Baker
  Economical ADS-B solution for Small aircraft: including the need for developing a performance standard with the stipulation that it would not affect the ADS-B rule; needing standards for GA, including TSO versus non-TSO question, cost of equipage, and pathway for equipping, exemption for experimental aircraft.
- Privacy - NBAA - Ed Bolen
  Aircraft privacy: determining how to provide the ability for aircraft operators to block the broadcast of specific “N” numbers if requested by the aircraft operators. This ability is required to be provided by the FAA and the need for encrypting broadcast with unique identification and the pathway for this capability.
- DoD - US Air Force - Maj Gen Tuck, Chair
  Department of Defense: identifying the unique challenges of DoD commitments to meet the 2020 implementation, including the pathway to equipping, mission critical need for anonymity.
- UAS - Insitu - Ryan Hartman
  Unmanned Aircraft Systems (UAS): identifying issues associated with the UAS operations to meet the mandate including pathway to equipping, weight, cost, and certain questions related to UAS.

- Other identified operational barriers that must be addressed in order to comply by 2020:
    1. Path for equipage for aircraft that do not have an affordable or technical pathway to an integrated solution
    2. FAA certification of avionics and installations
    3. Capacity of repair stations to install equipment
    4. Education & outreach

After a discussion of these issues, the Committee took the following action:

Committee Action: The Committee agreed by consensus to approve the recommendation, **NAC Ad Hoc ADS-B Report** (Attachment 7) and sunset the NAC ADS-B Ad Hoc.

The NAC also approved the following actions:

1. The FAA will brief the Committee at future meetings, as a standing agenda item, on the status of actions related to ADS-B implementation including the actions of the Equip 2020 initiative and the status of the elements recommended by the Ad Hoc. The FAA will also provide information to the NAC on benefits being accrued associated with ADS-B Out, as well as information on fleet installation and identification of issues that require additional follow-up.
2. The NAC also requested updates on space-based ADS-B deployment and oceanic surveillance, and the common weather picture.

Following approval, Chairman Anderson thanked the members of the Ad Hoc and recognized Major General Tuck for his leadership.

FAA Response to RTCA "Blueprint for Success to Implementing Performance Based Navigation" Recommendations

Josh Gustin, FAA, provided the FAA response to the NAC recommendation, "The Blueprint for Success to Implementing Performance Based Navigation (PBN) Procedures", that captures the lessons learned from PBN implementations across the country and provides a checklist for future implementations.

The majority of the recommendations were accepted by the FAA, including those related to community outreach and technical and non-technical stakeholder engagement, and the capturing of

lessons learned. On the areas of partial concurrence, the operators on the NAC continued to press for the availability of RNP procedures on the Automation Terminal Information Services (ATIS) and expressed interest in the FAA implementation as outlined in the response document. The other area of partial concurrence related to metrics will be addressed in several forums, including the ongoing collaborative efforts of the NIWG.

Summary of Meeting and Next Steps

The NAC Secretary summarized the following actions from the meeting and follow-up items (these are contained in a table below):

1.) ADS-B – Approved the ADS-B Ad Hoc Task Group report and associated recommendations with suggested mitigation strategies for challenges to implementation of the 2020 ADS-B implementation mandate for general aviation, UAS and DoD. The Ad Hoc completed its work and the NAC approved the following next steps:

   a. The FAA will brief the Committee at future meetings (as a standing agenda item) on the status of actions related to ADS-B implementation, including the actions of the Equip 2020 initiative and the status of the elements recommended by the Ad Hoc. The FAA will also provide information to the NAC on benefits and fleet installation and identification of issues that require additional follow-up.
   b. In addition, the NAC also requested additional information to be presented, related to space-based ADS-B deployment, oceanic surveillance and the common weather picture.

2.) Metrics – Approved 6 high level Performance Metrics for the 4 Focus Areas as recommended by the NACSC. There are two follow-on activities:

   a. The FAA will begin acting upon the metrics.
   b. The aviation industry, through RTCA, with engagement by the FAA will:
      i. develop an RFP for a 3rd party to measure implementation
      ii. provide the RFP to a set of vendors
      iii. evaluate the responses
      iv. select a vendor
      v. report to the NAC at the October meeting

3.) PBN NAS Navigation Strategy – the NACSC will review the FAA PARC developed industry input on the FAA's planned revision of the 2006 PBN Roadmap and report back to the NAC.

4.) Access to SWIM data by airport operators – The FAA (Teri Bristol) will have a detailed plan in response to question/concerns expressed about SWIM access with a commitment to brief the NACSC at the July meeting on customer responsibilities.

5.) DataComm Security Protections – the FAA (John Hickey/Teri Bristol) will communicate with airline Chief Information Officers on steps taken to ensure the communications process and procedures are secure and subject to the appropriate steps to ensure safety against cyber-attacks.

6.) The Committee requested a briefing of the NextGen implementation Concept of Operations to include elements, benefits and timeframes.

Recommendations

Title	Responsible Entity	Completion Date	Completed (Y/N)
NAC Ad Hoc ADS-B Report	NAC ADS-B Ad Hoc Task Group	June 2015	Yes
NACSC Ad Hoc Metrics Group Report	NAC Subcommittee	June 2015	Yes

Actions

Action Item	Responsible Entity	Completion Date
Briefing to NAC - status of actions related to ADS-B implementation, including the actions of the Equip 2020 initiative and the status of the elements recommended by the Ad Hoc. The FAA will also provide information to the NAC on benefits and fleet installation and identification of issues that require additional follow-up.	FAA, AVA/ANG/ATO	On-going /NAC meeting October 2015
Presentation to the NAC related to space-based ADS-B deployment, oceanic surveillance and the common weather picture	FAA, AVS/ANG/ATO	October 2015

PBN NAS Navigation Strategy	FAA PARC/NACSC	February 2016
FAA Metrics	FAA, ANG	Report –plans October 2015
Industry Metrics	RTCA	Report-plans October 2015
Brief NACSC on access to SWIM data	FAA, ATO	July 2015
Communicate with airline CIO's on DataComm Security Protections	FAA, ATO/AVS	September 2015
Briefing on NextGen Implementation Concept of Operations to include elements, benefits and timeframes	FAA, ANG	October 2015

DFO Closing Comments

Mr. Whitaker thanked the members for their participation in the meeting, and the continued work on the NIWG priorities and metrics.

Chairman Closing Comments

Mr. Anderson asked if the NAC should receive a briefing on the full picture of NextGen. This was added to the list of items for the upcoming meeting.

A Committee member shared an ad that was developed outlining a recent event providing important information on the implementation of the En route Automation Modernization (ERAM) program. The Committee also was presented a video featuring the DataComm program.

Other Business

Two committee members discussed the status of the DataComm mandate in Europe. The conclusion is that the timing of the US and European programs are not aligned, but the long-term concept of operations and capabilities are in sync.

Adjourn

By motion, Chairman Anderson concluded the meeting of the Committee at 2:55 p.m.

Next Meeting

The next meeting of the NAC is October 8, 2015 in Memphis, TN. Hosted by FedEx.

Attendees:
June 5, 2015 Meeting of the NextGen Advisory Committee
Washington, DC

Name	Company
Aguado, Blanca	RTCA, Inc.
Allen, Dan	FedEx Express
Anderson, Richard	*Delta Air Lines, Inc.*
Angeles, Eduardo	*Federal Aviation Administration*
Baker, Mark	*Aircraft Owners and Pilots Association*
Ball, Michael	Northrop Grumman
Batchelor, David	SESAR Joint Undertaking
Baum, Chris	ALPA
Beck, Gary	Alaska Airlines
Belger, Monte	Metron
Bertapelle, Joe	JetBlue Airways
Bolen, Ed	*National Business Aviation Association*
Bolton, Ed	*Federal Aviation Administration*
Bousquie, Marc	RTCA, Inc.
Bradford, Steven	Federal Aviation Administration
Brenner, Frank	*EUROCONTROL*
Bristol, Teri	*Federal Aviation Administration*
Bunce, Peter	*General Aviation Manufacturers Association*
Campbell, Timothy	*American Airlines, Inc.*
Canoll, Tim	*Air Line Pilots Association*
Caret, Susan	WSJ
Carnahan, Chris	AIA
Castillo, Cynthia	CSSI, Inc.
Cebula, Andy	*RTCA, Inc.*
Challan, Peter	Harris
Childs, Chip	*Regional Airline Association*
Coletta, Treakle	Department of Transportation
Crites, Jim	Dallas/Fort Worth Airport
D'Alessandro, Carl	*Harris Corporation*
Daee, Brett	Federal Aviation Administration
Davis, William	Federal Aviation Administration
DeLeon, Ben	Federal Aviation Administration
Denning, Jana	Lockheed Martin
Diaz, Mario	*City of Houston, Texas*
DiPasquantino, Diana	Federal Aviation Administration
Donovan, Colleen	Federal Aviation Administration
Eckert, Paul	Federal Aviation Administration
Egentouch, John	Federal Aviation Administration
Esposito, Carl	*Honeywell International, Inc.*
Fish, Sarah	Federal Aviation Administration
Foose, Scott	Federal Aviation Administration
Frazier, Geo	Federal Aviation Administration
Fulton, Steve	Sandell Avionics
Guillermet, Florian	SESAR Joint Undertaking

Gusti, Christopher	CSSI
Gustin, Josh	Federal Aviation Administration

Guy, Rebecca	Federal Aviation Administration
Hamiel, Jeff	Metropolitan Airports Commission
Hanlon, Dan	Raytheon
Hart, LeeAnn	Federal Aviation Administration
Hartman, Ryan	*Insitu Inc.*
Hawthorne, Michael	Noblis
Hennig, Jens	GAMA
Hickey, John	*Federal Aviation Administration*
Hill, Stephanie	*Lockheed Martin Corporation*
Hiremath, Urmila	The MITRE Corporation
Huegel, Carol	Federal Aviation Administration
Iversen, Jennifer	RTCA, Inc.
Jenny, Margaret	*RTCA, Inc.*
Joly, Pascal	Airbus
Kast, Christian	UPS
Kearns, Kathleen	SITA
Kee, Jackie	The MITRE Corporation
King, Lance	Northrup Grumman
Koch, Robin	Department of Transportation
Kohut, Anne	Airport Noise Report
Lelievre, Thierry	Altran
Martin, Jeff	*JetBlue Airways*
Morse, Glenn	United Air Lines
Moses, Hal	RTCA, Inc.
Murphy, Dan	Federal Aviation Administration
Narvid, Colonel Juan	DoD Policy Board on Federal Aviation
Nooger, Warren	ALPA
Noren, Per	*The Boeing Company*
Pekny, Ronald	American Airlines, Inc.
Perrone, Mike	*Professional Aviation Safety Specialists*
Pierce, Brad	*NOISE*
Price, Henry	Federal Aviation Administration
Rinaldi, Paul	*National Air Traffic Controllers Association*
Robinson, Cortney	AIA
Rudinger, Melissa	Aircraft Owners and Pilots Association
Ryals, Lillian	*The MITRE Corporation*
Schleiffer, Christian	EUROCAE
Short, Rico	The Beacon Group
Stanley, Jim	NextGen (FAA)
Strande, Paul	Federal Aviation Administration
Swartz, Jennifer	Department of Transportation OMB
Swayze, Rich	*Federal Aviation Administration*
Takemoto, Paul	Federal Aviation Administration
Teel, Brandi	RTCA, Inc.
Thornton, Gayle	Federal Aviation Administration
Townsend, Brian	American Airlines
Tranter, Emily	NOISE

Tree, Jon	The Boeing Company
Tuck, Giovanni	*U.S. Air Force*
Vail, Steve	Mosaic ATM
Van De Walker, Wayne	Department of Transportation OIG
Waris, Charles	Department of Transportation OIG
Whitaker, Mike	*Federal Aviation Administration*
Wijntjes, Jesse	Federal Aviation Administration
Wright, Dale	NATCA

Welcome to the Meeting of the NextGen Advisory Committee

June 5, 2015
RTCA, Inc.
Washington, DC

Welcome & Introductions

Richard Anderson, NAC Chairman

PUBLIC MEETING ANNOUNCEMENT
Read by: Designated Federal Official Michael Whitaker
NextGen Advisory Committee
June 5, 2015

In accordance with the Federal Advisory Committee Act, this Advisory Committee meeting is OPEN TO THE PUBLIC.

Notice of the meeting was published in the Federal Register on:

May 22, 2015

Members of the public may address the committee with PRIOR APPROVAL of the Chairman. This should be arranged in advance.

Only appointed members of the Advisory Committee may vote on any matter brought to a vote by the Chairman.

The public may present written material to the Advisory Committee at any time.

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RTCA

THE GOLD STANDARD FOR AVIATION SINCE 1935

Review and Approval of:

February 26, 2015
Meeting Summary

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THE GOLD STANDARD FOR AVIATION SINCE 1935

Chairman's Report

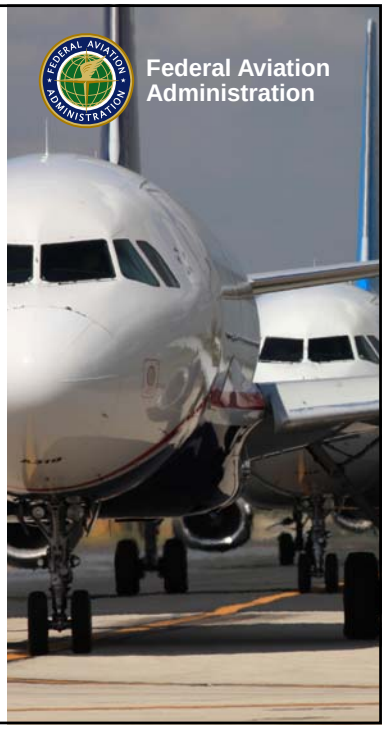
Richard Anderson, NAC Chair

NAC Agenda Topics

- FAA Report
- NextGen Integration Working Group Reports
  - Surface
  - PBN
  - Multiple Runway Operations
  - DataComm
- Hamonization of DataComm
- NACSC Metrics Ad Hoc Group Report
- NAC ADS-B Ad Hoc Group Report
- FAA Response to "Blueprint for Success to Implementing Performance Based Navigation"

Developing a PBN NAS Navigation Strategy

Presented to: RTCA NAC
By: Joshua Gustin, AJV-14
Date: 5 June 2015



Key Strategy Elements

- Clearly articulated vision of PBN procedures as the basis for daily operations at all locations in the NAS.
  - Legacy systems (i.e., ILS, VOR) are used for resiliency, backup or in very low weather conditions
- Identification of the key navigation capabilities that will be available in the NAS grouped into 5 year periods over the next 15 years
- Defined levels of service for navigation capabilities
  - Includes detailed criteria on where navigation capabilities (e.g., SID/STARs, IAP, etc.) are provided. These levels could also inform where specific capabilities are required to be used.

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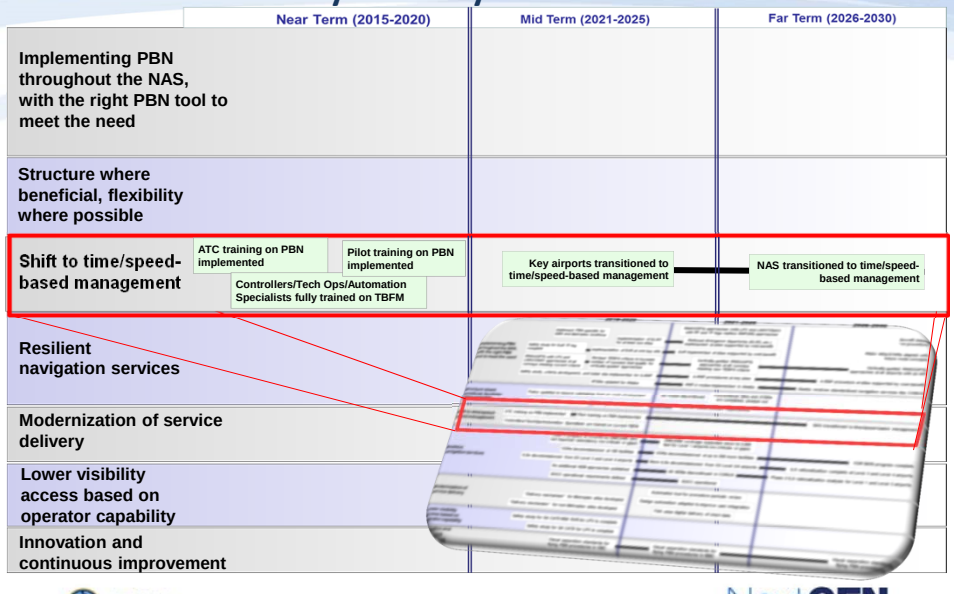
Key Goals By Timeframe



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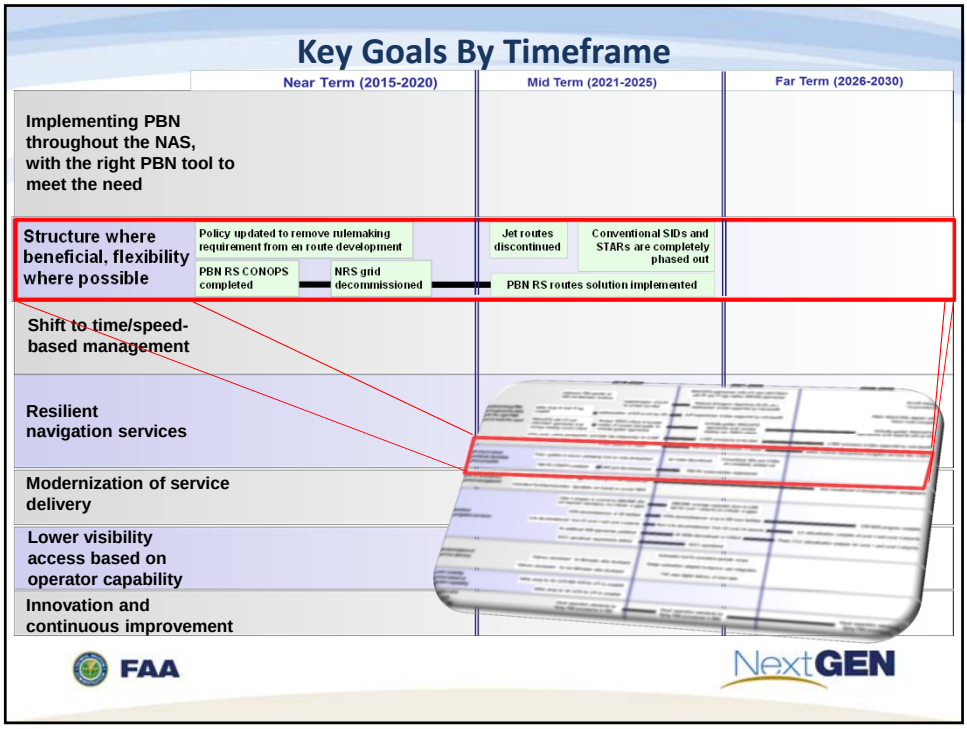
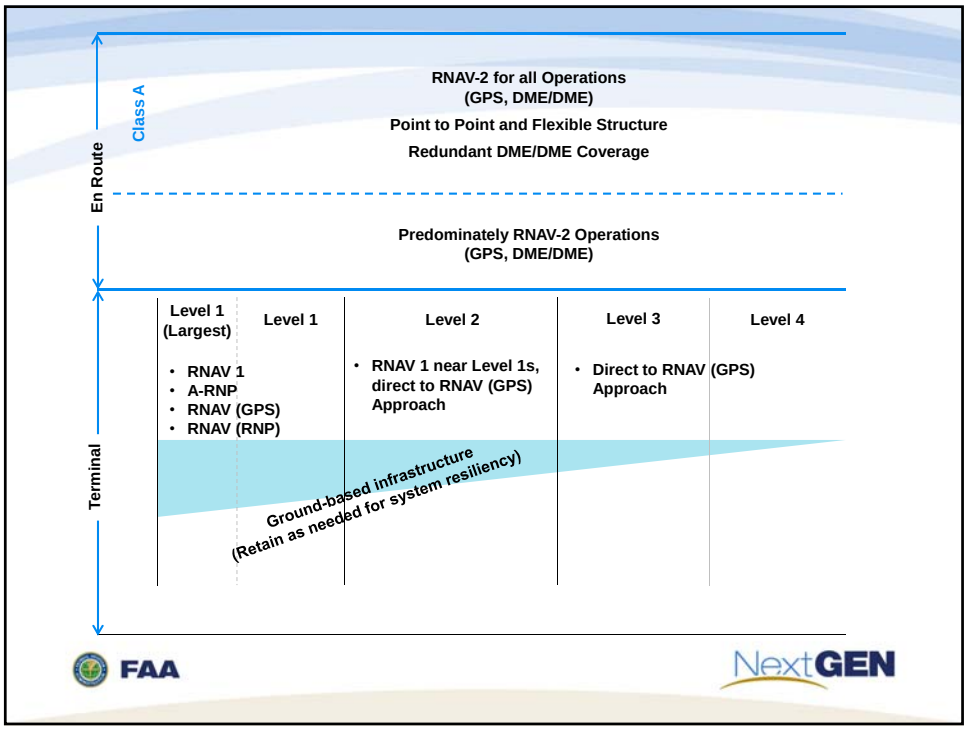
Attachment 2





Potential Questions for Stakeholders

- What are the operator requirements to successfully leverage the changes reflected by the goals in each of the five-year time frames?
- Some of the concepts identified will either require the uses of specific capabilities or the removal of legacy services and infrastructure. Are the assumptions and criteria adequate to reflect NAS user capabilities within the time frames identified?
- What additional capabilities or concepts would be required to move to a PBN-based NAS?

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Harmonization of DataComm

FROM INNOVATION TO SOLUTION

TOWARDS GLOBAL INTEROPERABILITY DATA COMMUNICATIONS BRIEF OUT OT THE NAC

SESAR JOINT UNDERTAKING

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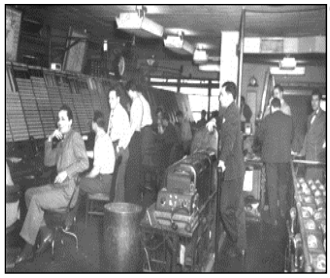
@WorldATM_now

founding members

EUROPEAN UNION EUROCONTROL

Transformation of Methods

Procedural Based Control:
Control on Where We Think the Aircraft Is



- Landmark Navigation
- Radio Beacons
- Position Reports

Surveillance Based Control:
Control on Where We Know the Aircraft Is

- VOR/DME
- RADAR

Trajectory Based Control:
Control on Where We Know the Aircraft Will Be*

- RNP
- ADS-B
- DataComm

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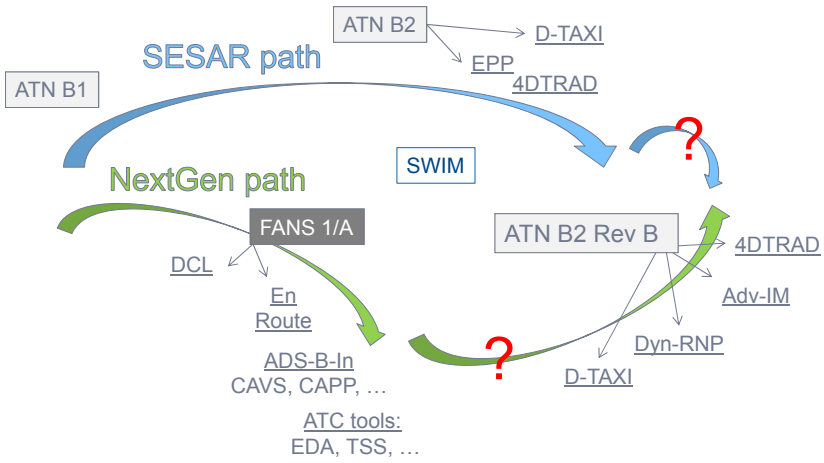
* Shared Trajectory

SESAR / NextGen convergence path on Datalink



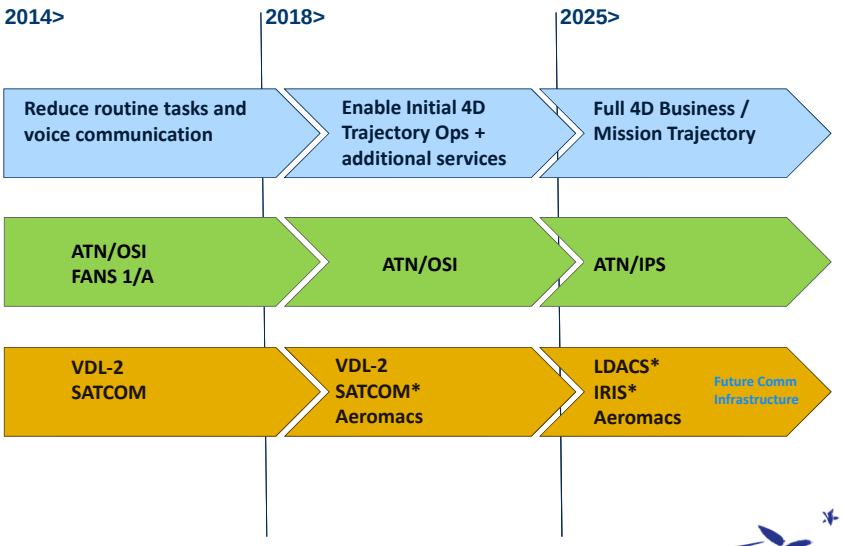
AIRBUS

Separating the Issues

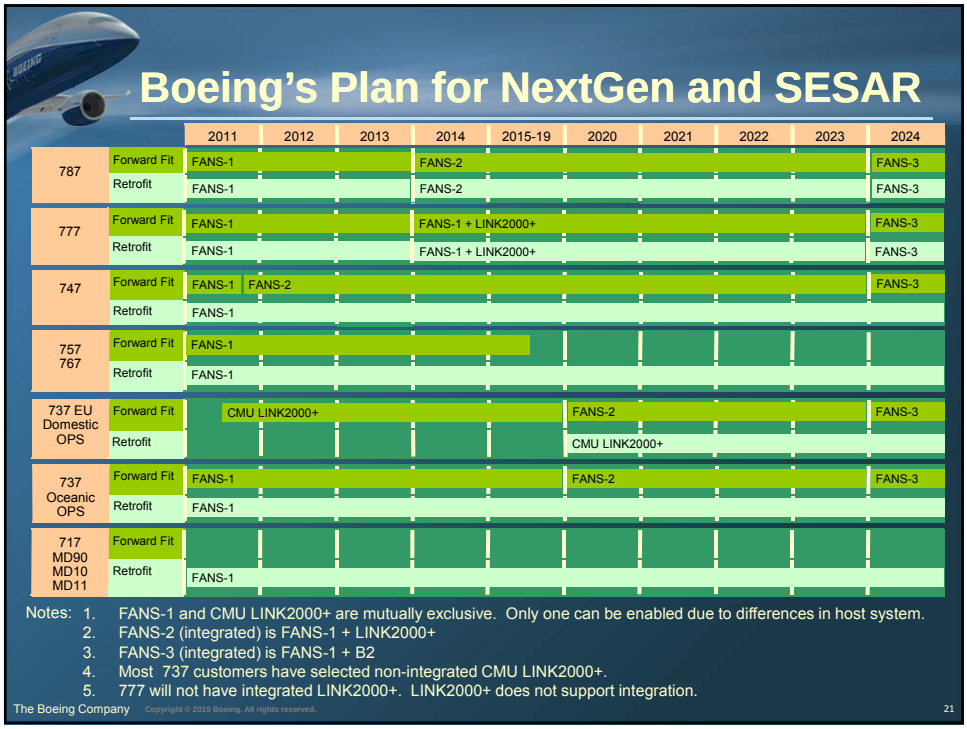
'Data com' Services	CPDLC, DCL, D-TAXI, i4D, etc ...
'Data com' networking	(FANS) , ATN/OSI transition to ATN/IPS
Physical Data link	VDL/2 transition to Future L band etc...
Supporting Avionics	Retrofit and forward fit issues (FMS, Display, etc)
Deployment	Budget, mandates, timescales

FROM INNOVATION TO SOLUTION

The Path Forward



FROM INNOVATION TO SOLUTION


Boeing's Plan for NextGen and SESAR
2011
2012
2013
2014
2015-19
2020
2021
2022
2023
2024
787
Forward Fit
FANS-1
FANS-2
FANS-3
Retrofit
FANS-1
FANS-2
FANS-3
777
Forward Fit
FANS-1
FANS-1 + LINK2000+
FANS-3
Retrofit
FANS-1
FANS-1 + LINK2000+
FANS-3
747
Forward Fit
FANS-1
FANS-2
FANS-3
Retrofit
FANS-1
757
767
Forward Fit
FANS-1
Retrofit
FANS-1
737 EU Domestic OPS
Forward Fit
CMU LINK2000+
FANS-2
FANS-3
Retrofit
CMU LINK2000+
737 Oceanic OPS
Forward Fit
FANS-1
FANS-2
FANS-3
Retrofit
FANS-1
717
MD90
MD10
MD11
Forward Fit
Retrofit
FANS-1
Notes: 1. FANS-1 and CMU LINK2000+ are mutually exclusive. Only one can be enabled due to differences in host system.
2. FANS-2 (integrated) is FANS-1 + LINK2000+
3. FANS-3 (integrated) is FANS-1 + B2
4. Most 737 customers have selected non-integrated CMU LINK2000+.
5. 777 will not have integrated LINK2000+. LINK2000+ does not support integration.
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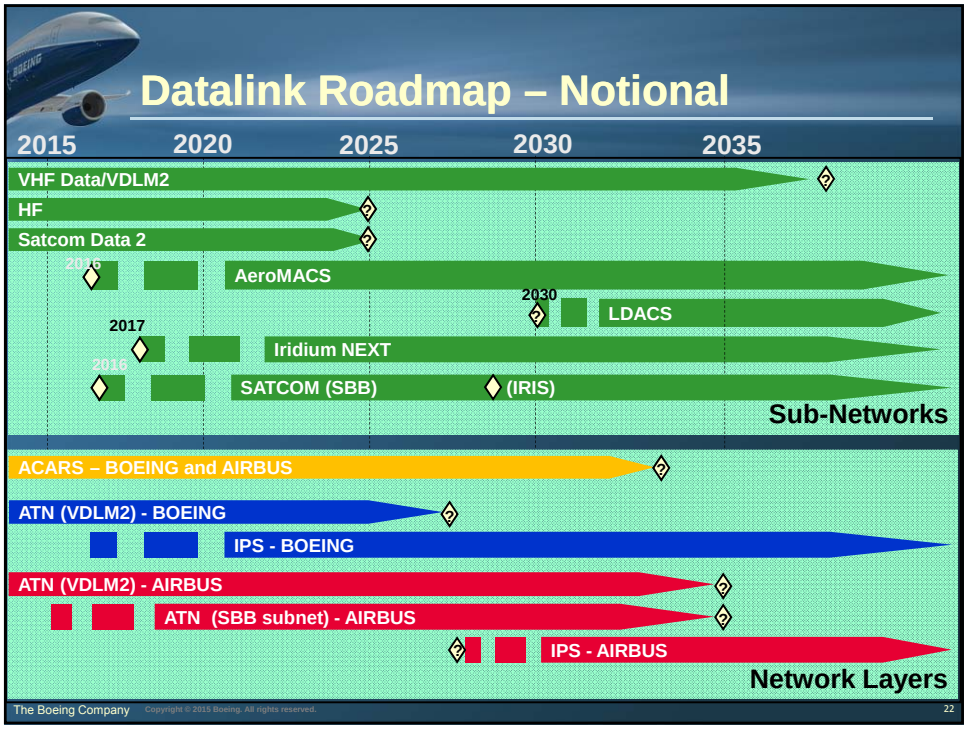
Datalink Roadmap – Notional
2015
2020
2025
2030
2035
VHF Data/VDLM2
HF
Satcom Data 2
2015
AeroMACS
2030
LDACS
2017
Iridium NEXT
2016
SATCOM (SBB)
(IRIS)
Sub-Networks
ACARS – BOEING and AIRBUS
ATN (VDLM2) - BOEING
IPS - BOEING
ATN (VDLM2) - AIRBUS
ATN (SBB subnet) - AIRBUS
IPS - AIRBUS
Network Layers
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JOINT UNDERTAKING

Thank you for your attention

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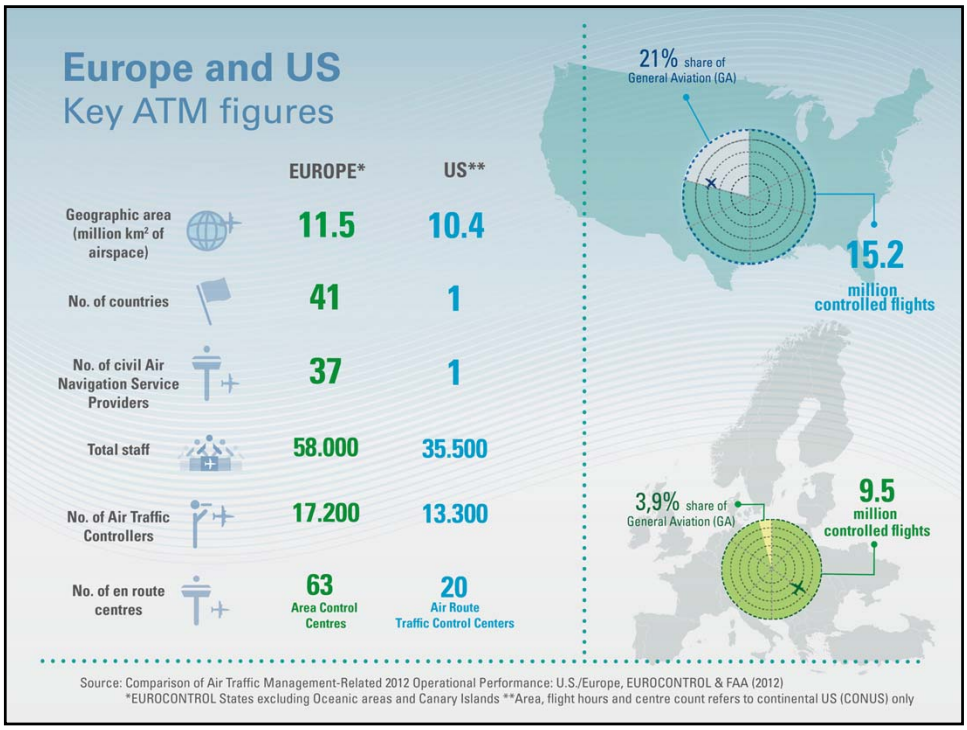
FROM INNOVATION TO SOLUTION

Attachment 2



Key Priorities

Transversal Activities

- ICAO GANP/ASBU and Industry Standardization bodies priorities. Incentives – *Most-Capable-Best-Served*
- High Level Functional Architecture of the Global ATM Concept evolution
- RPAS integration in ATM and the Aviation system
- Cyber Security Framework
- Remote ATS and Virtual Centers
- Airport integration – flight-turn-around-focus

Information Exchange & Mgmt

- SWIM
- Information Models – WXXM, FIXM, AIXM

4D Trajectory (4DT) Mgmt

- **Trajectory Based Operations**
- FF-ICE

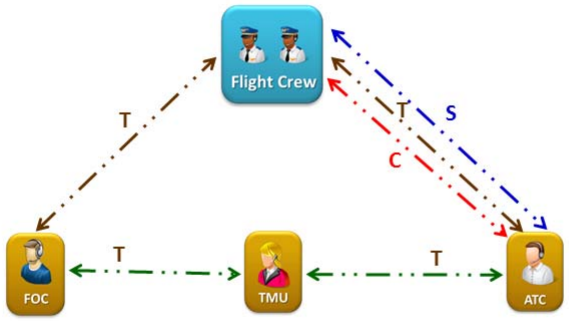
CNS & Airborne Interoperability

- Avionics Roadmap – *all airspace users*
  - **DataComm / Datalink Applications and Technology**
  - **Multilink and Software radios**
  - **FMS capabilities interfacing with FDP capabilities**

Collaboration Projects

- Global SWIM Demonstrations inviting other regions to participate
- Initial 4D Trajectory (i4D) Trials
- …more to come as cooperation develops and other regions requests to join

Historical Interactions: Between Stakeholders w/o automation



F	Flow Management
T	Trajectory Management
S	Separation Management
C	Collision Avoidance

Voice	⟵ · ·⟶
Data	⟵⟶

Definitions:

- **Voice:** Communications is by voice (person to person)
- **Data:** Communications involving automation tools (automation to automation or automation to person)

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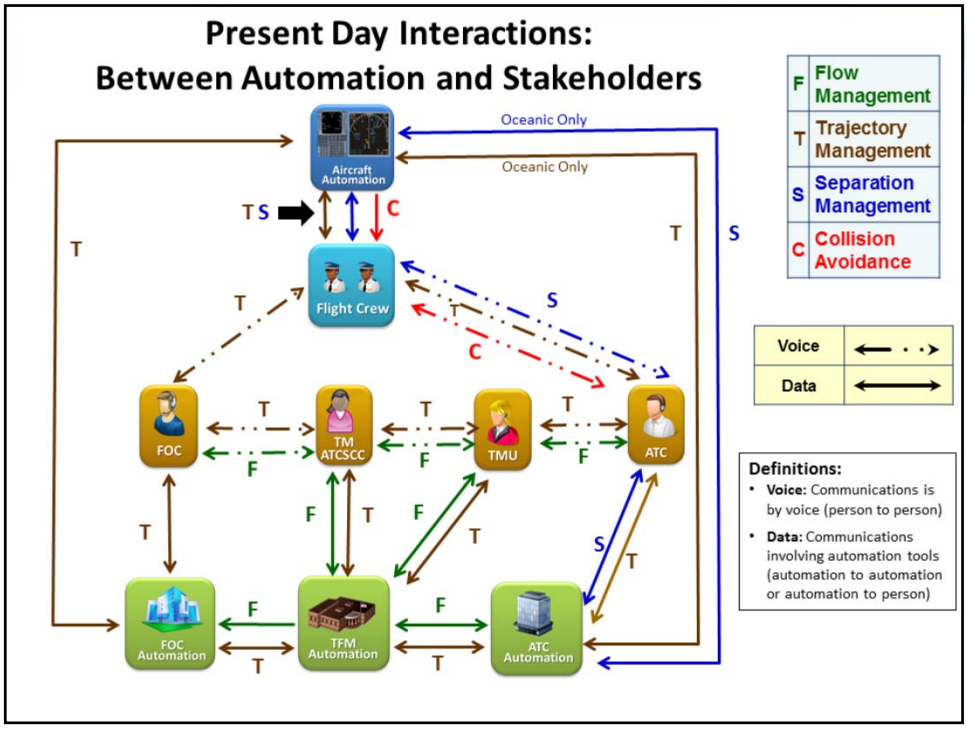

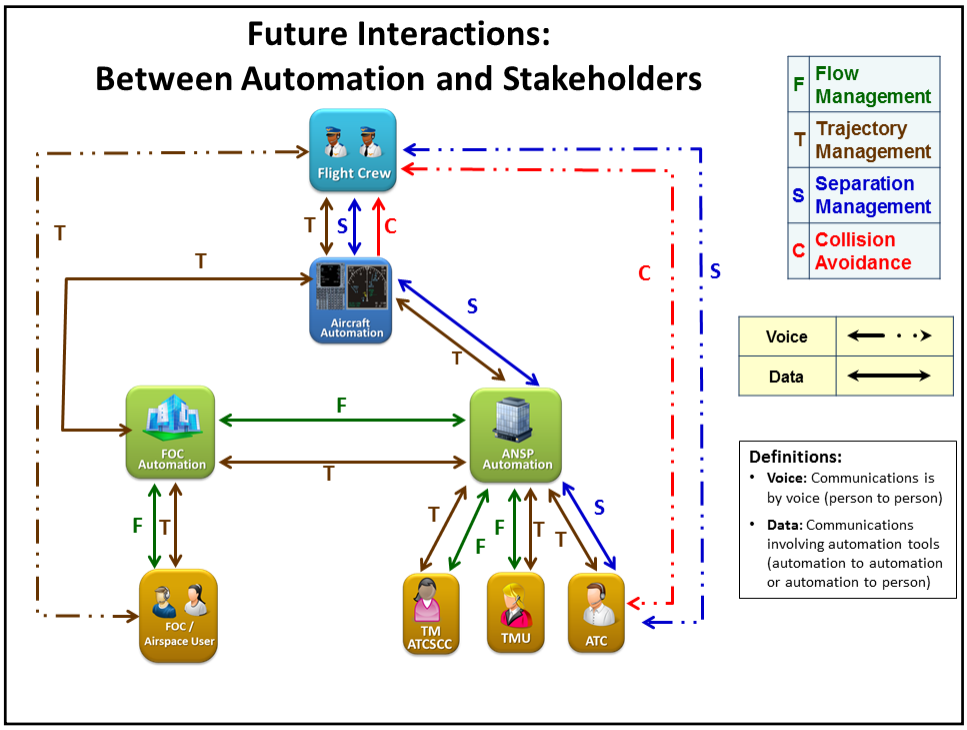

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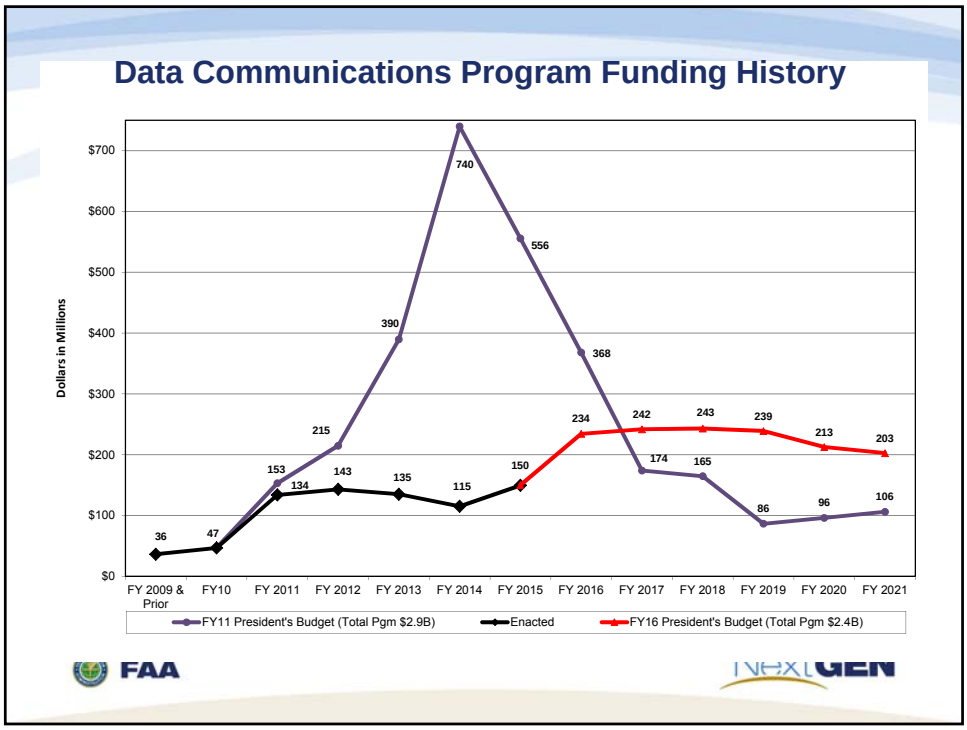

DISCUSSION

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THE GOLD STANDARD FOR AVIATION SINCE 1935

NextGen Integration Working Group (NIWG) Reports

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Surface Team

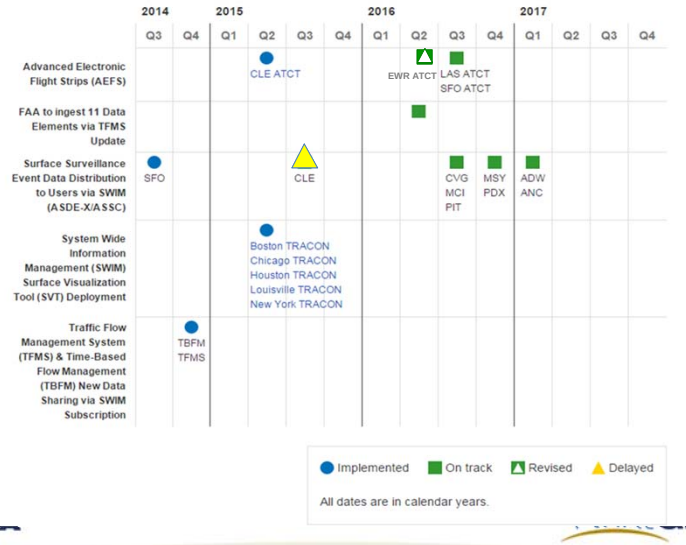
Industry Leads and FAA SMEs:

Rob Goldman/Steve Vail

Robert Varcadipane/Nick Lento

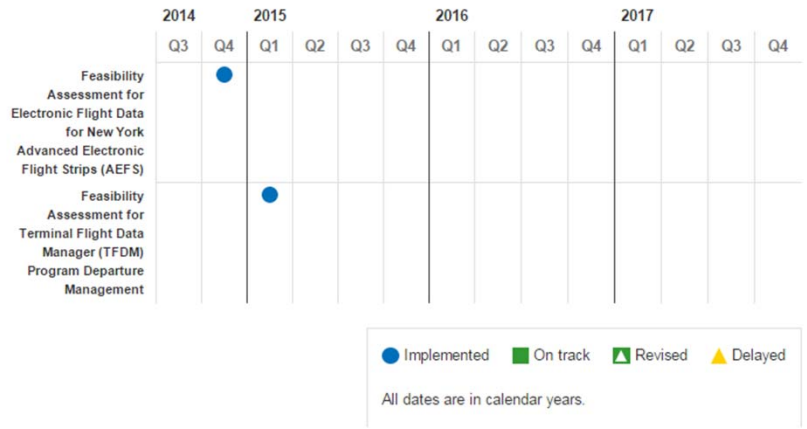
Surface Operations: Implementation commitments

Implementation Commitment



Surface Operations
Pre-Implementation Commitments

Pre-Implementation Commitment



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Surface Operations:
Industry Commitments

Industry Commitments

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Current SWIM Consumers

Consumer	Data Type / Subscription
Airlines	
American Airlines	ASDE-X / LGA, BOS, MIA
Delta Airlines	ASDE-X / LGA
FedEx	ASDE-X / MEM
JetBlue	ASDE-X /all airports
United Airlines	ASDE-X / all airports
USAIR	ASDE-X / PHX, DCA
Airports, FAA Facilities, & FAA Programs	
Atlanta Airport Authority	ASDE-X / all airports
San Francisco (SFO) Airport Authority	SFO Airport Surface Surveillance Capability (ASSC) data
Southern California TRACON	ASDE-X / San Diego, Los Angeles, Long Beach airport data
CIWS	WMSS NEXRAD /all radar sites
CRCT	ASDE-X / LGA, EWR, JFK
OASIS	HWDS / all products
WARP	Enhanced WINS

Consumer	Data Type / Subscription
Research & Development	
Kent State	CIWS / all products
MIT - Lincoln Labs	ASDE-X / all airports, WMSS NEXRAD
MITRE	ASDE-X / all airports
Volpe	ASDE-X / all airports
Industry	
Alliance	ASDE-X / MEM, ATL, JFK
ARINC	CIWS / all products
Lockheed Martin	ASDE-X/ ATL, CLT, MSP, DTW, BOS, IAD, LAS
MOSAIC ATM	ASDE-X / LGA, JFK, BOS, ATL, PHL, EWR, ORD, IAD, CLT; ITWS / all products
Passur	ASDE-X / all airports / STDDS
Rockwell Collins	CIWS / all products
Sabre	ASDE-X / all airports; ITWS / all products
Sensis	ASDE-X / ATL, JFK
Veracity	ASDE-X / LGA

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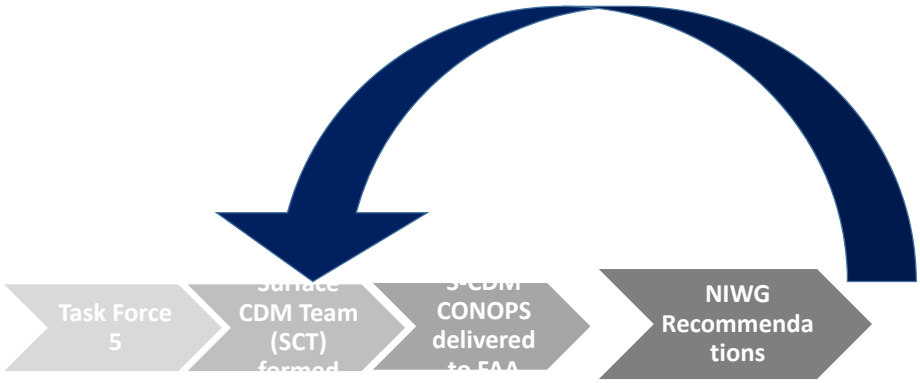
NIWG Surface Team Industry Status



Foundational:

1. Airports as CDM members → tasked to SCT – **In progress**
2. Improve access to SWIM data →being addressed by CSG – **In progress**

Early Benefit:

1. Use EOBT to schedule TBFM →tasked to SCT – **In progress (phase 1 complete)**
2. Deploy Departure metering →NASA ATD-2 solution – **Possible SCT tasking**

Backup

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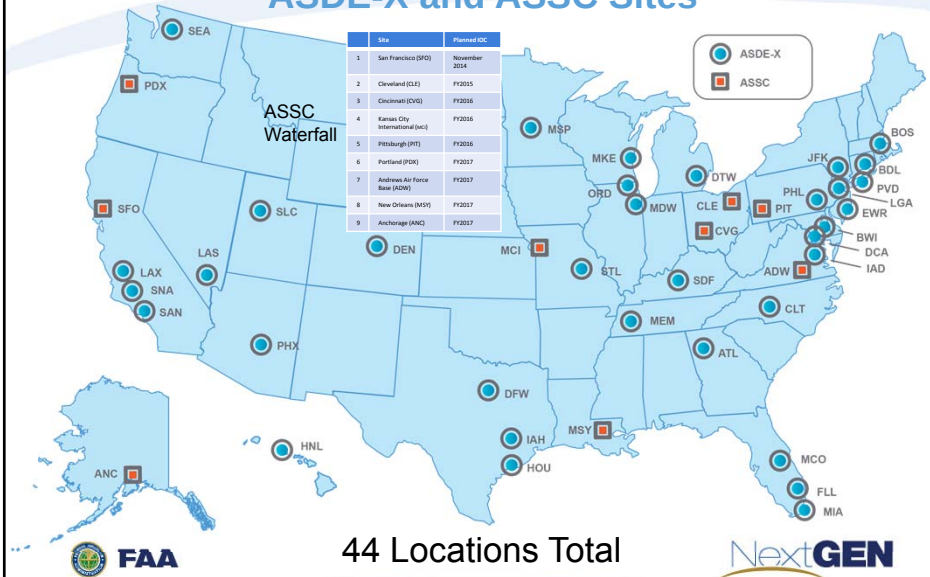
Surface Surveillance

ASDE-X and ASSC Sites

	Site	Planned IOC
1	San Francisco (SFO)	November 2014
2	Cleveland (CLE)	FY2015
3	Cincinnati (CVG)	FY2016
4	Kansas City International (MCI)	FY2016
5	Pittsburgh (PIT)	FY2016
6	Portland (PDX)	FY2017
7	Andrews Air Force Base (ADW)	FY2017
8	New Orleans (MSY)	FY2017
9	Anchorage (ANC)	FY2017



44 Locations Total

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SWIM Terminal Data Distribution by TRACON

As of February12, 2014

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DISCUSSION

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PBN Team

Industry Leads and FAA SMEs:

Gary Beck/Steve Fulton

Donna Creasap/Joshua Gustin

Performance Based Navigation (PBN)

Provides a basis for designing and implementing automated flight paths, airspace redesign and obstacles clearance

Commitments

- Develop a National Standard for Equivalent Lateral Spacing Operations for Departures (ELSO) (2015)
- Complete Established on RNP (EoR) Special Authorization for Widely Spaced Operations: at Denver (2015)
- Develop a National Standard for EoR Widely Spaced Operations (2017)
- Complete an EoR RNP Track-to-Fix Safety Assessment (2015)
- Complete 3 additional Metroplex sites: Northern California (2015), Charlotte (2017), and Atlanta (2017)
- Complete a Las Vegas Basin Assessment (2014)

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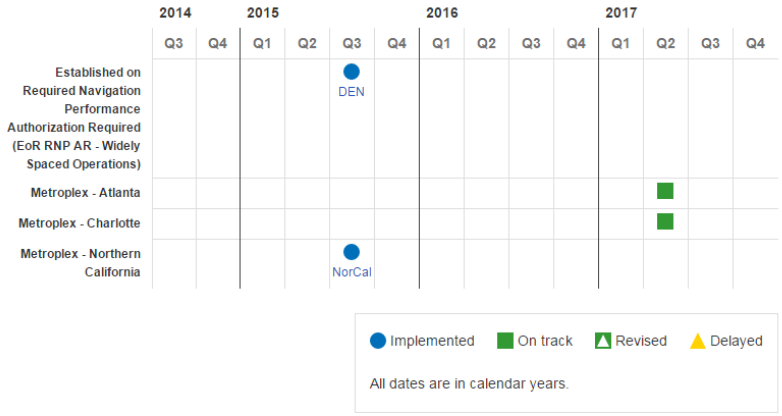
Performance Based Navigation- Implementation

Implementation Commitment



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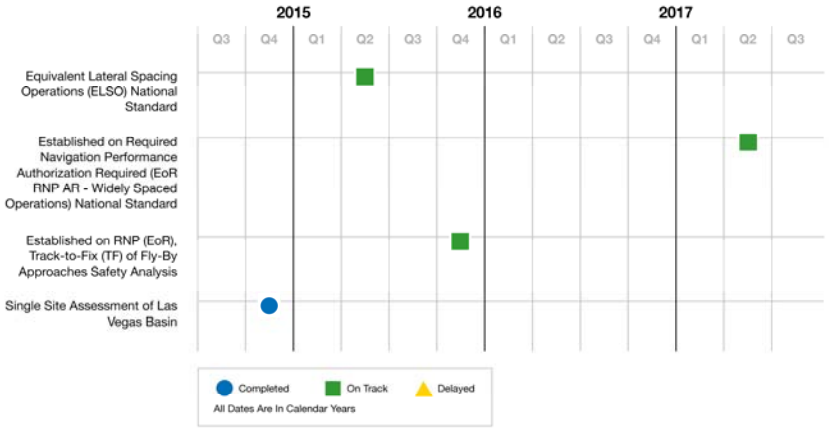
Performance Based Navigation - Pre-Implementation



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Established on RNP (EoR) @ Denver

- **Quote from Operators the day of Flying EoR Widely Spaced in Denver on March 12, 2015**
  - Ron Renk (United) – "Exciting day, United aircraft get to be the first to use a new waiver at DEN that allows simultaneous RNP with RF legs flying from downwind to final. This was a good accomplishment for industry and the FAA delivering a new PBN capability on schedule. This is a big deal because it allows aircraft to be "established" on the instrument approach starting from the downwind. Because they're established one aircraft doesn't have to fly out farther than the other to have varying altitudes and turn on points. It also alleviates the need to ATC vectors to be established on the final approach course with less than 30 degree intercept. Naturally since we can now have multiple RNPs running it will also double the amount of potential fuel savings RNP can bring to DEN"
  - Gary McMullin (Southwest) – "This is such an exciting day for all of us working on moving the NAS forward. Thank you Denver!!!"
  - Gary McMullin (Southwest) – "What a team!!! Thank you to all and SWA is ready to fly the RNP approaches as per the waiver"
  - Benjamin Dwyer (Frontier) – "Is definitely a big day. Amazing progress!! Just goes to show what great teamwork and hard work can do"
  - David Welt (Frontier) – "Great news!! Thanks to all of you for the effort. This is groundbreaking and I know Denver will be continue to lead the industry"

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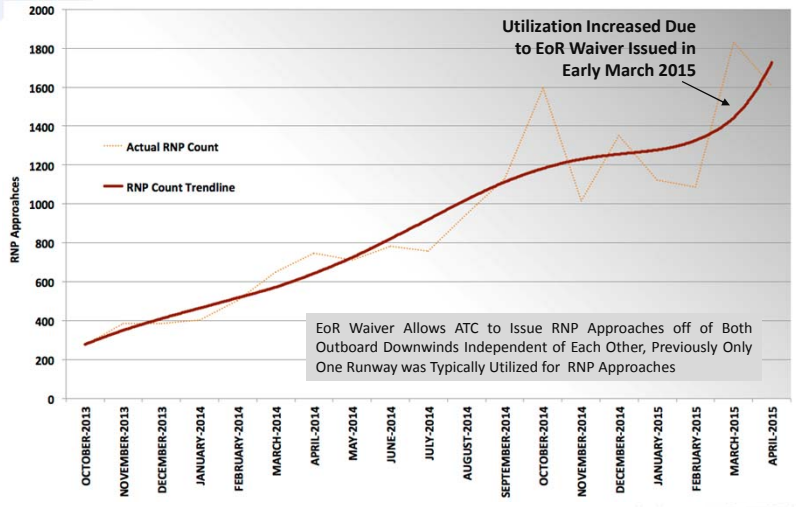
Denver WS RNP Utilization



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SEATTLE GREENER SKIES

Greener Skies Annual Benefits*	
Fuel Savings	2.7 Million Gallons
CO^2 Reduction	25,600 Metric Tons

*HAWKZ Arrival to RNP South Flow

Alaska

DISCUSSION

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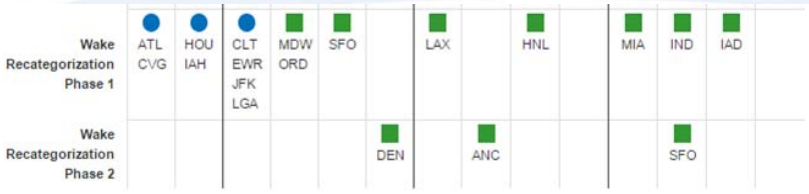
Multiple Runway Operations Team

Industry and FAA Leaders:

Glenn Morse/Jon Tree

Tom Skiles/Paul Strande

Wake RECAT and Beyond



Benefits at ATL

- Arrival throughput at ATL has increased by 4-5%
- This has led to a decrease in avg. flight time in the TRACON for arrivals of approx. 29 sec.
- Less reliance on Runways 10/28 for departures has led to a decrease in avg. taxi-out time of 1.1 - 1.6 min.
- Approx. $13.9-18.7 million in annual OpEx savings for Delta Air Lines

More Wake Recat?

- FAA has examined all opportunities
- Additional sites may benefit at capacity constrained airports
- Examining Implementation plans of Wake Recat II for FY18 and beyond
- FAA is working to accelerate benefits using Wake Recat II enhancements where possible

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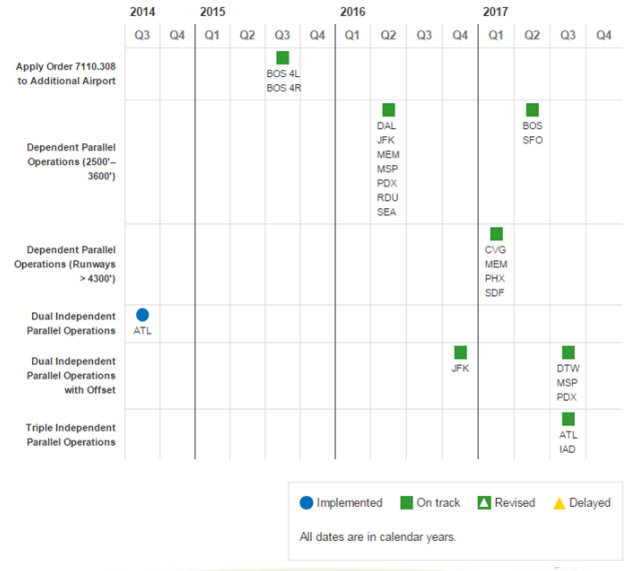
Attachment 2

Multiple Runway Operations

Implementation Commitment



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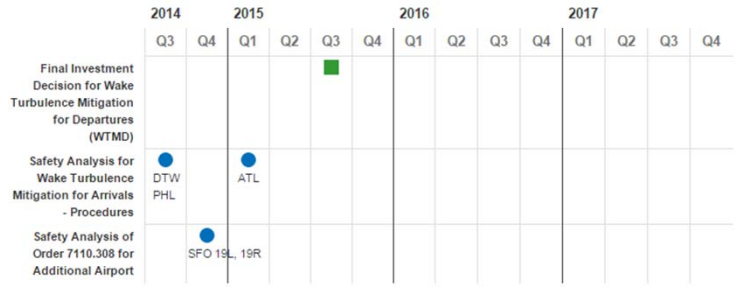
Multiple Runway Operations

Pre-Implementation Commitment



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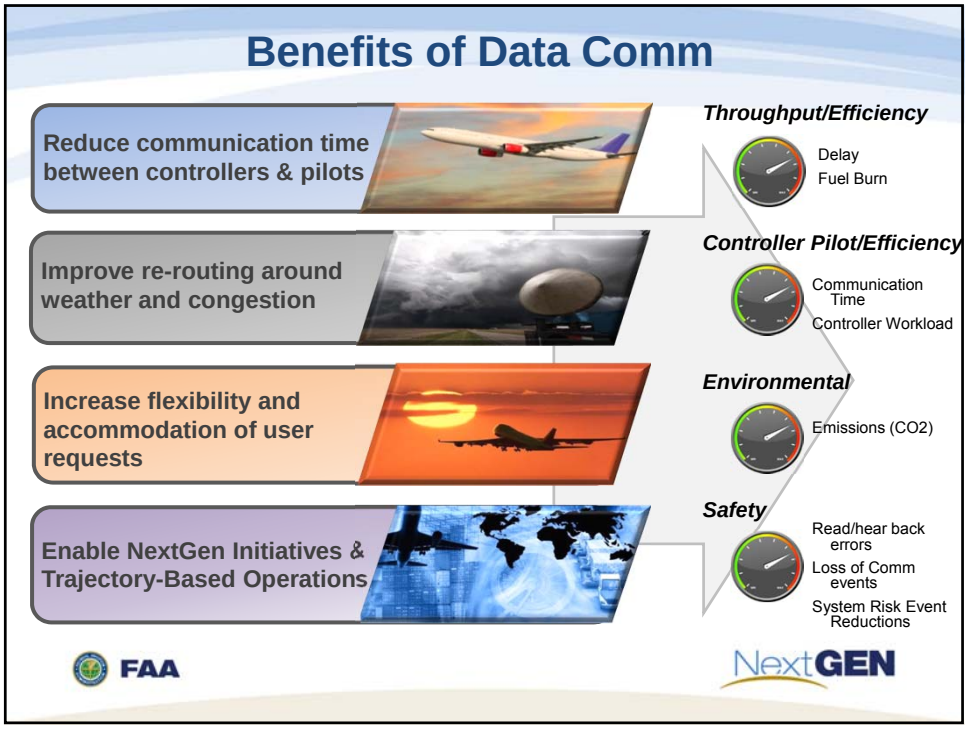
Data Comm Team

Industry and FAA Leaders:

Dan Allen/John O'Sullivan

Paul Fontaine/Jesse Wijntjes



Data Communications – Tower Implementation

Keysite (3 Towers)			
Site Name	Site ID	ARTCC ID	IOC
KS 1: Salt Lake City	SLC	ZLC	Q3 2015
KS 2: Houston Intcl	IAH	ZHU	Q3 2015
KS 3: Houston Hobby	HOU	ZHU	Q3 2015

Group A (19 Towers)			
Site Name	Site ID	ARTCC ID	IOC
New Orleans	MSY	ZHU	Q1 2016
Austin	AUS	ZHU	Q1 2016
San Antonio	SAT	ZHU	Q1 2016
Los Angeles	LAX	ZLA	Q1 2016
Las Vegas	LAS	ZLA	Q1 2016
San Diego	SAN	ZLA	Q2 2016
John Wayne	SNA	ZLA	Q2 2016
Bob Hope	BUR	ZLA	Q2 2016
Ontario	ONT	ZLA	Q2 2016
San Francisco	SFO	ZOA	Q2 2016
Oakland	OAK	ZOA	Q2 2016
San Jose	SJC	ZOA	Q3 2016
Sacramento	SMF	ZOA	Q3 2016
Phoenix	PHX	ZAB	Q3 2016
Albuquerque	ABQ	ZAB	Q3 2016
Seattle	SEA	ZSE	Q3 2016
Dallas Love	DAL	ZFW	Q4 2016
Dallas FTW (x2)	DFW	ZFW	Q4 2016

Group B (17 Towers)			
Site Name	Site ID	ARTCC ID	IOC
Louisville	SDF	ZID	Q1 2016
Indianapolis	IND	ZID	Q1 2016
Cincinnati	CVG	ZID	Q1 2016
Memphis	MEM	ZME	Q2 2016
Nashville	BNA	ZME	Q2 2016
Denver	DEN	ZDV	Q2 2016
Atlanta	ATL	ZTL	Q2 2016
Charlotte	CLT	ZTL	Q2 2016
Jacksonville	JAX	ZJX	Q2 2016
Orlando	MCO	ZJX	Q3 2016
Miami	MIA	ZMA	Q3 2016
Fort Lauderdale	FLL	ZMA	Q3 2016
Tampa	TPA	ZMA	Q3 2016
Palm Beach	PBI	ZMA	Q3 2016
St Louis	STL	ZKC	Q4 2016
Kansas City	MCI	ZKC	Q4 2016
Minn-St Paul	MSP	ZMP	Q4 2016

Group C (18 Towers)			
Site Name	Site ID	ARTCC ID	IOC
Newark	EWR	ZNY	Q1 2016
J F Kennedy	JFK	ZNY	Q1 2016
La Guardia	LGA	ZNY	Q1 2016
Teterboro	TEB	ZNY	Q1 2016
Westchester	HPN	ZNY	Q2 2016
Philadelphia	PHL	ZNY	Q2 2016
Boston	BOS	ZBW	Q2 2016
Providence	PVD	ZBW	Q2 2016
Bradley	BDL	ZBW	Q2 2016
Detroit	DTW	ZOB	Q3 2016
Cleveland	CLE	ZOB	Q3 2016
Pittsburgh	PIT	ZOB	Q3 2016
Balt/Wash	BWI	ZDC	Q3 2016
Dulles	IAD	ZDC	Q3 2016
Reagan	DCA	ZDC	Q3 2016
Raleigh/Durham	RDU	ZDC	Q4 2016
Chicago Midway	MDW	ZAU	Q4 2016
Chicago O'Hare	ORD	ZAU	Q4 2016

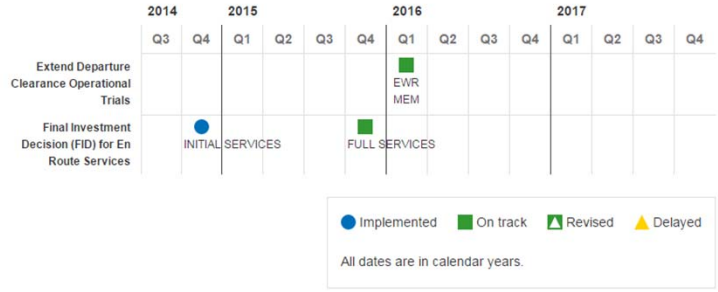
- Waterfall reflects challenge schedule dates (calendar year)
  - Baseline schedule Tower deployment dates are 2016-2019
- Will deploy En Route Services to all 20 Air Route Traffic Control Centers (ARTCC) starting in 2018 (challenge date)

FAA NextGEN

Attachment 2

Data Communications NIWG Commitments FAA

Pre-Implementation Commitment

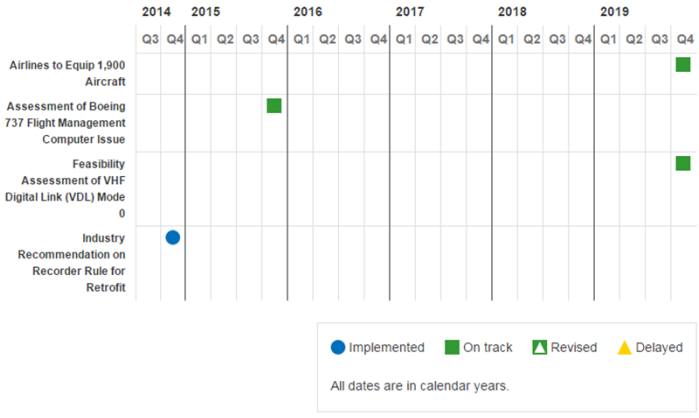


Due to budget constraints, only the Initial Services have received FID approval. The FID approval for Full Services is currently on Track for approval in Q4-2015.

FAA NextGEN

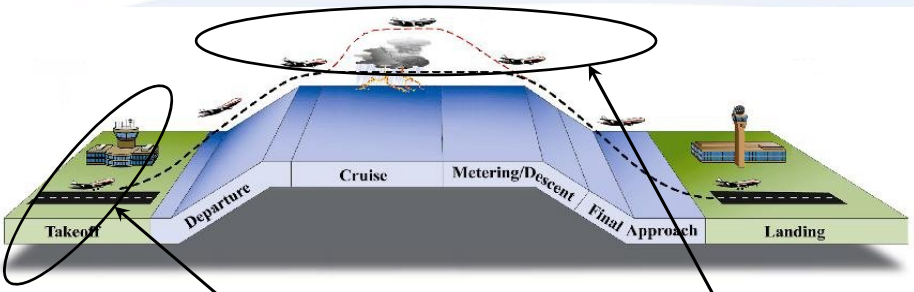
Data Communications NIWG Commitments Industry

Industry Commitments



FAA NextGEN

Data Comm Interdependencies



- **Data Comm supports improvements to Surface Operations with electronic exchange**
  - Data Comm increases the efficiency of surface clearance delivery operations
    - *Revised Departure Clearance*
    - *Flow Initiatives*
- **Coordinating deployment with other Surface Operations improvements (e.g., Advanced Electronic Flight Strips) to ensure smooth implementation**

- **Coordinating with PBN Office and the Metroplex Teams to ensure created route elements are Data Comm compatible**
  - More Efficient Delivery of Clearances
  - Allows Uplink of More Complex Clearances
  - En Route Notifications
  - Seamless Uplink of Flow Initiatives / TFM Reroutes

FAA NextGEN

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Air Carrier Equipage Decision

Tim Leonard
Director Flight Operations Compliance and Operations
Southwest Airlines

DISCUSSION

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BREAK

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NACSC Metrics AdHoc Group Report

Tim Campbell, American Airlines
Melissa Rudinger, AOPA

Executive Summary

Background

February 2015 NAC meeting identified need for 4-6 high-level performance metrics that most effectively assess the change to NAS performance of the four key capabilities outlined in the "*NextGen Priorities Joint Implementation Plan*" published in October, 2014

The NACSC formed an ad-hoc metrics working group per the TORs shown in the appendix to accomplish this tasking

Deliverables

Present a recommendation at the June NAC Meeting that:

1. *Determines performance metrics noted above*
2. *Describes how the metrics will be presented*

The work performed by the metrics WG reinforced the need for on-going, collaborative analysis to accurately capture the impact of NextGen capabilities in a complex and dynamic NAS. As such, the WG felt it was also important to propose a process to harmonize interpretations of changes in high-level metrics as NextGen capabilities are implemented.

Process

NACSC approved the recommendation developed by NACSC Metrics Ad Hoc consisting of air carriers, airports, business/general aviation, controllers, FAA SMEs, MITRE

RTCA helped the WG through the use of a decision support tool that helped determine ranked criteria to measure proposed metrics, as well as a means to ensure the metrics best mapped to all four key NextGen capabilities

Overview – TOR Scope

1) Ensure that the data for the recommended metrics currently exists or can easily be collected
2) All stakeholder input is considered
3) Metrics reflect performance areas important to all classes of operators
4) Limited to the airports or locations where capabilities are being implemented, to the extent practicable
5) FAA recommends continuing joint FAA/Airline analysis to quantify the impacts of the improvements in question. Detailed analysis is generally required to isolate the effects of the factors of interest.
6) To promote broad acceptance of the metrics, the source data will be available to all stakeholders to afford them the opportunity to reproduce/replicate the published reports

Criteria (Industry prioritized order)

1. Economic Value	Reflects the economic value to operators or the FAA of a NextGen capability in a way that lends itself easily to monetizing that value
2. Measures system-wide effect	Reflects the end-to-end or gate-to-gate effect of the particular NextGen capability
3. Conducive to isolating the effects for four NextGen Implementation areas	Can reasonably enable separation if impact of variables other than NextGen capability on change in performance
4. Measures local/regional effects	Reflects the effect of the particular NextGen capability in the local-regional area
5. Reflect performance for all classes of operators	Applicable to all classes of operators e.g. scheduled carriers, cargo carriers, business aviation and general aviation
6. Measures interaction among airports within a Metroplex	Reflects the extent to which the capability and throughput at each airport within the Metroplex is unaffected by traffic at other airports within the Metroplex

Metrics Reporting

Purpose:	A harmonized and credible joint industry-FAA depiction of the impact to the NAS of the short, medium, and longer term assessment of key NextGen implementations
Goal:	An on-line performance dashboard is requested that reflects the metrics WG recommendations, as well as additional elements of the TOR related to transparency and replicability
Reporting Frequency:	The frequency of dashboard updates should be adequate to identify trending to determine incremental benefits and should begin ASAP Request future NIWG status reports at NAC and NACSC meetings include a performance report in addition to the implementation timeline
Content:	More work is needed to refine the content and layout of the metrics dashboard, but some samples are provided in the appendix to this presentation
Future Review:	The metrics WG suggests an assessment "X" months after the dashboard rollout to determine whether any adjustments are necessary to the metric set and dashboard format/content

Measurement Considerations

Difference between "data" and "analysis":	Agreement on metrics data is an important step towards harmonized analysis of NextGen implementation effects. As noted in the TORs, this process necessitates on-going dialogue and analysis. The intent is to form a feedback loop of continuous learning and improvement.
Post implementation process:	1. Seek FAA's input on how soon metrics data will be available after implementation of NextGen capabilities 2. Determine means to isolate NextGen implementation apart from non-related issues (runway closure, airline schedule changes, etc.) 3. Use the NIWG co-chairs for each of the four key capabilities to coordinate analysis and reporting of metrics and to further refine the data filtering used for the reporting dashboard

Recommended Metrics

		Metric	Reported Values	Comments[1]
Measured on applicable existing *104* city-pairs:	1.	Actual block time	Mean and std dev or 60% percentile	• Actual time from Gate-Out time to Gate-In time for a specified period of time by city pair • GA: I FR flight time from ramp taxi to ramp park
	2.	Actual distance flown	Mean and std dev or 60% percentile	• Actual track distance between key city pairs for a specified period of time • GA: IFR flight distance from take-off to TOC & from TOD to touch down
	3.	Estimated Fuel burn	Mean and std dev	• Actual fuel burn for a specified period of time
Measured at applicable airports	4.	Throughput - facility reported capacity rates *	Mean and peak capacity rates	• Facility Airport Arrival Rates (AAR) & Arrival Departure Rate (ADR) Airlines (recommend: http://www.fly.faa.gov/ois/ however, the working group is open to alternate measurements that meet the requirements) • GA: measured as access events - Radar vector and not SID as OUT event and Ground based nav and not GPS / WAAS-LPV as IN event
	5.	Taxi-out Time *	Mean and std dev or 60% percentile	• Actual time from Gate-Out to Wheels-Off time by airport (minutes/flight) • GA: IFR flight taxi time from ramp taxi to take off
	6.	Gate Departure Delay	Delays/100 act depts. And total delay minutes	• Difference in actual Gate-Out time and scheduled Gate-Out time, Not measured for GA

*** - Identified by FAA**
1 GA data may not currently be collected

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Metrics Mapped by Capabilities*
Measured on 104 City

Metrics	MRO	PBN			Surface				Data Comm	Description (units)
		Metroplex	EOR	ELSO	CDM	Dep.Meter	EIS	EOBT		
Actual block time	x	x	x	x	x	x	x	x	x	Actual time from Gate-Out time to Gate-In time for a specified period of time by city pair (minutes/flight)
Actual distance flown *	x	x	x	x						Actual track distance between key city pairs for a specified period of time (Nm). Key city pairs pre-identified by FAA as-per NAC recommendation. This metrics would be affected by Enroute DataComm implementation that is not currently in the NIWG time frame.
Fuel burn (data is collected by FAA for 104 city pairs)	x	x	x	x	x	x	x	x	x	Actual fuel burn for a specified period of time (ton-miles/gallon)

* The capabilities are based on those initially recommended by the NAC in October 2014. Prior to implementation it is expected that these would correlate directly to the final implementation report provided to Congress and a determination made for each metric as to whether it is a primary or secondary for determining impact for each capability.

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Metrics Mapped by Capabilities Measured at applicable airports

Metrics	MRO	PBN			Surface				Data Comm	Description (units)
		Metroplex	EOR	ELSO	CDM	Dep. Meter.	EIS	EOBT		
Airport Throughput	x	x	x	x						Average Daily Capacity (ADC) * - By airport (Facility reported rates) Average daily sum of effective Airport Arrival Rate (AAR)and Arrival departure rate (ADR) for a specified period of time by airport (operations)
Taxi-out Time *	x			x	x	x	x	x	x	Actual time from Gate-Out to Wheels-Off time by airport (minutes/flight)
Gate Departure Delay	x			x	x	x	x	x	x	Difference in actual Gate-Out time and scheduled Gate-Out time

Next Steps

- The NACSC requests NAC approval of the proposed six performance metrics
- Further, the NACSC requests approval to extend the WG's charter to address the following:
  1. Either in parallel to FAA's review of the proposed metrics or after their response, the ad hoc working group will:
     - Develop (and document) a methodology to filter/correct the 6 metrics to best isolate NextGen impacts from exogenous events
     - Determine for each metric as to whether it is a primary or secondary for determining impact for each capability
  2. Recommend a limited expansion of the 104 city pairs that directly reflect NextGen benefits[1]
  3. Develop appropriate methods to consistently and credibly monetize the impacts of NextGen implementation in partnership with FAA *(see note appendix)*
  4. Perform additional research to determine if appropriate sources of General Aviation data are readily available for inclusion with airline and cargo data

1) Both industry and FAA WG representatives collectively expressed interest in this topic to improve the accuracy of the measurements

DISCUSSION

NAC Action

Consider:

Recommendation for approving *The Blueprint for Success to Implementing Performance-Based Navigation Procedures*

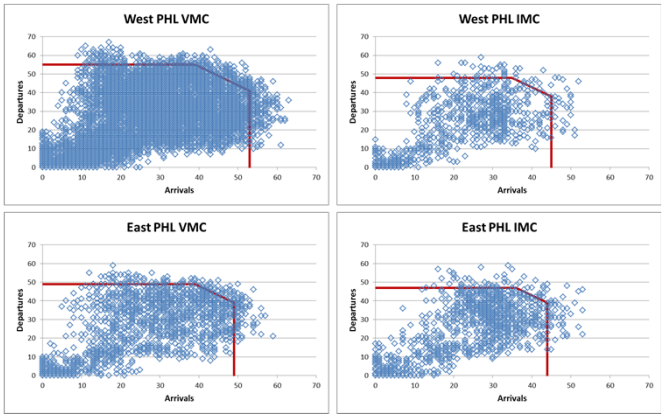
and Transmit to FAA

Appendix

Examples of Throughput measurements

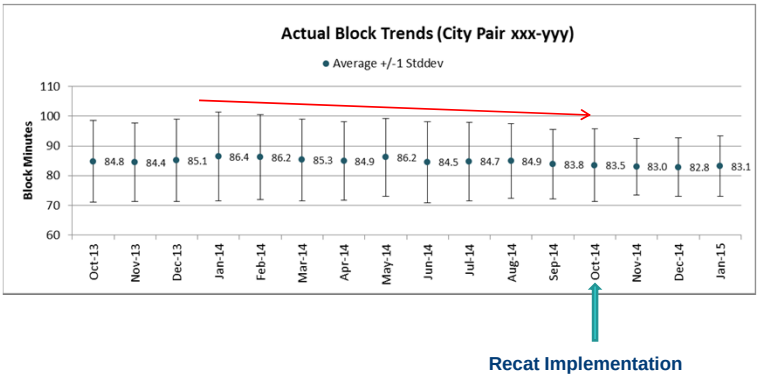
Based on 95th percentile of observations, arrival rate at PHL is 53 flights/hour and departure rate is 55 flights/hour

95th Percentile AAR and ADR at PHL from Oct 2014 – March 2015



Examples of Time and Distance measurements

Both, average and dispersion of block times are trending downwards since implementation of wake recategorization in October, 2014



Note about calculating economic value

- The cost and revenue impact of changes to these metrics will be analyzed separately using a standardized methodology or provided by users.
- The calculations will include:
  1. Cost of fuel
  2. Cost of block (other than fuel)
  3. Cost of delay - two groupings: 1) short/medium & 2) 180+ mins
- Two items need special attention:
  1. FAA typically monetizes passenger time; Industry doesn't (explicitly)
  2. How to handle extrapolation to future years.

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LUNCH

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ADS-B Ad Hoc Group Final Report

Ad Hoc Chair:

Major General,
Giovanni K. Tuck

Task Review – ADS-B Ad Hoc

- Launch: February 2015 NAC meeting identified need for implementation commitments in order to meet the 2020 ADS-B implementation mandate
- Review and action
  - What is your “long pole” in getting to 2020?
  - What needs to be done to mitigate it?
  - What are the milestones to make that happen?
- Inputs: Equip 2020, other industry and FAA actions
- Deliverable: Report developed and presented at the June 2015 NAC meeting

Presenters - ADS-B Ad Hoc Report June NAC Meeting

- Mainline Carriers - A4A - Paul McGraw
- Regional Airlines - SkyWest - Chip Childs
- Small Aircraft - AOPA - Mark Baker
- Privacy - NBAA - Ed Bolen
- DOD – Maj Gen Tuck, Chair
- UAS - Insitu - Ryan Hartman

Air Carriers

- **Air Carriers:** Maximizing the use of existing equipage and precluding multiple aircraft retrofits; airlines will comply with mandate.
- **Identified issues:**
  - Unavailability of certified equipment for air carrier aircraft
  - Airplanes flying in affected airspace will need to augment GPS accuracy to meet rule requirements 100% of the time
  - Current generation GPS will meet rule requirements >99.9%
  - Alternate means of traffic separation will be made available to augment GPS in the event of GPS service disruption.

Air Carriers (cont.)

- **Resolution:**
  - Airlines are provisioning aircraft (wiring, etc.) and will install new transponders by January 1, 2020.
  - A4A Petition for exemption seeks relief from rule GPS accuracy requirements during limited periods of GPS satellite disruption. FAA requested to provide alternate means of surveillance during these events.
  - Airline exemption grantees will create, maintain and update a GPS equipage plan that will commit to comply with rule requirements by 1/1/2025.
  - Safety will not be adversely affected if FAA grants the petition.

Regional Air Carriers

- **Air Carriers:** Maximizing the use of existing equipage and identifying missing pieces of information needed to make decisions regarding compliance plans.

- **Identified issues:**
  - Unavailability of certified equipment for air carrier aircraft
  - Software uncertainties for identified equipment
  - Fleet plans unknown beyond 2020
  - Many leases do not extend past 2020
  - Aircraft reallocation plans to execute over next several years

Regional Air Carriers (cont.)

- **Resolution:**
  - RAA and its member airlines are working to supplement the equipage and compliance paths identified by Equip 2020
  - Regional airlines are in the process of identifying fleet for 2020-2025
  - RAA will confirm the applicability of A4A petition for exemption
  - Over 87% of the 2014 regional aircraft departures (scheduled and non-) were performed by RAA member airlines

Small Aircraft

- **ADS-B solution for Small aircraft:** may include the need for developing a performance standard with the stipulation that it would not affect the ADS-B rule.
- **Identified issues:** Standards for GA (including TSO versus non-TSO question), cost of equipage, pathway for equipping, exemption for experimental

Small Aircraft

- **Resolution:**
  - Industry announcements on low cost solutions (50% of previous prices) (<$2K for certified, <$1K non-TSO experimental/LSA)
  - FAA issued policy on non-TSO for experimental and Light Sport Aircraft, but not economically viable solution for certificated aircraft
  - AOPA, equipment manufacturers, and aviation associations commit to work together to educate aircraft owners about their options when it comes to ADS-B equipage
  - Need for FAA certification of new avionics developed by equipment manufacturers (delaying availability of low cost rule compliant avionics and installation)

Aircraft Privacy

- **Aircraft privacy:** determining how to provide the ability for aircraft operators to block the broadcast of specific “N” numbers if requested by the aircraft operators. This ability is required to be provided by the FAA
- **Identified issues:** need for encrypting broadcast with unique identification and the pathway for this capability
- **Resolution - Near term:** FAA establishes a “privacy office” to administer assignment of anonymous 24-bit addresses and anonymous Flight IDs

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Aircraft Privacy (cont.)

- **Resolution - Long term:** RTCA should be tasked with a request to have a committee begin work in the near future that will examine mitigating the ability to track aircraft on a real-time basis to add encryption of the transponder interrogation response as part of a future change to the DO-260C MOPS when published early in the 2020s

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Department of Defense

- **Department of Defense:** identify the unique challenges of DoD commitments to meet the 2020 implementation.
- **Identified issues:** pathway to equipping, mission critical need for anonymity

Department of Defense (cont.)

- **Resolution:**
  - Majority of DoD fleet should be equipped by 2020
  - Developed roadmap for equipping all others
  - Seeking AFRL funding for non-integrated solutions
  - Reviewing prioritizing within USAF fleet – heavy fleet commonly operating in NAS vs specialized

Unmanned Aircraft Systems

- **Unmanned Aircraft Systems (UAS):** identify issues associated with the UAS operations to meet the mandate
- **Identified issues:** pathway to equipping, weight, cost
- **Resolution:** Meet ADS-B equipage requirements for all UAS operating in the NAS in areas where it is required should be a goal.
- Certification requirements must be established that are appropriate to UAS
  - Adopting manned avionics certification standards may not be practical
  - Leverage LSA/Experimental aircraft provisions for ADS-B equipage
  - ADS-B is partial, but not complete solution to detect and avoid

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Operational Requirements

- **Foundational Requirements:** Operational barriers that must be addressed in order to comply by 2020
- **Identified issues:** Path for equipage for aircraft that do not have an affordable or technical pathway to an integrated solution, FAA certification of avionics and installations
- **Resolution:**
  - Identifying non-integrated solutions – “stand alone” or non-integrated with avionics suite solutions
    - Equip 2020 identifying other options for compliance
  - FAA needs to prioritize resources for avionics certification approvals
  - FAA resources/policies needed for approval of installations

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Other Operational Limitations

- **Other operational limitations:** identify operational barriers associated with the 2020 implementation
- **Identified issues:** Capacity of repair stations to install equipment, education & outreach, certain questions related to UAS
- **Resolution:**
  - NAC can help draw attention to issues of capacity, not waiting until “last minute”
  - Education of aircraft owners on the 2020 mandate & the implication of waiting for maintenance resources
  - FAA website resource, continual updates, http://www.faa.gov/nextgen/equipadsb/
  - Research on UAS platforms - UAT and 1090ES capability due to mission diversity & “In” functionality
  - Policy question related to UAS equipage for low altitude/small UAS

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DISCUSSION

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NAC Action

Consider:

Recommendation for approving the *NAC ADS-B Ad Hoc Group Final Report* and Transmit to FAA

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FAA Response to "Blueprint for Success to Implementing Performance Based Navigation" Recommendations

Federal Aviation Administration (FAA) Response to RTCA's "Blueprint for Success to Implementing Performance Based Navigation" Recommendations

Agenda

- RTCA Performance Based Navigation (PBN) Blueprint Overall Findings & Recommendations
- Recommendations Summary
- FAA Concurrence
- FAA Partial Concurrence
- FAA / RTCA Collaboration
- Summary

PBN Blueprint Overall Findings & Recommendations

- Identify and effectively engage all Stakeholder Groups
- Avoid duplication of process & other efforts under development
- Develop Overall Goal of the PBN Effort - Agreement on overall goal of what PBN procedure is designed to achieve including all stakeholder views/interests
- Goal Defines High-level Outcomes and Metrics - selected metrics should be aligned with the established stakeholder goals
- Capturing Lessons Learned – Tools need further refinement/support

FAA NextGEN

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Recommendations Summary

RTCA made 28 specific recommendations in 6 categories.

1. **Non-Technical Stakeholders**
2. **Technical Stakeholders**
3. **Outcomes and Metrics**
4. **Capturing Lessons and Future Efforts**
5. **Checklist**
6. **Additional**

FAA analysis determined 10 recommendations contained overlapping content and developed 18 combined responses.

FAA NextGEN

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FAA Concurrence

FAA concurs with 16 recommendations that include:

- **Community involvement activities and checklist**
- Role of airport authority
- Cross-cutting FAA lines of business
- **Controller training**
- Metrics alignment with PBN goals and objectives
- **Pre-implementation flight simulation**
- **Special procedures**

FAA Partial Concurrence

FAA partially concurs with the 12 remaining RTCA recommendations.

- Automated Terminal Information Service (ATIS) use
- Specific metrics
- Procedure design process, project tracking, reporting, and data management
- Implementation of Holistic checklist vs. PBN checklist/Project Schedule

FAA / RTCA Collaboration

- FAA is committed to examining all partially adopted recommendations for future inclusion in the PBN process.
- Several telcons occurred with NAC members to clarify intent and discuss FAA draft Blueprint responses.
- Further changes to draft Blueprint resulted from discussions.
- PBN Office will continue dialogue with RTCA after experience is gained with the currently adopted procedures.

Summary

- FAA made 18 combined responses to 28 RTCA PBN recommendations, with complete or partial concurrence in all areas.
- Community involvement, role of airport authority, controller training, and further metrics development are significant recommendations that FAA endorses.
- FAA will continue collaboration with RTCA to incorporate the partially adopted recommendations into future changes to FAA orders, and PBN processes and tools.

DISCUSSION

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Summary of Meeting & Next Steps

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DFO and NAC Chairman Closing Comments

Michael Whitaker, FAA DFO

Richard Anderson, NAC Chairman

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Other Business

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Next Meeting

October 8, 2015

Memphis, TN

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Adjourn

Attachment 3

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RTCA Paper No. 035-15/NAC-33

March 3, 2015

Meeting Summary, February 26, 2015

NextGen Advisory Committee (NAC)

The fourteenth meeting of the NextGen Advisory Committee (NAC) was held on February 26, 2015 at the Headquarters of Delta Air Lines, 1010 Delta Blvd, NYC Room, Atlanta, GA. The meeting discussions are summarized below.

List of attachments:

- Attachment 1 - Attendees
- Attachment 2 - Presentations for the Committee meeting - (containing much of the detail about the content of the material covered)
- Attachment 3 - Approved October 8, 2014 Meeting Summary
- Attachment 4 - NAC Chairman's Report
- Attachment 5 - FAA Report from The Honorable Michael Whitaker, FAA Deputy Administrator
- Attachment 6 - FAA Metrics Point Paper, Agenda Item 8

Welcome and Introductions

RTCA President, Margaret Jenny opened the meeting by introducing the new NAC Chairman, Richard Anderson (Chief Executive Officer, Delta Air Lines) and seven new Committee members:

- Pete Bunce, President & CEO of General Aviation Manufacturers Association
- Paul Cassel, Senior VP Flight Operations of FedEx Express, representing the Cargo Airline Association
- Tim Canoll, President of Air Line Pilots Association
- Chip Childs, President of SkyWest, Inc., representing the Regional Airline Association
- Carl D'Alessandro, VP & General Manager Civil Business Unit, Harris Corporation
- Ryan Hartman, President and CEO, Insitu
- Per Noren, VP Customer Solutions, Digital Aviation of The Boeing Company

All NAC members and attendees from the general public were asked to introduce themselves (attendees are identified in Attachment 1).

Chairman Anderson welcomed the NAC members and others in attendance and provided introductory remarks explaining that the NAC is made of individual interest, but collectively reflects the broader interests of the aviation community. The Committee has achieved consensus on many tough issues and the FAA is doing a good job but it is important now to focus on successfully

implementing the four priority areas – safely and in consideration of everyone's needs and interests. He also noted the importance of achieving measurable benefits as the FAA faces pressures to advance NextGen implementation in light of the pending reauthorization legislation.

Designated Federal Official Statement

In his role as the DFO, The Honorable Michael Whitaker (FAA Deputy Administrator) read the Federal Advisory Committee Act notice, governing the open meeting.

Approval of October 8, 2014 Meeting Summary

Chairman Anderson asked for consideration of the written Summary of the October 8, 2014 meeting. By motion, the Committee approved the Summary (Attachment 3) contingent on a revision being circulated as requested by NAC member, Lilian Ryals, The MITRE Corporation. The revision related to the section describing the independent assessment of the FAA's progress on NextGen. The summary was approved pending final review by the Committee of the revision. The report will also be posted for the NAC members.

Approval of Revised Committee Terms of Reference

By motion, the Committee approved a revised Terms of Reference to reflect changes in Committee leadership, the addition of UAS to the Committee membership and the revised structure of the NAC supporting entities.

Chairman's Remarks

The following is a summary of the remarks made by Chairman Anderson (Attachment 4):

He stated the importance for the industry and the FAA of being on-time, and on-budget in implementing the NextGen Integration Working Group (NIWG) recommendation. Developing metrics on measuring the effects of the implementations will also provide the information necessary to help communicate success.

He stated that the NAC has made progress in the collaborative efforts between the industry and the FAA on recommendations related to implementing NextGen, and together, real results need to be delivered. He continued that we must build on the work of the NAC done under the leadership of past Chair, Bill Ayer. Chairman Anderson stated that since assuming responsibility for the Committee, he has had several meetings with Mike Whitaker, and has reached out to many of the members of the Committee. He said the success of the NAC is due to the drive of the people working to achieve the mission and goals of NextGen: improved safety, increased capacity and efficiency, and reduced environmental impact. He thanked the FAA for placing their confidence in the NAC and for working in a transparent and collaborative manner. He told the NAC members that we must always stay focused on the delivery of solutions that work for all of the aviation constituents around the table.

Chairman Anderson reviewed the goals of the NAC:

- Delivering the Next Gen Priorities Joint Implementation Plan on time, on spec, and on budget - achieving all FAA and industry milestones and commitments for the four focus areas of capabilities that Bill specified in his letter of 10/14/2014 to the FAA.
- Achieving measurable improvements in the performance of the NAS, attributable to the implementation of the NextGen capabilities in the four focus areas to which both FAA and operators will attest.
- Forging consensus among the key FAA stakeholders (all represented on the NAC) on issues of critical importance to the industry and FAA.
- Gaining more followers once the benefits and positive attributes are fully delivered and widely acknowledged. Nothing short of achieving the benefits and communicating those to stakeholders will lead to future investments and the acceleration of new benefits.
- Continuing to tackle the difficult and relevant issues facing the FAA and its stakeholders.

Chairman Anderson then discussed specific goals for the NAC in 2015:

- As requested by the FAA, identify 4-5 top-level metrics to measure benefits (air carriers and business/general aviation) attributable to the implementation of NextGen capabilities, as FAA Deputy Administrator Mike Whitaker committed in his January 28, 2015 letter;
- Establish a method of continuing the constructive collaboration on the NIWG focus areas between the FAA and industry on a rolling 3 year progression; and
- Consider additional topics for the NAC to provide constructive industry consensus recommendations, including the integration of UAS into the NAS (large and small); rationalization of NAS infrastructure both manned and unmanned; and other challenging policy issues facing the FAA as it works to modernize the air traffic management system that could be more easily solved with a single voice from industry.

FAA Report

Mr. Whitaker thanked Chairman Anderson for hosting the meeting and taking on the Chairman's role.

The following are highlights from the verbal report--details are contained in the official FAA report (Attachment 5).

Recognition of Dennis Roberts – Mr. Whitaker recognized Dennis Roberts in his new role as the FAA Southern Regional Administrator, based in Atlanta, GA. He stated that Mr. Roberts played an important role by serving as Director of Airspace Services for ATO Mission Support since 2010 and worked on several PBN-related NAC Taskings.

NextGen Priorities – Mr. Whitaker explained that the NextGen Priorities Joint Implementation Plan was delivered to Congress on October 17, 2014. This incorporated the NAC's NextGen Integration Working Group Final Report as an appendix. The FAA has delivered on 11 out of 11 commitments in the 2014 calendar year, and is on target to deliver three commitments at the end of the first quarter

of this year. Mr. Whitaker also recognized the industry for meeting its 2014 commitment, with the Performance Based Operations Aviation Rulemaking Committee (PARC) completing their review of the data link recording rule and delivering their recommendations in November 2014. It was reported that the FAA had completed its review of the recommendations, and that on February 25, the FAA's new policy was published in the Federal Registry.

John Hickey, FAA Deputy Assistant Administrator for Aviation Safety, explained the FAA's action on a change that now applies the data recorder rule, in most cases, only to new aircraft manufactured after the December 6, 2010 effective date of the rule. Mr. Hickey commented that there was recognition that the recorder rule was an inhibitor on moving forward with DataComm and that this helps the industry equip older aircraft.

Mr. Whitaker commented that the work on NextGen Priorities has been very rewarding for the FAA and has set a new standard for how the FAA is working together with the NAC to move NextGen forward. He also thanked Steve Dickson for his leadership of the NAC Subcommittee and welcomed Tim Campbell as the new Co-Chair.

ADS-B Equip 2020 Mandate – Mr. Whitaker reviewed the FAA industry Call to Action, intended to gather together all industry stakeholders in order to assess progress on being fully equipped with ADS-B Out by January 1st, 2020. He noted that from this event, the Equip 2020 initiative, led by NextGen Institute's General Hoot Gibson, has made progress in 3 areas:

1. General aviation--a marked uptick in equipage since October and cost reductions in equipment.
2. Airline equipage--an agreement was reached to allow air carriers with 1st and 2nd generation receivers to continue their use until 2025.
3. The production of an equipage tracking database.

A Committee member raised the need to determine how ADS-B can provide a privacy capability that is a key issue to business aviation. This allows aircraft operators to block the broadcast of specific "N" numbers at their request and is required under law to be provided by the FAA.

Chairman Anderson asked the Committee if everyone was in agreement among all operators to adhere to the 2020 ADS-B mandate. Overall, the Committee members (and operator representatives in attendance at the meeting) expressed agreement, but offered the following caveats and comments:

- It would be helpful to educate pilot members of Congress on the industry position on ADS-B implementation.
- A low cost solution is needed for light general aviation (GA) aircraft.
- The privacy function capability must be resolved.
- Similar to light GA, a low cost solution is needed for Unmanned Aircraft Systems (UAS).
- The DoD has the challenge of equipping approximately 15,000 aircraft.

Chairman Anderson then suggested the formation of an ADS-B Ad Hoc group to report back to the Committee at the June meeting, on what implementation commitments are necessary for the 2020 ADS-B implementation mandate. General Tuck, USAF, will chair the Ad Hoc. Members will include:

a. AOPA - Mark Baker (Melissa Rudinger)

b. UAS – Ryan Hartman (Insitu)

c. NBAA – Ed Bolen

d. Regional Airlines – Chip Childs (SkyWest)

e. Avionics Provider – Carl Esposito (Honeywell)

f. While not a member of the Ad Hoc, coordinate with Gen Marke Gibson, NextGen Institute, Equip 2020 initiative

Ms. Jenny volunteered RTCA to serve as secretary for the group.

McKinsey Benefits Study – Mr. Whitaker reported that the FAA had engaged with McKinsey & Company in order to better understand the benefits Next Gen is providing to the aviation industry. The study covered major categories of carrier benefits. Mr. Whitaker noted that the FAA had also held discussions with Delta, Alaska, United, Southwest, American, jetBlue, and UPS. A visit had also been scheduled with FedEx and Republic. These airlines expressed:

- Appreciation and the need for an open airline-specific dialogue with the FAA on NextGen;
- Challenges with previous programs;
- Commitment to equip for the ADS-B 2020 mandate; and
- Specific, near-term improvements in order to maximize benefits.

Mr. Whitaker informed the Committee that the next steps for the FAA regarding NextGen benefits and carrier alignment would be follow-up discussions with airlines and to update the FAA's NextGen strategy.

Houston, North Texas and DC Metroplex – Lynn Ray, Vice President Mission Support, Air Traffic Organization, updated the Committee on the following Metroplex implementations:

Houston–the FAA launched 61 new flight routes in and out of the Houston area airports in the spring of 2014, utilizing Time Based Flow Management capabilities. Post-implementation data analysis showed an annual savings of $6 million in fuel consumption. Ms. Ray noted that in December 2014, the FAA had added Wake ReCat capability into Houston Intercontinental and Hobby airports.

North Texas–in September 2014, the FAA implemented 80 new NextGen procedures (separating departure and arrival flows), leading to increased safety in the North Texas region. The FAA continues to link North Texas to the rest of the country's airspace. Ms. Ray also commented that the FAA is currently conducting a post-implementation analysis in the region.

DC Metroplex–Ms. Ray highlighted that the FAA's initiative in this region would implement 50 new procedures staged over eight publication cycles to be completed by June 25th, with a projected savings of $6.8 million in fuel costs.

A Committee member asked the industry and the FAA to do a better job of communicating PBN efforts, suggesting that including community outreach as a part of PBN projects would be a way forward. Mr. Whitaker also stated that an important issue is the challenge to identify and articulate the benefits, and Chairman Anderson commented that identifying clear metrics will help. A Committee member offered that reporting on the five greatest successes would help in this effort.

Finding a better way to communicate environmental reductions in carbon dioxide emissions under PBN procedures could help counter noise concerns, according to another Committee member. An airport operator Committee member commented that communicating with individuals in the areas where aircraft fly over is crucial stating that there is a need to clearly articulate what the procedures mean to them and being aware that departures have the most impact. They also suggested that a more robust community outreach, sharing of information, converting data to identify the tradeoffs. "Fear of the unknown" and the lifestyles of the community are crucial. Echoing an earlier comment, a Committee member stressed the need for connecting the CO2 reduction and noise, along with better outreach.

The discussion concluded with the observation that change in flight patterns is a huge issue for the airports and the communities affected. This includes the need for fair and shared impact.

En Route Automation Modernization (ERAM) – Teri Bristol, Chief Operating Officer, Air Traffic Organization, provided a brief description of the importance of ERAM for the nation's airspace system, noting that the transition represents one of the largest automation changeovers the FAA has ever undertaken. All 20 En Route centers have reached Initial Operating Capability (IOC) and 16 of the 20 centers have declared an Operational Readiness Date (ORD). Ms. Bristol highlighted that with the remaining 4 centers declaring ORD by the end March, the FAA anticipates the completion of the ERAM deployment.

Future Airport Capacity Task (FACT) 3 Report – Eddie Angeles, Associate Administrator for Airports, reported that in late January, the FAA had issued its latest FACT report. The report identified airports at risk for significant delays and congestion through 2020 and 2030. For the rest of the decade, most of the U.S. hub airports have sufficient capacity except NYC area airports, ATL, PHL, and SFO. It was also reported that new runways and NextGen improvements are needed to improve efficiency at capacity-constrained airports.

Small Unmanned Aircraft Systems (UAS) Proposed Rule – Mr. Whitaker informed the Committee that the FAA issued a UAS proposed rule earlier in the month. The FAA has continually made an effort to integrate UAS safely into the U.S. airspace, and the proposed rule outlined the framework governing the operation of UAS weighing less than 55 pounds.

CatEx 2 Decision – Mr. Whitaker reported that the FAA has decided to implement (with two modifications) the NAC's recommended net noise reduction methodology to implement the Categorical Exclusion. The first modification was that the FAA would evaluate net changes in noise,

and not net changes in the affected population to be more consistent with the statute. The second modification was that the FAA would rule out using categorical exclusion if noise increased significantly. Mr. Whitaker pointed out that only the industry provided positive comments on this categorical exclusion and net reduction methodology. All other comments were negative and highlighted the problem the FAA is experiencing with opposition to PBN procedures that shift noise over communities. The noise issue will be discussed more in depth at the June NAC meeting.

SESAR/NextGen collaboration – Mr. Ed Bolton, FAA Assistant Administrator, NextGen, and Mr. David Batchelor, SESAR, provided a brief update on the areas of collaboration between the FAA and SESAR. Mr. Batchelor noted that SESAR is moving forward with the deployment manager organization that will coordinate implementation. The NAC is being examined as an example of how to resolve the various issues and balance interests in implementation air traffic control modernization in Europe.

The FAA-SESAR "State of Harmonization" report has been completed and will be made available to the Committee members for additional details on the harmonization efforts between the US and Europe.

Reauthorization and Capital Investment Plan (CIP) – Mark House, FAA Chief Financial Officer, reported the current situation of the CIP, informing the Committee that the 2016-2020 CIP targets are significantly higher than the 2015 targets. It was noted that while these targets allow for more investment, they still do not fund looming out-year needs. Furthermore, while the NAC and the NIWG helped redefine near-term NextGen priorities, Congress historically has appropriated funds at levels that are lower than the targets. Mr. House also highlighted the elements of the CIP: Activity 5 and 6 (22%), Legacy (55%), NextGen Complete Commitments (16%) and NextGen Trade Space (7%).

Atlanta Multiple Runway Operations Implementation Experience

Joe Post, FAA, and Mark Hopkins, Delta Air Lines, provided a joint presentation on runway Wake Recategorization (Wake ReCat) in Atlanta.

Chairman Anderson, on a very positive note, noted that six more arrivals and departures an hour offers a huge economic and customer service benefit, adding capacity, improving the passenger experience by reduced missed connections and missed luggage. He noted further that the benefits from Wake ReCat do not require technology investments.

Committee members made the following additional comments related to Wake ReCat and described the benefits being achieved through implementation:

- Translating into what people care about
- Reducing block time and helping with maintenance
- Similar benefits are being experienced at other airports where wake ReCat is being implemented
- Illuminating other challenges that will surface as a result of implementation
- Emphasizing that NextGen is happening, "real life, and tangible stuff"
- NextGen is increasing capacity and making the most of what we have
- Wake ReCat brings huge capacity and efficiency gains – track it, implement it, build the case for continued investments

- Wake ReCat is important for JFK and other airport as well

Open Discussion: NextGen Implementation

Ed Bolton and Joe Post provided an overview of the FAA's proposal (Attachment 5 - FAA Metrics Point Paper, Agenda Item 8) for identifying metrics that can determine the benefits of implementing NextGen capabilities in the four priority areas.

Chairman Anderson opened the discussion by observing that there is a great deal of existing data and there shouldn't be an attempt to reinvent data, but leverage what is being collected and is available.

Mr. Bolton picked up on the comment and stated that the NAC should, (1) look at what is currently being measured and evaluate benefits using metrics that are already being tracked; (2) including those called for by Congress in Section 214 of the 2012 FAA Authorization legislation; and (3) enable evaluation the implementation for the four NIWG priority areas.

In response to a question from a Committee member about defining specific goals to achieve associated with each metric (e.g. reduce city-air average flying time by x%), Mr. Post and Mr. Bolton explained that while the FAA has recommended metrics for each capability area, there were no targets identified. Another Committee member pointed out that evaluating the implications on operations can affect how to best communicate the benefits.

Mr. Bolton's suggestion that a small team be assembled to work out a proposal for specific metrics for the NAC to consider at the next meeting was echoed by others on the Committee.

Committee members observed that metrics should showcase economic benefits. Another Committee member stated that capacity/efficiency measurement must incorporate business aviation into the impact assessment to ensure that implementation of new capabilities does no harm to this segment of aviation. It was also stated that metrics should be outcome driven, illustrating the economic value of operational capability implementation, using data we can collect.

The Committee members agreed that the goal is not to create new metrics but leverage or substitute those congressionally required, as well as those already recommended by the NAC. An FAA Committee member also commented that the previous recommendation related to city pairs should be considered when looking at the impact of implementation at airports

A Committee member pointed out the need for a metric that can measure the impact on General Aviation. FAA reminded the Committee that NextGen Priorities were established with a consensus of all stakeholders. It was observed that measuring the impact on NAS performance of NextGen operational capabilities is critical, and the intent of the industry is not to attempt to highlight deficiencies but to highlight successes and learn from results that are less than what was aimed for, enabling constant improvement. The Committee generally agreed that the metrics can address GA.

A DoD representative reminded the Committee that access to airspace is essential.

In response to the question of whether one metric should be identified for each of the four priority areas, Committee members commented that:

- A single metric can apply across multiple capabilities

- A metric should enable clear tracking of commitments
- Metrics need to correlate to success and be simple to understand

A question was raised related to taxi time being a metric for DataComm, and a conversation between the members and an FAA SME occurred with an overall observation that it is important to the program, but that there may be additional metrics that help identify the benefits from DataComm.

The Committee provided the following guidance as the NACSC takes on the Task of providing recommendations for NAC consideration. Metrics should start with those provided by the FAA and be:

- Outcome-focused
- Leverage existing metrics
- capable of being measured against tangible goals
- applicable to all stakeholders including DoD, GA, and air carriers

It was also noted that multiple metrics may be needed to assess the impact for a single capability area, although the overall number of metrics should be 4-5.

Assumptions include: (1) maximizing use of existing metrics, (2) leveraging mandated metrics as well as earlier NAC recommendations (e.g., city-pairs), (3) finding a simple set that communicates clearly, (4) focusing scope on measuring NextGen Priorities (5) being outcome-focused, (6) being amenable to setting goals, and (7) recognizing access to airspace by the military is still of utmost importance.

NextGen Integration Working Group

Since the Committee approved the recommendations for implementing NextGen capabilities in the four focus areas of DataComm, Multiple Runway Operations, Performance-Based Navigation and Surface, the FAA and industry leadership of the NIWG have developed the means for oversight & monitoring, and tracking the progress in the four areas. Ed Bolton, Teri Bristol, John Hickey, Steve Dickson (Delta Air Lines) and Melissa Rudinger (AOPA) worked collaboratively to institute this process.

Overall comments from the leaders were that there was good collaboration and a tremendous amount of work done by the FAA and the industry, all with a focus on the delivery of capabilities. An industry representative observed that the on-going work will present opportunities in the future, because of the dynamic nature of the process.

Focus Area Reports

The Industry Leads and the FAA Subject Matter Experts (SMEs) for each of the four focus area teams presented a report on the consensus recommendations.

Surface and Data Sharing

- FAA SMEs: Lorne Cass (ATO), Nick Lento (NG)
- Industry Leads: Rob Goldman (Delta Air Lines), Steve Vail (Mosaic ATM, Inc.)

The SMEs and the Team Leads reviewed the recommendation that includes airport participation in Collaborative Decision Making and access to surface data; Airport Surface Departure Metering;

provides real-time traffic management updates to New York Air Traffic Control Towers, flight and aircraft operators; and utilizes Earliest Off Block Time (EBOT) for short range flights.

In response to a question about the scalability of EOBT using the test at Atlanta (ATL) where the first boarding pass scanned triggers the request, the FAA representatives explained how it works and how this could be used beyond this test program.

The FAA reported on the Advanced Electronics Flight Strips (AEFS) assessment for New York area airports and the selection of Newark Airport as an implementation site. Rebecca Guy, the Program Manager for AEFS, explained that the agency's review indicated that the unique Departure Spacing Program (DSP) system that improves the efficiency of departure traffic and automates inter-facility coordination of schedules and clearances is a major encumbrance to moving forward at the New York airports. Current tower operations require controllers to scan flight strips to enter aircraft location into DSP. The FAA plans to incorporate an AEFS capability into the Terminal Flight Data Manager (TFDM) acquisition set for 2019-2020.

In response to a question from a Committee member, Ms. Guy commented that Newark Airport was chosen for implementation based on funding the cost of providing the capability and the sustainability for future operations. A Committee member also noted that Teterboro Airport was also an important location for surface management capabilities.

DataComm-enabled Controller-Pilot DataLink Communications (CPDLC) and pre-departure clearances

- FAA SMEs: Jessie Wijntjes (ATO), Paul Fontaine (NG)
- Industry Leads: Dan Allen (FedEx Express), John O'Sullivan (Harris Corporation)

Mr. Wijntjes discussed the FAA program for Surface DataComm pre-departure clearances and En route Controller-Pilot DataLink Communications (CPDLC).

Mr. Allen emphasized the work of the NAC in obtaining relief from the Data Recorder rule discussed earlier in the meeting. He thanked the FAA for addressing the financial impediment for airlines to equip aircraft with DataComm technology.

A Committee member asked if the FAA program is harmonized with the DataComm program that is being implemented in Europe. In response, Mr. Allen commented that in the long-term they are harmonized (Baseline 2), but the FAA (via FANs) and Europe (via Baseline 1) are taking different paths to get that point.

Performance-Based Navigation (PBN)

- FAA SMEs: Josh Gustin (ATO), Donna Creasap (NG)
- Industry Leads: Gary Beck (Alaska Airlines), Steve Fulton (Fulton Navigation)

Mr. Gustin and Ms. Creasap discussed the following recommendations for PBN:

- Develop a National Standard for Equivalent Lateral Spacing Operations for Departures (ELSO) (2015)
- Complete Established on RNP (EoR) Special Authorization for Widely Spaced Operations: at Denver (2015)

- Develop a National Standard for EoR Widely Spaced Operations (2017)
- Complete an EoR RNP Track-to-Fix Safety Assessment (2015)
- Complete 3 additional Metroplex sites: Northern California (2015), Charlotte (2017), and Atlanta (2017)
- Complete a Las Vegas Basin Assessment (2014)

Based on the assessment conducted of Las Vegas PBN initiatives, the FAA has determined to move forward utilizing a Metroplex process. The timeline will depend on funding, staffing, etc. A study team will be established to determine the scope. A NAC member commented that air traffic controllers had specific concerns about previous PBN efforts in Las Vegas, emphasizing the need for collaboration.

Related to increasing the use of PBN procedures, another Committee member expressed the need for broadcasting the availability of PBN procedures on the Automatic Terminal Information Service (ATIS) to help educate pilots and raise awareness across the aviation community. In response, an FAA official noted that the Agency has been doing this, balancing the amount of information that needs to be provided on the ATIS and also relates to the goal of moving towards a "PBN NAS".

A discussion ensued about the need to bring the various elements of PBN together and identify benefits, institute the procedures as part of an overall need for "change management" and follow an integrated view of how the capabilities in the four areas are integrated and how PBN fits into this bigger picture. Mr. Whitaker commented that the NAC's role is to support and advise the FAA in moving ahead on PBN.

An FAA Committee member discussed how to move ahead in the bigger, strategic view of what capabilities are delivered, according to a pre-determined timing. This may also require the issue of rationalizing the infrastructure of the NAS, to which a Committee member assessed that the NAC could be helpful in identifying the criteria to guide decisions. Chairman Anderson observed the need for a longer term integrated plan for rationalization.

Closely Spaced Parallel Runways Multiple Runway Operations

- FAA SMEs: Tom Skiles (ATO), Paul Strande (NG)
- Industry Leads: Glenn Morse (UAL), Jon Tree (The Boeing Company)

The leaders quickly summarized efforts related to Wake Recategorization since many of the areas were discussed during the morning committee brief on Atlanta Wake ReCat. A recommendation was made that the FAA determine locations where Wake Recategorization efforts should be accelerated (or implemented at additional sites) based on quantifying the benefits of increased throughput.

Recap of Meeting and Anticipated Issues for NAC consideration and action at the next meeting

The NAC Secretary summarized the following actions items from the meeting:

1.) Creation of an ADS-B Ad Hoc group to report back to the Committee at the June meeting with suggested mitigation strategies for challenges to implementation of the 2020 ADS-B implementation mandate for general aviation, UAS and DOD.
2.) General Tuck, USAF, will chair the Ad Hoc. Members will include:

a. AOPA - Mark Baker (Melissa Rudinger)
b. UAS – Ryan Hartman (Insitu)
c. NBAA – Ed Bolen
d. Regional Airlines – Chip Childs (SkyWest)
e. Avionics Provider – Carl Esposito (Honeywell)
f. Coordinate with Gen Marke Gibson, NextGen Institute, Equip 2020 initiative

3.) Performance Metrics for the 4 Focus Areas – RTCA will develop a Terms of Reference in coordination with FAA and NACSC leadership that will frame the development of a recommendation for consideration by the Committee at the June meeting. The work will identify a high level suite of existing metrics that measures the effect on NAS performance attributable to the deployment of the capabilities in the following:
   - DataComm
   - Improved Multiple Runway Operations (IMRO)
   - Performance-Based Navigation (PBN)
   - Surface
4.) Provide a copy of the FAA-SESAR "State of Harmonization" report to the Committee members.
5.) Request the FAA to determine locations where Wake Recategorization efforts should be accelerated (or implemented at additional sites) based on quantifying the benefits of increased throughput.
6.) Circulate a revised version of the October 8, 2014 Meeting Summary as requested by NAC member, Lilian Ryals, The MITRE Corporation, related to the section describing the independent assessment of FAA's progress on NextGen. The summary was approved pending final review by the Committee of the revision. The report will also be posted for the NAC members.
7.) Examine future opportunities for community outreach as emphasized in the PBN Blueprint report, approved by the Committee at the October 2014 meeting. This also includes publicizing the availability of PBN procedures on the ATIS.

Other business

No other business was raised by the Committee members.

Adjourn

By motion, Chairman Anderson concluded the meeting of the Committee at 3 p.m.

Next Meeting

The next meeting of the NAC is June 5, 2015 in Washington, DC.

NAC Chair Report
Washington, DC - Friday, June 5, 2015

Opening

- Thank the FAA for its continued commitment to work in collaboration with the industry in the implementation of NextGen capabilities.
- The work of the industry and the FAA under the NextGen Integration Working Group was recognized at the RTCA Symposium by presentation of the Achievement Award to the executive leaders and the Industry Team Leads and the FAA Subject Matter Experts.
- This morning the Committee had a discussion with several of the authors of the National Research Council (NRC) of the National Academy of Sciences recent report, "A Review of the Next Generation Air Transportation System: Implications and Importance of System Architecture." The NAC and its predecessors at RTCA have been consistently focused on the successful **implementation** of NextGen, in an **evolutionary** manner that delivers benefits all along the way, bolstering our collective confidence and encouraging investments. In fact, you will hear from operators during today's meeting about decision to equip for NextGen capabilities not only because of mandates but also because of anticipated return on those investments.

Since Last Meeting:

- The FAA and the Aviation Industry have been working together on implementation of Surface capabilities of Electronic Flight Strips and Departure Metering building from our discussion at the meeting in February.
- Progress on Wake ReCat continues to be made – thank Mike for responding to the NAC request at the last meeting to identify additional locations to expedite implementations.
- These underscore the critical nature of the FAA and the industry both committing to and successfully implementing capabilities – that is necessary to build confidence with the industry and the policy makers.
- Reached consensus on six metrics and methods for tracking performance improvements made possible by the implementation of the top 4 operational capabilities.

Today's Meeting

- The Committee will consider a NACSC developed recommendation for 6 metrics to track the impacts of implementing capabilities in the four priority areas.
    - This is an important step to tell the story of what we are collectively achieving. Since its inception, the NAC has the goal to tell the full story about the difference the implementation of NextGen capabilities are making.
    - Collectively we also need to look at the results and work together in an open and constructive manner to determine what might need to be adjusted to maximize investments- industry and FAA. The adjustment might be a process change, additional resources, or removal of a constraint from the system.
    - As an example, the implementation of PBN arrival procedures in the Twin Cities has led to some performance degradation in the form of increased taxi times and degraded arrival performance that we need to assess and account for in future implementations.
    - We have to ask the question, "why can't airports operate at the same level of VFR capacity when the weather is only marginally IFR (operations down to Cat 1 minimums)?" That should be a goal of the implementations.
- We should discuss the interdependencies of the four priority areas. Implementing capabilities in one, while helpful, doesn't always lead to the bigger benefits we are all seeking.
- In the vein of staying focused on delivery of solutions that work for all of the aviation constituents around the table, we will discuss the ADS-B Ad Hoc group findings. Given a tough task and a short time frame in which to complete it, General Tuck and the team, working closely with Hoot Gibson, found solutions to some tough issues facing GA and DOD regarding the ADS-B 2020 mandate.
- Because of PBN's ability to deliver measurable return on investment, a consistent focus for the NAC has been the implementation of PBN, from recommendations on the Metroplex initiative, to identifying strategies to overcome the barriers to implementations. Most recently the NAC published the Blueprint for Performance-

Based Navigation Procedures Implementation Report that captured the lessons learned from PBN implementations across the country and built on those lessons to create a checklist for future implementations. Today, the FAA will brief the Committee on how it is addressing this package of recommendations.

- Finally, the 2013 prioritization identified 11 Tier One capabilities, now that the industry and the FAA have been working together and we are over halfway through year one of the three year plan, what comes next in a rolling three year plan? How do we take advantage of the good will and momentum created by this collaboration as we continue down the path toward modernization together?

06/01/15 at 12 P.M.

Mike Whitaker

NextGen Advisory Committee

Washington, D.C.

June 05, 2015

Introduction

Thank you, Richard (Anderson, NAC Chairman).

It's great to be here with you today. I'm very proud to say that, since we met in February, our partnership has led to substantial progress with several key NextGen technologies. I'd like to take a moment to share these important milestones with you.

In April, thanks to our partners in this room, as well as NATCA, PASS and Lockheed Martin, we completed one of the most complex technological projects in agency history. ERAM is now fully operational at 20 en route centers.

As you know, ERAM is the backbone of the nation's air traffic control system, serving as the operating platform for critical NextGen technologies such as ADS-B and Data Comm.

It enables controllers to handle more aircraft over larger sections of the sky, increasing capacity and efficiency while enhancing safety in what is already the world's safest aviation system. It is also incredibly reliable: ERAM has been running for well over 300,000 hours since December 2011 with an availability of 99.9997 percent.

Data Comm

Last month, thanks to our partners in this room -- including Fed Ex, UPS, United, Harris and Thales -- we celebrated successful trials of Data Comm at Memphis and Newark. We took reporters into the tower and onto flight decks of aircraft owned by FedEx, UPS and United to show them how pilots and controllers are communicating through the instant, accurate exchange of data rather than a two-way conversation .

Data Comm is a game-changer. This is especially true during bad weather. Pilots simply press "wilco" to accept re-routes, which are then immediately loaded into onboard systems and sent to their operations centers.

Judging by the coverage we received, the reporters were as impressed with this technology as we are. And Memphis and Newark are just the beginning. This summer Data Comm will be rolled out at Houston's two major airports, as well as Salt Lake City.

Next year, 53 more airports will get this revolutionary technology.

ADS-B

A couple of weeks ago -- thanks to our partners in this room, including JetBlue, NATCA and PASS -- we conducted a successful, live demonstration of ADS-B with a JetBlue aircraft flying far off the East Coast in airspace where radar coverage was limited. The ERAM system at New York Center seamlessly switched from traditional ground-based radar to satellite-based ADS-B, tracking the JetBlue aircraft with the pinpoint accuracy that is the hallmark of this next leap in air traffic control.

As we all know, we face a tough challenge in getting everyone equipped in time for the Jan. 1, 2020 deadline to install ADSB-Out in all aircraft that operate in controlled airspace. We appreciate the support from AOPA and all of our other industry partners that are encouraging their members to take this step so we may fully realize the benefits of ADS-B.

A recent survey conducted by Embry Riddle Aeronautical University found that about 56% of General Aviation aircraft owners surveyed indicated that they don't plan to install ADS-B until the price comes down. This works out to about 114,000 aircraft owners who are still sitting on the fence.

It doesn't take a mathematician to figure out that not all of these operators will be able to wait until 2019 and still expect to get their airplanes out of the shop by the deadline.

We are working closely with these organizations through our Equip 2020 working group and the NAC ADS-B Ad Hoc group to identify and get past any barriers standing in the way. You'll hear more about this later today.

Benefits to everyone as we continue to build the system

Overall, we're building a strong foundation for NextGen while delivering benefits to *everyone* who uses our airspace system. As many of you know, we worked with McKinsey Consulting to identify specific benefits that airlines are getting from the NextGen technologies and procedures already in place.

We found through this data-driven survey that we've already realized $1.6 billion in benefits system-wide. More than $500 million of this goes directly to

aircraft operators. These benefits are being generated by improvements such as ELSO, Wake Recat, PBN routing and Time Based Flow Management.

We expect that these capabilities will continue to produce an additional $11.4 billion in benefits over the next 15 years. This is a return on investments that we've already made.

You've heard me use the words "partners" and "partnership" several times already today. Without the cooperation of the people in this room, we wouldn't be anywhere close to maintaining our schedule on what we all agree is the necessary modernization of our nation's air traffic control system.

With your help, we have so far implemented more than 7,000 satellite-based procedures in the National Airspace System. To put that into perspective, we now have more satellite-based procedures than radar-based procedures.

Last year, we successfully implemented our Houston and North Texas Metroplex plans, flipping the switch overnight on dozens of NextGen procedures in each of these busy areas. This year, we did the same thing with the Washington, D.C., and Northern California areas.

Although the vast majority of our NextGen projects have gone without a hitch, we are aware that some of them have been – and continue to be – controversial with the general public.

We are always striving to get better at what we do, and part of that is learning from experience. While our mandate is for safety and efficiency, we are

very conscious of the noise issue as it relates to the improvements we're making for the flying public.

It's important to point out that we have done noise modeling on all of these projects. In all of them, the modeling indicates that there would be no significant noise impacts as a result of the proposed changes.

Importance of NAC partnership

Time and again, we have rolled up our sleeves and collaborated with labor and the aviation industry to achieve great things. Our work here on the NAC is an excellent example of what we can accomplish when government and industry partner on common goals.

The joint implementation plan we developed last year prioritized four NextGen areas where we can deliver concrete benefits over the next three years. In 2014, we collectively delivered on 19 of our commitments – three ahead of schedule.

This morning, we had the opportunity to hear from Bob Sproull, chair of the Computer Science and Telecommunications Board and member of the committee that worked on the National Research Council NextGen report.

As you know, the scale of the project to modernize the U.S. airspace system is massive and complex – and we're committed to getting the execution right. To tackle it, we are using a pragmatic approach that matches investments with tangible benefits to airlines and passengers.

PBN Strategy

We know that collaboration with industry is essential, particularly as we continually set benchmarks and analyze our progress. This approach has already been a huge success as the FAA has refined its work on Performance Based Navigation.

We all agree that it's time to flip the switch to a National Airspace System based on PBN procedures. A fully implemented NAS based on PBN will minimize the risks and consequences of maintaining two navigation systems -- particularly as one of them continues to become more costly and complex to keep in working order.

The FAA has initiated a cross-agency effort to develop a PBN strategy that identifies the key navigation capabilities and operations that we'll need over the next 15 years. It lays out a roadmap for deploying and effectively using PBN in the NAS while ensuring safety and efficiency.

It's important that the FAA and industry agree on a strategy that will allow for that transformation, as well as providing the framework that supports our broader NextGen efforts.

Now, I'm going to hand things over to FAA PBN Program Manager Josh Gustin and FAA Flight Technologies and Procedures Division Manager Bruce DeCleene, who will share our PBN strategy.

[JOSH GUSTIN AND BRUCE DECLEENE DELIVERS REMARKS]

[YOU WRAP UP]

Conclusion: Staying the course will require steady funding

Thank you, Josh and Bruce.

We remain confident that the benefits of NextGen will only increase as more capabilities come on line, but this will only happen if we can secure a continuous, reliable source of funding to deliver the next milestones.

That's where you, as members of the NextGen Advisory Committee, can help us stress the importance of keeping this vital initiative on schedule.

Over the last few years, we carved up our capital investments into increasingly smaller pieces to make them affordable after we received lower-than-planned funding from Congress. This might help with near-term budget constraints, but it makes it difficult to know when we'll achieve the benefits that you, our stakeholders and partners, demand.

For example, Data Comm is a multi-year program with a multi-year budget. When we originally included DataComm as a NextGen priority, we planned to

make a single investment decision for en route services. But when we saw the budget outlook, it was apparent that we could not predict a stable funding stream.

Last November, we had to split the en route investment into two packages, raising questions about when we will follow through. The second package is pending a firm decision later this year.

But Data Comm is just one of the four NextGen priorities we have set with industry through the NAC. So it comes down to trade-offs.

We all understand that trade-offs are a part of every budgeting process, whether it's here in the government or in your own boardrooms. Our immediate concern with NextGen is that -- within our current funding environment – the trade-offs we are forced to make are cutting deeper and may require us to choose among NextGen improvements.

At the February NAC meeting in Atlanta, the FAA's Chief Financial Officer presented our five-year capital investment plan. Since that time, we received the initial Fiscal Year 2016 budget markup from the House of Representatives. Unfortunately, our capital account is now $355 million below our budget request – and $100 million lower than our appropriations for the current fiscal year. We are now waiting to see what happens with the Senate and conference committee.

This will obviously affect our NextGen plans. We need the support of you, our partners, to help us ensure sufficient funding.

Reauthorization

As we wait to see what happens with the budget, we're also keeping a watchful eye on the FAA's upcoming reauthorization. Our current authorization expires on Sept. 30, and we are committed to working closely with Congress to pass a long-term bill.

Although we don't know what it will exactly look like, we do know that it must embrace a few key principles, such as making it possible for us to maintain our exceptional safety record, securing appropriate funding for airports, and strengthening America's global aviation leadership.

Most notably for this group, reauthorization must enable us to continue our progress in modernizing the air traffic system.

We have all seen how sequestration and lapses in funding make it hard for us to plan and execute these critical projects. Now is the time for us to build on our momentum – not slow it down.

Thank you. That concludes the FAA report.

Attachment 6

NACSC Ad Hoc Group: Performance Metrics for Four Priority Areas

Report of the NextGen Advisory Committee

June 2015

Attachment 6

Metrics Ad-Hoc Group
Final Recommendation

Executive Summary

Background

February 2015 NAC meeting identified need for 4-6 high-level performance metrics that most effectively assess the change to NAS performance of the four key capabilities outlined in the "*NextGen Priorities Joint Implementation Plan*" published in October, 2014

The NACSC formed an ad-hoc metrics working group per the TORs shown in the appendix to accomplish this tasking

Deliverables

Present a recommendation at the June NAC Meeting that:

1. *Determines performance metrics noted above*
2. *Describes how the metrics will be presented*

The work performed by the metrics WG reinforced the need for on-going, collaborative analysis to accurately capture the impact of NextGen capabilities in a complex and dynamic NAS. As such, the WG felt it was also important to propose a process to harmonize interpretations of changes in high-level metrics as NextGen capabilities are implemented.

Process

NACSC approved the recommendation developed by NACSC Metrics Ad Hoc consisting of air carriers, airports, business/general aviation, controllers, FAA SMEs, MITRE

RTCA helped the WG through the use of a decision support tool that helped determine ranked criteria to measure proposed metrics, as well as a means to ensure the metrics best mapped to all four key NextGen capabilities

Overview – TOR Scope

1) Ensure that the data for the recommended metrics currently exists or can easily be collected
2) All stakeholder input is considered
3) Metrics reflect performance areas important to all classes of operators
4) Limited to the airports or locations where capabilities are being implemented, to the extent practicable
5) FAA recommends continuing joint FAA/Airline analysis to quantify the impacts of the improvements in question. Detailed analysis is generally required to isolate the effects of the factors of interest.
6) To promote broad acceptance of the metrics, the source data will be available to all stakeholders to afford them the opportunity to reproduce/replicate the published reports

Criteria (Industry prioritized order)

1. Economic Value	Reflects the economic value to operators or the FAA of a NextGen capability in a way that lends itself easily to monetizing that value
2. Measures system-wide effect	Reflects the end-to-end or gate-to-gate effect of the particular NextGen capability
3. Conducive to isolating the effects for four NextGen Implementation areas	Can reasonably enable separation if impact of variables other than NextGen capability on change in performance
4. Measures local/regional effects	Reflects the effect of the particular NextGen capability in the local-regional area
5. Reflect performance for all classes of operators	Applicable to all classes of operators e.g. scheduled carriers, cargo carriers, business aviation and general aviation
6. Measures interaction among airports within a Metroplex	Reflects the extent to which the capability and throughput at each airport within the Metroplex is unaffected by traffic at other airports within the Metroplex

Metrics Reporting

Purpose:	A harmonized and credible joint industry-FAA depiction of the impact to the NAS of the short, medium, and longer term assessment of key NextGen implementations
Goal:	An on-line performance dashboard is requested that reflects the metrics WG recommendations, as well as additional elements of the TOR related to transparency and replicability
Reporting Frequency:	The frequency of dashboard updates should be adequate to identify trending to determine incremental benefits and should begin ASAP Request future NIWG status reports at NAC and NACSC meetings include a performance report in addition to the implementation timeline
Content:	More work is needed to refine the content and layout of the metrics dashboard, but some samples are provided in the appendix to this presentation
Future Review:	The metrics WG suggests an assessment “X” months after the dashboard rollout to determine whether any adjustments are necessary to the metric set and dashboard format/content

Measurement Considerations

Difference between "data" and "analysis":

Agreement on metrics data is an important step towards harmonized analysis of NextGen implementation effects. As noted in the TORs, this process necessitates on-going dialogue and analysis. The intent is to form a feedback loop of continuous learning and improvement.

Post implementation process:

1. Seek FAA's input on how soon metrics data will be available after implementation of NextGen capabilities
2. Determine means to isolate NextGen implementation apart from non-related issues (runway closure, airline schedule changes, etc.)
3. Use the NIWG co-chairs for each of the four key capabilities to coordinate analysis and reporting of metrics and to further refine the data filtering used for the reporting dashboard

Recommended Metrics

		Metric	Reported Values	Comments[1]
Measured on applicable existing *104* city-pairs:	1.	Actual block time	Mean and std dev or 60% percentile	• Actual time from Gate-Out time to Gate-In time for a specified period of time by city pair • GA: I FR flight time from ramp taxi to ramp park
	2.	Actual distance flown	Mean and std dev or 60% percentile	• Actual track distance between key city pairs for a specified period of time • GA: IFR flight distance from take-off to TOC & from TOD to touch down
	3.	Estimated Fuel burn	Mean and std dev	• Actual fuel burn for a specified period of time
Measured at applicable airports	4.	Throughput - facility reported capacity rates *	Mean and peak capacity rates	• Facility Airport Arrival Rates (AAR) & Arrival Departure Rate (ADR) Airlines (recommend: http://www.fly.faa.gov/ois/ however, the working group is open to alternate measurements that meet the requirements) • GA: measured as access events - Radar vector and not SID as OUT event and Ground based nav and not GPS / WAAS-LPV as IN event
	5.	Taxi-out Time *	Mean and std dev or 60% percentile	• Actual time from Gate-Out to Wheels-Off time by airport (minutes/flight) • GA: IFR flight taxi time from ramp taxi to take off
	6.	Gate Departure Delay	Delays/100 act depts. And total delay minutes	• Difference in actual Gate-Out time and scheduled Gate-Out time, Not measured for GA

*** - Identified by FAA**

1 GA data may not currently be collected

Metrics Mapped by Capabilities* Measured on 104 City

Metrics	MRO	PBN			Surface				Data Comm	Description (units)
		Metroplex	EOR	ELSO	CDM	Dep.Meter	EIS	EOBT		
Actual block time	x	x	x	x	x	x	x	x	x	Actual time from Gate-Out time to Gate-In time for a specified period of time by city pair (minutes/flight)
Actual distance flown *	x	x	x	x						Actual track distance between key city pairs for a specified period of time (Nm). Key city pairs pre-identified by FAA as-per NAC recommendation. This metrics would be affected by Enroute DataComm implementation that is not currently in the NIWG time frame.
Fuel burn (data is collected by FAA for 104 city pairs)	x	x	x	x	x	x	x	x	x	Actual fuel burn for a specified period of time (ton-miles/gallon)

* The capabilities are based on those initially recommended by the NAC in October 2014. Prior to implementation it is expected that these would correlate directly to the final implementation report provided to Congress and a determination made for each metric as to whether it is a primary or secondary for determining impact for each capability.

Metrics Mapped by Capabilities Measured at applicable airports

Metrics	MRO	PBN			Surface				Data Comm	Description (units)
		Metroplex	EOR	ELSO	CDM	Dep. Meter.	EIS	EOBT		
Airport Throughput	x	x	x	x						Average Daily Capacity (ADC) * - By airport (Facility reported rates) Average daily sum of effective Airport Arrival Rate (AAR)and Arrival departure rate (ADR) for a specified period of time by airport (operations)
Taxi-out Time *	x			x	x	x	x	x	x	Actual time from Gate-Out to Wheels-Off time by airport (minutes/flight)
Gate Departure Delay	x			x	x	x	x	x	x	Difference in actual Gate-Out time and scheduled Gate-Out time

Next Steps

- The NACSC requests NAC approval of the proposed six performance metrics
- Further, the NACSC requests approval to extend the WG's charter to address the following:

1. Either in parallel to FAA's review of the proposed metrics or after their response, the ad hoc working group will:
   - Develop (and document) a methodology to filter/correct the 6 metrics to best isolate NextGen impacts from exogenous events
   - Determine for each metric as to whether it is a primary or secondary for determining impact for each capability
2. Recommend a limited expansion of the 104 city pairs that directly reflect NextGen benefits[1]
3. Develop appropriate methods to consistently and credibly monetize the impacts of NextGen implementation in partnership with FAA *(see note appendix)*
4. Perform additional research to determine if appropriate sources of General Aviation data are readily available for inclusion with airline and cargo data

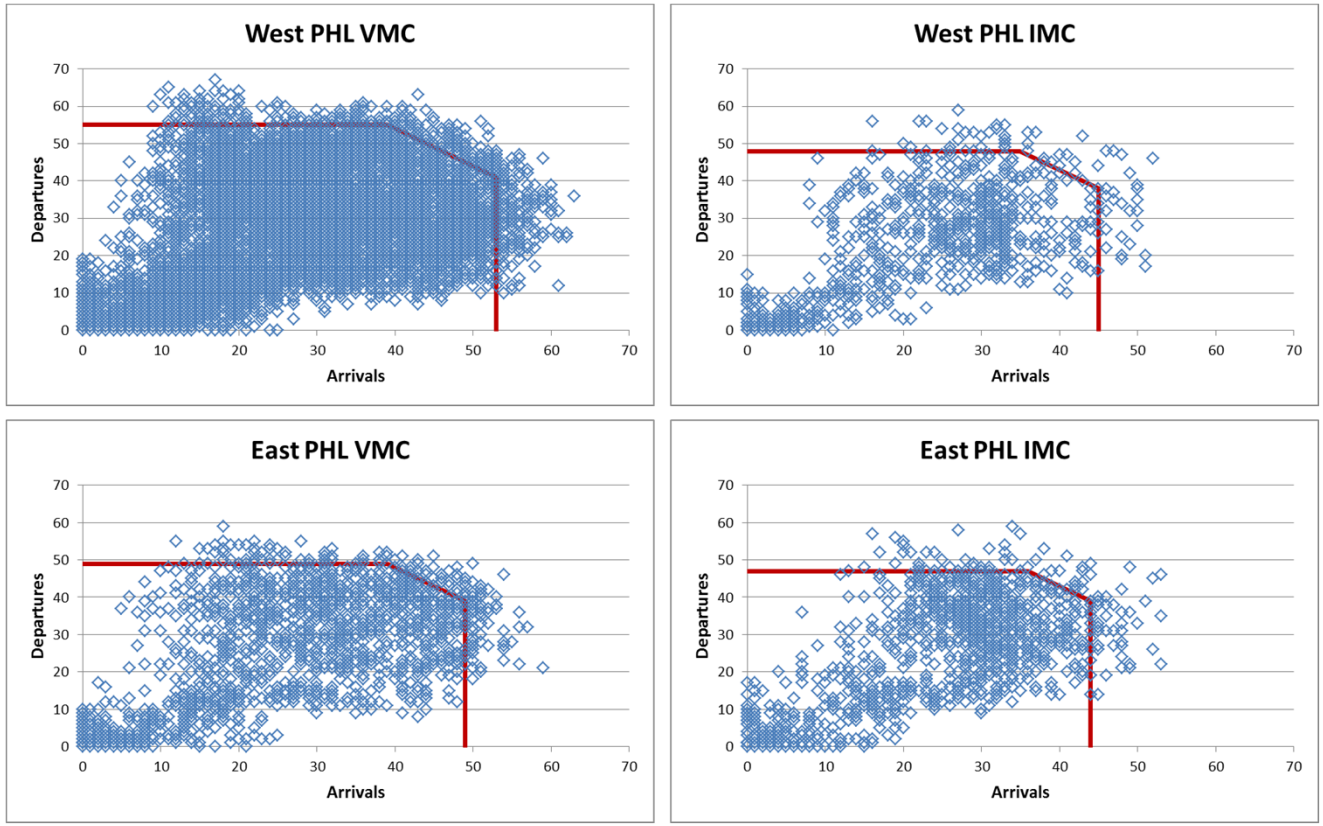
1) Both industry and FAA WG representatives collectively expressed interest in this topic to improve the accuracy of the measurements

Appendix

Examples of Throughput measurements

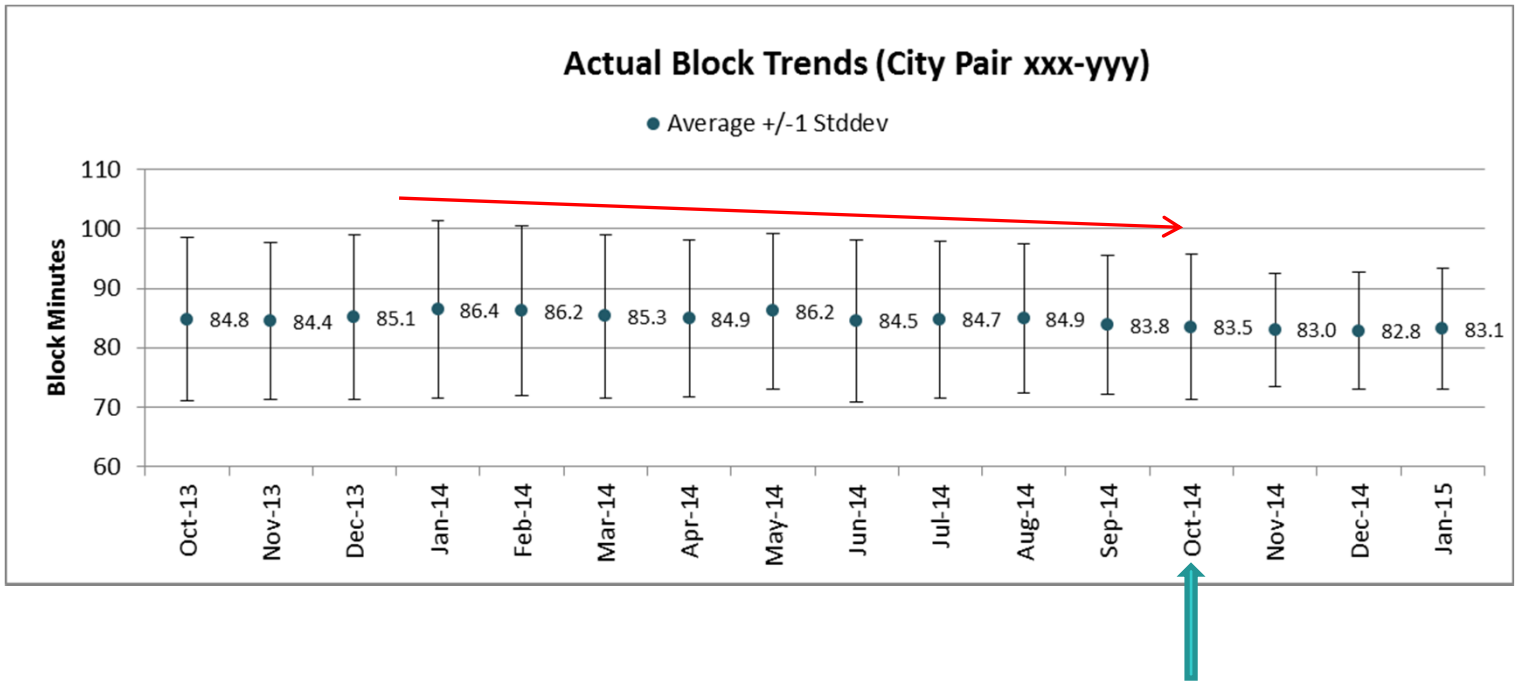
Based on 95th percentile of observations, arrival rate at PHL is 53 flights/hour and departure rate is 55 flights/hour

95th Percentile AAR and ADR at PHL from Oct 2014 – March 2015



Examples of Time and Distance measurements

Both, average and dispersion of block times are trending downwards since implementation of wake recategorization in October, 2014



Note about calculating economic value

- The cost and revenue impact of changes to these metrics will be analyzed separately using a standardized methodology or provided by users.
- The calculations will include:
  1. Cost of fuel
  2. Cost of block (other than fuel)
  3. Cost of delay - two groupings: 1) short/medium & 2) 180+ mins
- Two items need special attention:
  1. FAA typically monetizes passenger time; Industry doesn't (explicitly)
  2. How to handle extrapolation to future years.

TERMS OF REFERENCE

NACSC Ad Hoc Group: Performance Metrics for 4 Priority Areas

1. **Leadership:** NACSC Co-Chairs: Melissa Rudinger and Tim Campbell
2. **Tasking:** Building on the FAA-proposed small number of high-level performance metrics, identify a high level suite of existing metrics that measure the effect on NAS performance attributable to the deployment of the capabilities in the four (4) priority areas.
3. **Scope:** The FAA proposal augmented with NAC input resulted in the following scope and constraints that the group should consider in their deliberations:

   - Limit the total number of metrics to 4-6
   - Unless a defensible case can be made to do otherwise, limit the list of candidate metrics to those identified in the FAA Point Paper for the Feb 2015 NAC Meeting Agenda Item 8, which includes the 12 NextGen metrics required by the February 2012 Reauthorization and those recommended by the NAC.
   - FAA suggested one high-level metric for each of the focus areas in the Joint Implementation Plan:

     Improved Multiple Runway Operations (IMRO) – Average Daily Capacity

     Performance Based Navigation (PBN) – Average Flight Distance

     Data Comm – Taxi-Out Time (This is for surface DataComm only)

     Surface – Dispersion of Block Time
   - Ensure that all stakeholder input is considered, and that metrics reflect performance areas important to all classes of operators.
   - Ensure that data can easily be collected for metrics identified. Further, to promote broad acceptance of the metrics, the source data will be available to all stakeholders to afford them the opportunity to reproduce/replicate the published reports.
   - Limited to the airports or locations where capabilities are being implemented, to the extent practicable. This will aid in isolating the effects of the implementation plan improvements. This can include city pairs from the final list recommended to the FAA by the NAC in 2013.
   - Identify the scope of the metric for the Surface focus area, since the data-sharing activities there are not location-specific.
   - FAA recommends continuing joint FAA/Airline analysis to quantify the impacts of the improvements in question. The NAS is a complex and continuously evolving system of systems. Simple static metrics are sensitive to many exogenous factors, including but

not limited to such things as runway construction, airline scheduling, industry consolidation, weather, other safety-related changes (e.g., Converging Runway Operations), etc. Detailed analysis is generally required to isolate the effects of the factors of interest.

4. **Process:** The NACSC will convene an Ad Hoc group to review the FAA proposal, and prepare a response to the FAA. The NACSC co-chairs will chair the Ad Hoc group. The Ad Hoc group will prepare a report and present it to the NACSC at their April meeting. The NACSC will respond with comments which will be resolved by the Ad Hoc group and presented to the NACSC at their May meeting. The final report will be presented to the NAC at the June meeting for discussion and submission to the FAA.

5. **Inputs:** The NACSC Metrics Ad Hoc group will consider the following input:

   a. Congressional Requirement for Metrics - Section 214 of the FAA Modernization and Reform Act of 2012

   b. FAA Point Paper for the Feb 2015 NAC Meeting Agenda Item 8

   c. NAC NextGen Integration Working Group recommendations – includes suggested metrics for each of the four priority areas

   d. NAC recommendations on metrics

      1. Key NextGen Performance Indicators and NextGen Measurement Methodology (May 2011)
      2. Measuring NextGen Performance: Recommendations for Operational Metrics and Next Steps (September 2011)
      3. Measuring NextGen Performance (May 2012)

   e. NAC recommendations on Key City Pairs

      1. Key City Pairs for Measuring NextGen Performance (October 2012)
      2. Revised Key City Pairs for Measuring NextGen Performance (February 2013)

   f. NAC Recommendations on fuel burn data sources

      1. Preliminary Report: Data Sources for Measuring NextGen Fuel Impact (October 2012)
      2. Interim Report: Fuel Data Sharing for Measuring NextGen Performance—BRIEFING (June 2013)
      3. Fuel Data Sharing for Measuring NextGen Performance (Sept. 2013)

   g. FAA Dashboards - https://www.faa.gov/nextgen/snapshots/ and http://www.faa.gov/about/plans_reports/operational_metrics/

6. **Schedule & Deliverables:** The NACSC will convene an Ad Hoc group to complete this task. The group will adhere to the following scheduled:

ACTION	DUE DATE
Review NAC meeting discussion with NACSC	**March 11**
Form Ad Hoc group, identify leadership and secretary, create Metrics Ad Hoc Workspace site	**March 16**
Conduct meetings	**TBD March-April**
Review inputs and formulate draft response	**April 16**
Present and discuss draft with NACSC	**April 21**
Final NACSC review and approval	**May 13**
Distribute draft recommendation to NAC in advance of meeting	**May 22**
Present report to NAC	**June 5**

Deliverable	***Description***	**Date**
Recommended Performance Metrics for NextGen Top 4 Priority Area capabilities	Response to FAA-recommended metrics and description of 4-6 high-level performance metrics to be tracked to report the affect on NAS performance of the deployment of the capabilities in the 4 top priority NextGen areas. This should include a description of how the metrics will be presented.	June 2015

- **Termination of Metrics Ad Hoc:** Group will be terminated with the acceptable deliverable of their report.

Members of the NACSC Ad Hoc Group
Performance Metrics for Four Priority Areas

Blanca Aguado	RTCA, Inc.
Dan Allen	FedEx Express
Timothy Campbell	American Airlines, Inc.
Andy Cebula	RTCA, Inc.
Rick Dalton	Southwest Airlines
Mel Davis	National Air Traffic Controllers Association
Tony Diana	Federal Aviation Administration
Paul Eckert	Federal Aviation Administration
Ken Elliot	Jetcraft Avionics LLC
Rob Goldman	Delta Air Lines, Inc.
Pamela Gomez	Federal Aviation Administration
Reddy Gumireddy	American Airlines, Inc.
Urmila Hiremath	The MITRE Corporation
Margaret Jenny	RTCA, Inc.
Bill Jones	FedEx Express
Jackie Kee	The MITRE Corporation
Dan Murphy	Federal Aviation Administration
Joe Post	Federal Aviation Administration
Melissa Rudinger	Aircraft Owners and Pilots Association
Rocky Stone	United Continental Holdings
Jessica Sypniewski	Federal Aviation Administration
Ralph Tamburro	Port Authority of New York & New Jersey

Attachment 7

NAC ADS-B Ad Hoc Group

Report of the NextGen Advisory Committee

June 2015

Attachment 7

Attachment 7

RTCA

THE GOLD STANDARD FOR AVIATION SINCE 1935

ADS-B Ad-Hoc Group
Final Report
Major General, Giovanni K. Tuck

Task Review – ADS-B Ad Hoc

- Launch: February 2015 NAC meeting identified need for implementation commitments in order to meet the 2020 ADS-B implementation mandate
- Review and action
  - What is your “long pole” in getting to 2020?
  - What needs to be done to mitigate it?
  - What are the milestones to make that happen?
- Inputs: Equip 2020, other industry and FAA actions
- Deliverable: Report developed and presented at the June 2015 NAC meeting

Presenters - ADS-B Ad Hoc Report June NAC Meeting

- Mainline Carriers - A4A - Paul McGraw
- Regional Airlines - SkyWest - Chip Childs
- Small Aircraft - AOPA - Mark Baker
- Privacy - NBAA - Ed Bolen
- DOD – Maj Gen Tuck, Chair
- UAS - Insitu - Ryan Hartman

Air Carriers

- **Air Carriers:** Maximizing the use of existing equipage and precluding multiple aircraft retrofits; airlines will comply with mandate.
- **Identified issues:**
  - Unavailability of certified equipment for air carrier aircraft
  - Airplanes flying in affected airspace will need to augment GPS accuracy to meet rule requirements 100% of the time
  - Current generation GPS will meet rule requirements >99.9%
  - Alternate means of traffic separation will be made available to augment GPS in the event of GPS service disruption.

Air Carriers (cont.)

- **Resolution:**
  - Airlines are provisioning aircraft (wiring, etc.) and will install new transponders by January 1, 2020.
  - A4A Petition for exemption seeks relief from rule GPS accuracy requirements during limited periods of GPS satellite disruption. FAA requested to provide alternate means of surveillance during these events.
  - Airline exemption grantees will create, maintain and update a GPS equipage plan that will commit to comply with rule requirements by 1/1/2025.
  - Safety will not be adversely affected if FAA grants the petition.

Regional Air Carriers

- **Air Carriers:** Maximizing the use of existing equipage and identifying missing pieces of information needed to make decisions regarding compliance plans.

- **Identified issues:**
  - Unavailability of certified equipment for air carrier aircraft
  - Software uncertainties for identified equipment
  - Fleet plans unknown beyond 2020
  - Many leases do not extend past 2020
  - Aircraft reallocation plans to execute over next several years

Regional Air Carriers (cont.)

- **Resolution:**
  - RAA and its member airlines are working to supplement the equipage and compliance paths identified by Equip 2020
  - Regional airlines are in the process of identifying fleet for 2020-2025
  - RAA will confirm the applicability of A4A petition for exemption
  - Over 87% of the 2014 regional aircraft departures (scheduled and non-) were performed by RAA member airlines

Small Aircraft

- **ADS-B solution for Small aircraft:** may include the need for developing a performance standard with the stipulation that it would not affect the ADS-B rule.
- **Identified issues:** Standards for GA (including TSO versus non-TSO question), cost of equipage, pathway for equipping, exemption for experimental

Small Aircraft

- **Resolution:**
  - Industry announcements on low cost solutions (50% of previous prices) (<$2K for certified, <$1K non-TSO experimental/LSA)
  - FAA issued policy on non-TSO for experimental and Light Sport Aircraft, but not economically viable solution for certificated aircraft
  - AOPA, equipment manufacturers, and aviation associations commit to work together to educate aircraft owners about their options when it comes to ADS-B equipage
  - Need for FAA certification of new avionics developed by equipment manufacturers (delaying availability of low cost rule compliant avionics and installation)

Aircraft Privacy

- **Aircraft privacy:** determining how to provide the ability for aircraft operators to block the broadcast of specific “N” numbers if requested by the aircraft operators. This ability is required to be provided by the FAA
- **Identified issues:** need for encrypting broadcast with unique identification and the pathway for this capability
- **Resolution - Near term:** FAA establishes a “privacy office” to administer assignment of anonymous 24-bit addresses and anonymous Flight IDs

Aircraft Privacy (cont.)

- **Resolution - Long term:** RTCA should be tasked with a request to have a committee begin work in the near future that will examine mitigating the ability to track aircraft on a real-time basis to add encryption of the transponder interrogation response as part of a future change to the DO-260C MOPS when published early in the 2020s

Department of Defense

- **Department of Defense:** identify the unique challenges of DoD commitments to meet the 2020 implementation.
- **Identified issues:** pathway to equipping, mission critical need for anonymity

Department of Defense (cont.)

- **Resolution:**
  - Majority of DoD fleet should be equipped by 2020
  - Developed roadmap for equipping all others
  - Seeking AFRL funding for non-integrated solutions
  - Reviewing prioritizing within USAF fleet – heavy fleet commonly operating in NAS vs specialized

Unmanned Aircraft Systems

- **Unmanned Aircraft Systems (UAS):** identify issues associated with the UAS operations to meet the mandate
- **Identified issues:** pathway to equipping, weight, cost
- **Resolution:** Meet ADS-B equipage requirements for all UAS operating in the NAS in areas where it is required should be a goal.
- Certification requirements must be established that are appropriate to UAS
  - Adopting manned avionics certification standards may not be practical
  - Leverage LSA/Experimental aircraft provisions for ADS-B equipage
  - ADS-B is partial, but not complete solution to detect and avoid

Operational Requirements

- **Foundational Requirements:** Operational barriers that must be addressed in order to comply by 2020
- **Identified issues:** Path for equipage for aircraft that do not have an affordable or technical pathway to an integrated solution, FAA certification of avionics and installations
- **Resolution:**
  - Identifying non-integrated solutions – “stand alone” or non-integrated with avionics suite solutions
    - Equip 2020 identifying other options for compliance
  - FAA needs to prioritize resources for avionics certification approvals
  - FAA resources/policies needed for approval of installations

Other Operational Limitations

- **Other operational limitations:** identify operational barriers associated with the 2020 implementation
- **Identified issues:** Capacity of repair stations to install equipment, education & outreach, certain questions related to UAS
- **Resolution:**
  - NAC can help draw attention to issues of capacity, not waiting until “last minute”
  - Education of aircraft owners on the 2020 mandate & the implication of waiting for maintenance resources
  - FAA website resource, continual updates, http://www.faa.gov/nextgen/equipadsb/
  - Research on UAS platforms - UAT and 1090ES capability due to mission diversity & “In” functionality
  - Policy question related to UAS equipage for low altitude/small UAS

NextGen Advisory Committee (NAC) ADS-B AdHoc Group

Background

At the February 26, 2015 meeting of the NextGen Advisory Committee (NAC), the Committee discussed the work of the NextGen Institute Equip 2020 initiative that is designed to bring all industry stakeholders together with the goal of being fully equipped with ADS-B Out by January 1, 2020. During the discussion it was generally agreed by members on the Committee, and other operators in attendance at the meeting, that there was agreement on meeting the mandate, but several areas were identified as needing resolution.

The Committee created an ADS-B AdHoc group of the NAC to report back at the June meeting on what implementation commitments are necessary for meeting the 2020 ADS-B implementation mandate.

Participants

Chair: Gen Tuck, USAF
Members:

- AOPA - Mark Baker (Melissa Rudinger)
- UAS – Ryan Hartman (Insitu)
- NBAA – Ed Bolen
- Regional Airlines – Chip Childs (SkyWest)
- Avionics Provider – Carl Esposito (Honeywell)
- Coordinate with Gen Marke Gibson, NextGen Institute, Equip 2020 initiative

Specific Issues to Be Addressed

Based on the discussion at the NAC meeting, the following areas are the scope for the Ad Hoc:

- ADS-B solution for small aircraft – may include the need for developing a performance standard with the stipulation that it would not affect the ADS-B rule.
- Aircraft Privacy – determining how to provide the ability for aircraft operators to block the broadcast of specific “N” numbers if requested by the aircraft operators. This ability is required to be provided by the FAA.
- Department of Defense – identify the unique challenges of DoD commitments to meet the 2020 implementation.
- Unmanned Aircraft Systems (UAS) – identify issues associated with UAS operations to meet the manadate.
- Other operational limitations – identify operational barriers associated with the 2020 implementation.

Deliverable

A report will be developed and presented to the NAC at the June 5, 2015 meeting for discussion and submission to the FAA.

Members of the NAC ADSB Ad Hoc Group

Mark Baker	Aircraft Owners and Pilots Association
Chris Benich	Honeywell International, Inc.
Ed Bolen	National Business Aviation Association
Doug Carr	National Business Aviation Association
Andy Cebula	RTCA, Inc.
Chip Childs	SkyWest/Regional Airline Association
Carl Esposito	Honeywell International, Inc.
Scott Foose	FAA/Beacon Management Group
Marke Gibson	NextGen Institute
Pamela Gomez	Federal Aviation Administration
Ryan Hartman	Insitu, Inc.
Paul McDuffee	Insitu, Inc.
Juan Narvid	DoD Policy Board on Federal Aviation
Melissa Rudinger	Aircraft Owners and Pilots Association
Giovanni Tuck	U.S. Air Force

Federal Aviation Administration
Response to RTCA, Inc.
"Blueprint for Success to Implementing Performance Based Navigation" Recommendations
(Final)

June 5, 2015

Department of Transportation
Federal Aviation Administration
Air Traffic Organization
Performance Based Navigation Program Office, AJV-14
490 L'Enfant Plaza, Suite 4102
Washington, DC 20024

Signature Page

Title: Federal Aviation Administration (FAA) Response to RTCA, Inc. (RTCA) "Blueprint for Success to Implementing Performance Based Navigation (PBN)" Recommendations

Prepared by: FAA PBN Program Management Office (PMO), AJV-14

Submission Date: June 5, 2015

Approved by:

Jodi McCarthy, — Date: 5/15/15

Director, Airspace Services, AJV-1

Reviewed by:

Joshua Gustin, — Date: 5/14/15

PBN Program Manager, PBN PMO, AJV-14

Robert Novia, — Date: 5/14/15

PBN Lead Coordinator, PBN PMO, AJV-14

Bruce Kinsler, — Date: 05/13/2015

Team Manager, PBN PMO, AJV-142

Prepared by:

Ray Spickler, — Date: 5/13/15

Response Team Lead, PBN PMO, AJV-142

Table of Contents

Executive Summary

In December 2013, the FAA requested the RTCA NextGen Advisory Committee (NAC) develop additional recommendations to their previous Performance Based Navigation (PBN) recommendations. The FAA asked the NAC to analyze lessons learned from previous PBN implementations and develop a "blueprint" for future success to implementing PBN. The "blueprint" would cover the entire lifecycle, from planning to execution, and both technical and non-technical components.

The RTCA delivered "*Blueprint for Success to Implementing Performance Based Navigation*" to the FAA in October 2014. The report identified six (6) categories shown below, and made 28 recommendations.

- Recommendations for Non-Technical Stakeholders (3)
- Recommendations for Technical Stakeholders (8)
- Recommendations for Outcomes and Metrics (8)
- Recommendation for Capturing Lessons and Future Efforts (6)
- Recommendations for Checklist (2)
- Additional Recommendations (1)

The FAA believes the original 28 RTCA recommendations contained in the "Blueprint" are specific to 18 areas of concern. We comprehensively address the identified issues in the report by consolidating our responses into these 18 areas.

Findings

The table below lists all of the RTCA recommendations grouped by topic, a brief synopsis of each recommendation, and the FAA's response to each recommendation.

The FAA concurs with 16 RTCA recommendations that include: community involvement activities; procedure design philosophy; implementation processes; controller training; pre-implementation flight simulation; and special procedures. We applaud the work of the RTCA, particularly in the areas of community involvement recommendations, increased cross cutting between FAA Lines of Business (LOB's), improvements to controller training on PBN, and metrics selection.

The FAA concurs partially with the remaining 12 RTCA recommendations. These areas have been identified and will require further collaboration and work to bring all stakeholders to a more complete agreement on a path forward. These areas include: specific metric selections; implementation checklist items; and project tracking.

Non-Technical Stakeholders	
Recommendation 1 (Concur)	Include populations and political jurisdictions affected or perceived to be affected by anticipated changes as a result of PBN implementation.
Recommendation 2 (Concur)	Community engagement should go beyond "public awareness," with airport authorities serving as the lead non-technical stakeholder.
Recommendation 3 (Concur)	Provide education, engagement, and advocacy on behalf of all technical and non-technical stakeholders that also includes local community interests.
Technical Stakeholders	
Recommendation 1 (Concur)	Adopt a broader (i.e., expand scope of FAA Order 7100.41 to include other FAA Lines of Business (LOBs)) cross-cutting policy that ensures all FAA representatives are working from the same foundational guidance.
Recommendation 2 (Concur)	Clearly define the roles and responsibilities of the lead industry representative; consider adopting the term "Lead Operator" as PBN is not reserved for only air carrier operations.
Recommendation 3 (Concur)	Develop a national standard for controller education and outreach to reduce cultural barriers and resistance to change.
Recommendation 4 (Concur partially)	Consider using the Automated Terminal Information Service (ATIS) as a means of advertising the availability of Required Navigation Performance (RNP) approaches for those who are equipped.
Recommendation 5 (Concur)	Expand the role of the airport technical stakeholders and include them in the PBN [Core] Work Group.
Recommendation 6 (Concur)	Ensure local Department of Defense (DoD) support for a particular area by coordinating with national and regional DoD airspace representatives.
Recommendation 7 (Concur)	Include newly identified stakeholders in the PBN Core Work Group (e.g., pilot unions, DoD, industry associations, third-party procedure developers, database and charting providers.)
Recommendation 8 (Concur)	Analyze impacts to adjacent Air Route Traffic Control Center (ARTCC) facilities for complex PBN implementations and include affected ARTCCs as stakeholders in all phases of the PBN project.
Outcomes and Metrics	
Recommendation 1 (Concur)	Metrics should be aligned with goals and objectives identified in the Preliminary Work phase of a PBN project with the opportunity for re-evaluation at each project phase and periodically during post-implementation.
Recommendation 2 (Concur partially)	Select applicable Key Performance Areas (KPAs) and Key Performance Indicators (KPIs) from the Master PBN Implementation Metrics Spreadsheet to supplement FAA Order 7100.41 to measure achievement of the stated objectives for the PBN project.
Recommendation 3 (Concur partially)	With respect to the Baseline Analysis Report (BAR) process, baseline data should consist of existing procedure data to inform the selection of the metrics to be established for analysis later in the project.

Recommendation 4 (Concur partially)	Conduct a prototype exercise to "test" the KPAs and KPIs which may yield lessons learned that can be stored for use later during other PBN projects.
Recommendation 5 (Concur partially)	Develop two reports to report progress while a PBN project is ongoing, called the By-Phase Implementation Summary (BPIS) for Phases 1-4, and the existing Post-Implementation Analysis Report (PIAR) that is part of Phase 5.
Recommendation 6 (Concur partially)	Establish a secure repository that is accessible at different levels suitable for storing reports, findings, and lessons learned for the BPISs and PIARs that are created.
Recommendation 7 (Concur partially)	Establish or procure the services of a data management and analysis center to provide a single data stewardship and lessons learned repository.
Recommendation 8 (Concur partially)	Create a task group or action team that determines the particulars of data storage, analysis, metrics, and de-identification of data while exploring accessibility option for both internal and external stakeholders, to include messaging of data to the general public.
Capturing Lessons and Future Efforts	
Recommendation 1 (Concur partially)	FAA should provide transparency and work closely with stakeholders to develop the key components of the lessons learned functionality of the Project Tracking Tool (PTT).
Recommendation 2 (Concur partially)	Establish a work group to collaboratively identify requirements for the lessons learned functionality of the PTT, including user interface recommendations.
Recommendation 3 (Concur partially)	Identify an automated communication workflow similar to the FAA's Unmanned Aircraft System (UAS) Certificate Of Authorization (COA) application process.
Recommendation 4 (Concur)	Establish a lessons learned overseer responsible for providing periodic updates on solutions underway and notification of when an issue has been resolved.
Recommendation 5 (Concur)	Provide management support and resources to overhaul PTT.
Recommendation 6 (Concur)	Identify the necessary resources and tools that can reduce the complexities of simulation and validation, thus reducing the need for full-motion flight simulations.
Checklist	
Recommendation 1 (Concur partially)	Incorporate a holistic checklist into FAA Order 7100.41.
Recommendation 2 (Concur)	Develop a "best practices" guide for developing a Community Outreach Plan that takes into consideration local circumstances as well as the scope and scale of the particular PBN effort.
Special Procedures	
Recommendation 1 (Concur)	Establish a formal process that provides for the development of temporary "special" procedures when it is deemed necessary and appropriate.

RTCA Recommendations for Non-Technical Stakeholders

Recommendation 1: Non-technical issues—particularly potential (or perceived) noise and/or community impacts associated with proposed PBN implementations—should be evaluated from the outset of implementation planning efforts. The evaluations should include the populations and political jurisdictions affected by anticipated changes in flight track centerline locations (both lateral and altitude changes), aircraft dispersion around the centerlines, and anticipated changes in runway use at the affected airport(s). Potentially "impacted communities" should be based not only on federal (e.g., National Environmental Policy Act (NEPA)) standards, but should also include communities likely to "perceive" changes in impacts, whether or not they meet/exceed NEPA standards. Community opposition to PBN can result in increases (or perceived increases) in noise or changes in overflight activity which can delay/derail PBN projects whether or not federal standards are exceeded. A proactive approach to community engagement is recommended to ensure project success.

Recommendation 2: For PBN projects involving airspace procedure changes at or near airports, community concerns should be considered during the PBN development process. Each project will differ in scope and level of outreach required. Community engagement should go beyond "public awareness." Airport authorities should be viewed as the lead non-technical stakeholder of first resort in these cases and should assist in identifying other key non-technical stakeholders—including community organizations, Non-Governmental Organizations (NGOs), and others—that should be involved in the PBN planning and development process. Such groups may include established community advisory groups, airport/community "roundtables", or similar stakeholders. The non-technical stakeholder role and level of involvement will also vary based on project complexity, potential impacts, and other factors.

Recommendation 3: PBN implementation efforts should include plans for education, engagement, and advocacy on behalf of technical and non-technical stakeholders that takes into consideration local community interests as well as those of industry and the National Airspace System (NAS).

FAA Consolidated Response to 1, 2, and 3: Concur

(Note: FAA is interpreting the NAC recommendation language "the federal standards" to refer to the FAA Significance Thresholds as defined in FAA Order (FAAO) 1050.1E, *Environmental Impacts: Policies and Procedures*.)

The RTCA is highly commended for their recommendations in this area. As a result of these recommendations and FAA's internal review of community issues, FAA has initiated several new and expanded efforts in the area of community involvement to complement and enhance other FAA efforts.

The FAA is undertaking an agency-wide effort to revise the *FAA Community Involvement Manual* to provide a high-level document that serves as a guide for a broad range of community involvement efforts. The manual will be revised to include current requirements, expectations, best practices, and technologies using a cross-FAA

workgroup to leverage other related FAA efforts, facilitate alignment, and integrate these NAC recommendations. The FAA's Office of Environment and Energy will lead this effort in collaboration with a working group of representatives from FAA lines of business and staff offices. The working group will identify stakeholders and subject matter experts to provide input on effective approaches and practices, as well as lessons learned. In addition to the updated manual, this effort will encompass complementary actions and materials to facilitate awareness and use of successful practices and tools by FAA practitioners.

Additionally, the FAA's Environmental Policy Team in the Airspace Services Directorate is developing a community involvement plan that will examine community outreach practices and seek methods to improve on inclusivity and transparency. The FAA will use the goals and tasks contained in its Community Involvement Policy Statement for determining the appropriate level of community notification and involvement for each proposed project, identified in FAAO 7400.2, *Procedures for Handling Airspace Matters*, Chapter 32, Appendix 10. The FAA will continue to use lessons learned from previous community interactions to refine its application of this policy. A short term focus of the plan is to implement additional measures within the framework of FAAO 7100.41, *PBN Implementation Process,* and supporting guidance documents to ensure the application of and consistency with good community involvement practices. Improved practices would include assurance that coordination is performed with appropriate organizations and that a record is built on steps taken with community involvement and how the information gathered is considered in the procedure design process.

Past PBN implementations have identified the need for representatives from the respective airport authorities on the PBN workgroups beginning in the conceptual phases. Early representation fosters greater understanding of the goals of the initiative and provides the working group members greater insight into the potential community concerns they might encounter.

The FAA concurs that the participation of representatives from the respective airport authorities is a critical component of successfully implementing new PBN initiatives and procedures using a multi-pronged approach. FAAO 7100.41, published in April, 2014, and briefed to the RTCA states in Appendix A that a primary role of the airport authority as a member of the PBN Working Group is to provide "input on procedure and route design, including any potential operational or environmental impacts to the airports and surrounding communities." The PBN Program Office (PO) (AJV-14) believes the contribution of the airport authority is essential to this process, and will notify the FAA Office of Airports when the decision is made to investigate the development of any new PBN procedure for that airport. The FAA Office of Airports will work with AJV-14 to identify the key executives/individuals at airport authorities who should be aware of new PBN procedures. Airport authorities will be notified and invited to participate in the PBN work group throughout the process by the responsible FAA Service Center, as appropriate, in order to foster two-way communication on the advantages and disadvantages of proposed PBN procedures, and to provide input into the community involvement strategy being used for a project.

Initial phases of FAAO 7100.41 procedure development also include the Air Traffic Initial Environmental Review (IER) per FAAO 7400.2, Chapter 32, Appendix 5. The local airport authority will be involved in the process to help:

- Identify any existing environmental agreements and any previous aircraft–related environmental or noise analyses, (i.e., Part 150 studies, Environmental Assessments (EAs) or Environmental Impact Statements (EISs).
- Identify persons or officials, local citizens, community groups, or others who should be notified, consulted, or otherwise informed because they might have some concern about the proposed project due to their location or by their function in the community.
- Identify persons, officials, local citizens, community groups, or others who are supportive of the proposed project or may be opposed to it (including the reason for their opposition).

The FAA assesses potential environmental impacts of its proposed projects as required by its NEPA implementing procedures provided in FAAO 1050.1 and FAAO 7400.2, Chapter 32. In accordance with those orders, FAA determines if proposed PBN procedures qualify for a categorical exclusion (CATEX) or require more detailed analysis in an Environmental Assessment (EA) or Environmental Impact Statement (EIS). Regardless of the level of NEPA review completed, the FAA will utilize its expanded community involvement strategy for all PBN implementations as appropriate.

The FAA has also formed a Noise Complaint Initiative (NCI) working group to identify how FAA can more efficiently and effectively address noise complaints in a clear, consistent, and repeatable manner that is responsive to the public and applies the best use of FAA resources. The NCI team includes representatives from affected lines of business and staff offices, and began deliberations in September, 2014. Recommendations coming out of this initiative will be considered in terms of what they may contribute to community involvement guidance and practices.

RTCA Recommendations for Technical Stakeholders

Recommendation 1: Technical stakeholders must cross all organizational lines of business within the FAA. FAAO 7100.41, *PBN Implementation Process*, is an Air Traffic Organization (ATO) policy document. Because the ATO has no authority over the Aviation Safety (AVS) organization, which includes Flight Standards, it is challenging to implement any new PBN procedures without continual coordination of the technical stakeholders from both of these organizations. A broader cross cutting policy needs to be adopted that ensures all FAA representation is working from the same foundational guidance.

FAA Response: Concur

The PBN PO (AJV-14) was reorganized in April, 2014 under a new national PBN Program Manager, and included two deputies from NextGen (ANG) and Flight Standards Service (AFS) to maintain agency alignment, and a Lead Project Coordinator to oversee and integrate PBN project implementations. The addition of the AFS Deputy Director also helps to ensure the effectiveness of cross-cutting coordination between the PBN PO and AFS. With the addition of the Metroplex and Project Control teams, AJV-14 now consists of five teams. The AJV-14 teams are: PBN Technical Support, PBN Policy and Strategic Planning, Metroplex, Project Control, and NAV Lean.

FAAO 7100.41, *PBN Implementation Process*, establishes a framework for integrated, cross functional workgroups consisting of key personnel within the ATO, ANG, National Air Traffic Controllers Association (NATCA) and industry to ensure effective project implementation. Formalized cross cutting between FAA LOB's occurs during coordination with the Regional Airspace Procedures Team (RAPT) that occurs between Phases 1 and 2 of the PBN development process. When necessary, issues may elevate to the National Airspace and Procedures Team (NAPT) for resolution and to ensure consistency between service centers. The RAPT procedures are contained in FAAO 8260.43B, *Flight Procedures Management Program*. As a result of this RTCA recommendation, FAA is undertaking efforts to update FAAO 8260.43B to better harmonize with FAAO 7100.41, and seek to increase the amount of cross cutting between FAA LOB's.

The FAA has also entered into formal agreements with other PBN stakeholder organizations to ensure the PBN implementation process is coordinated, implemented, and followed in a collaborative manner, including:

- Memorandum of Agreement (MOA) between ATO Service Center Operations Support Group (OSG) and PBN Policy and Support Group AJV-14, Section 4.0, Responsibilities, June 2013

- Memorandum of Understanding (MOU) Regarding Non-Optimization of Airspace and Procedures in the Metroplex (OAPM) PBN Initiatives between the National Air Traffic Controllers Association (NATCA) and AJV-14, Section 3.0, August 2014

Recommendation 2: To provide a consistent and repeatable process, the role of the lead industry representative should be more defined as part of the PBN Blueprint. PBN is not specific to airline operations and could potentially include an operator that is not necessarily a major air carrier. As such, "Lead Operator" should become the official reference for the lead industry representation in PBN projects.

FAA Response: Concur

FAAO 7100.41 provides the framework for consistent and repeatable project implementation. The role of the Lead Industry Representative or Lead Operator is instrumental in assessing the potential benefits and impacts to our industry partners. These names are used interchangeably throughout FAAO 7100.41 as appropriate; they do not imply air carrier operations over other users, and are clearly defined. However, the FAA recognizes the need to more clearly define the roles and responsibilities of the Lead Industry Representative or Lead Operator as described in Recommendation 2 and will review and make the appropriate changes to FAAO 7100.41 now underway.

Lead Industry Representative or Lead Operator participation occurs in the PBN Development and Implementation Process in each phase of the five phase process. Lead Industry Representative or Lead Operator and other industry stakeholder's involvement and participation are built into the PBN Implementation Process.

Recommendation 3: The Task Group recommends the FAA take appropriate action to develop a national standard for controller education and outreach. A program of this type can be pivotal in reducing cultural barriers and the resistance to change that can extend the timeline of projects, and in some cases, completely stop an initiative.

FAA Response: Concur

The FAA concurs with the RTCA that controller training is essential to ensure the success of PBN implementations. The RTCA is commended for their recommendation in this area, and FAA is aggressively addressing modifications to controller training to address the concern.

FAAO 3120.4N, *Air Traffic Technical Training,* dated 09/30/13 establishes the national requirement and standard for the conduct of air traffic control (ATC) training. This order "conveys instructions, standards, and guidance for the administration of air traffic (AT) technical training." FAAO 3120.4N is managed by ATO Safety and Technical Training (AJI).

In January, 2015 FAA began to identify additional training needs and refresher requirements for controllers concerning PBN procedures, to identify course curricula and methods to address these needs, and to share resources on cross-functional programs. AJV-14 personnel have been assigned to support AJI as PBN Subject Matter Experts (SME) during AJI's re-evaluation and update to basic and advanced controller training at the Mike Monroney Aeronautical Center in Oklahoma City, OK and the field. This stakeholder arrangement ensures PBN training will eventually be included at all levels of controller training.

AJV-14 has developed a suite of briefing materials called PBN 101 that is available to FAA air traffic controllers and other employees on the PBN Policy and Support Group web page. It consists of five modules that teach the basics of PBN and the individual

types of procedures developed. AJV-14 is also developing a sixth module that will raise controller awareness regarding cockpit and crew resource workload issues as they relate to PBN clearance entries into aircraft Flight Management Systems (FMS). Additionally, working with NATCA, AJV-14 has developed peer-to-peer training that is conducted during Metroplex and non-Metroplex PBN implementations.

FAA developed training material for Climb Via, Descend Via, and RNAV Optimized Profile Descent (OPD) procedures. Some of these are required refresher training for controllers. Others are used optionally during briefings.

Recommendation 4: An important issue in transitioning from legacy voice communicated clearances and routing that rely on ground-based navigational aids to a performance-based En route and terminal structure is leveraging the capability for equipped operators. The current level of equipage in the system has not attained a "critical mass" that seamlessly permits controllers to issue RNP approaches as the rule. There will be a time where the equipage level permits the routine use of RNP throughout the system. Until then, the challenge is finding ways to increase the use of RNP where it is currently in place. An effective tool in addressing this is adding the availability of the procedure on the ATIS broadcast for pilots to "Expect the RNP Approach," for those that are equipped. This is another effective way to encourage the use of RNP. The PBN Blueprint Task Group recommends that the FAA use the ATIS as a means to advertise the availability of RNP approaches.

FAA Response: Concur partially

Guidance for the content of Automatic Terminal Information Service (ATIS) broadcasts is contained in FAAO 7110.65, *Air Traffic Control,* and FAAO 7210.3, *Facility Operation and Administration*. FAAO 7110.65 Chapter 2-9 lists the requirements for ATIS broadcasts, and FAAO 7210.3 Chapter 10-4-1.g requires the ATIS to remain concise and optimally up to 30 seconds in length. However, ATIS broadcasts at the larger ATC facilities have increasingly become lengthy and may become saturated with essential need-to-know information related to the current status of airport equipment, operations, weather, and field conditions.

ATC facilities are required to identify via the ATIS broadcast the primary runways in use and the associated published instrument approach and departure procedures for each designated runway. At some larger airports there may also be more than one ATIS available, depending upon the complexity of the airport. Prevailing wind, weather, airport, and runway conditions are the main factors used by ATC to select the primary runway instrument approach and departure procedures. Advertising the availability of an alternative PBN approach on the ATIS that differs from the current advertised approach procedures in use (e.g. Instrument Landing System (ILS)) can create confusion and excess workload for ATC, and the pilots who may not be qualified or authorized to conduct these approaches. However, nothing prevents ATC at their discretion, from advertising that an alternative PBN approach to the designated arrival runway is available during normal daily operations and upon request through the servicing ATC facility. ATC would pre-coordinate this activity to ensure there was no confusion during the

actual conduct of the requested alternative PBN approach procedure. By doing so, additional PBN procedure experience and training can and will be gained by controllers and pilots.

FAA also recommends commercial operators authorized to conduct PBN approaches take internal steps to ensure flight crews are made aware of the availability of PBN approaches at the destination airport and when conditions warrant, have their pilots request to fly a procedure upon initial contact with the servicing ATC facility. This could be accomplished by the inclusion of a remark by the dispatcher on the flight release.

AJV-14 also endorses the use of lessons learned from previous PBN implementation efforts to form "Best Practices" recommendations. Previous PBN implementations have utilized the ATIS successfully to advertise new procedures. The inclusion of a remark in the miscellaneous section of the ATIS will be considered by Implementation Teams for the initial start-up of new and amended PBN operations and procedures.

Recommendation 5: Airport technical stakeholders should be consulted early in the PBN implementation process and participate in each step as a member of the PBN Work Group. Their role as a bridge in the community should be expanded beyond that currently identified in the Order as both a Non-Technical and Technical Stakeholder.

Recommendation 6: In order to ensure local Department of Defense (DoD) support for a particular area, FAA PBN project leaders must contact national and regional DoD airspace representatives listed in Appendix D.

Recommendation 7: Newly identified technical stakeholders should be included in the PBN Work Group: Pilot Unions, Department of Defense, Third Party Procedure Developers (where appropriate), and Non-Airlines For America (A4A)/Regional Airline Association (RAA) airlines/operators, International Air Transport Association (IATA), Aircraft Owners and Pilots Association (AOPA), Database and charting providers, and Aircraft and Avionics manufacturers.

FAA Consolidated Response to 5, 6, and 7: Concur

Under the FAAO 7100.41 PBN Implementation Process, a Full Work Group (FWG) consisting of technical stakeholders is established to participate in the procedure development process. It is the responsibility of the FAA and NATCA FWG Co-Leads to ensure all affected parties are notified and invited, both civilian and military. Depending upon the location and scope of the project, these participants will include some or all of the parties, as appropriate, identified in recommendations 5, 6, and 7.

Recommendation 8: An analysis of the impacts on adjacent Air Route Traffic Control Centers (ARTCCs) and the impact of new procedures on potential flow restrictions/considerations should be conducted for complex PBN implementations. If an impact is identified, affected ARTCCs must be included as stakeholders during all phases of the PBN project.

FAA Response: Concur

Impacts on adjacent ARTCCs are identified early on in the process by the Flight Procedures Team (FPT), Operations Support Group (OSG), NATCA, or AJV-14. This would also pertain to any adjacent terminal facilities whose airspace the procedure might impact. If identified, these facilities would be represented on the FWG as subject matter experts (SMEs).

Recommendations for Outcomes and Metrics

Recommendation 1: Metrics should be aligned with the goals and objectives of the PBN procedure identified in the Preliminary Work phase of a PBN project. This results in the metrics having real meaning to all stakeholders. Moreover, the selected metrics should be re-evaluated at each project phase and then periodically beyond Post Implementation, which will result in more subtle issues and concerns being captured. As an example, controller and pilot user experience and acceptance takes time, and will not be faithfully captured by a singular data gathering event.

Recommendation 2: Each PBN project should begin by restating the goals and objectives for a PBN procedure. Measureable objectives or targets should be tracked in each phase, and specific metrics should be selected to measure achievement of the objectives and inform project managers. The project is complete once the lessons learned of each implementation phase are documented, and the Post Implementation Reports are published. To ensure stakeholder involvement and buy-in, project managers with input from the project team, should select applicable Key Performance Areas (KPAs) and Key Performance Indicators (KPIs) from the Master PBN Implementation Metrics Spreadsheet to supplement FAA Order 7100.41. (p.23)

Recommendation 3: As part of the considerations for the Phase 1 Baseline Analysis Report (BAR), baseline data reflecting the existing status of procedure(s) should be used to inform the selection of metrics intended to be used for data collection and later analyzed to compare outcomes to existing status. The overall data management needs to be consistent, effective and demonstrate a clear relationship between pre and post implementation of a PBN procedure.

Recommendation 4: A prototype exercise should be completed to 'test' the KPAs and KPIs identified in the Master PBN Implementation Metrics Spreadsheet. As diverse and inclusive PBN projects are brought online; the Master PBN Implementation Metrics Spreadsheet and FAAO 7100.41 can be updated. It is recommended the FAA could begin with a Post Implementation Analysis Report (PIAR), (see 5 below), based on an existing completed PBN implementation that was considered to be successful and not complex. Appendix C includes a Draft PBN PIAR (at Phase 5) that for this instance was provided and presented to the WG by Alaska Airlines and Port of Portland. This partial analysis identifies both KPAs and KPIs, all but one of which can be informed by a reasonable degree of data gathering and further analysis. From this prototype effort

lessons learned may be derived and retained in a Lessons Learned Repository for future access by other PBN implementation stakeholders.

FAA Consolidated Response to 1, 2, 3, and 4: Concur partially

All PBN project requests from proponents are reviewed by the Core Work Group (CWG), FWG, and AJV-14 before acceptance, to determine the benefits of the procedure in the National Airspace System (NAS). One of the responsibilities of the CWG authorized by AJV-14 in Phase I is to make an initial assessment of project goals and objectives, and select suitable metrics which will compare baseline status of operations to the results achieved during the Post Implementation and Monitoring Phase (Phase V). The CWG is free to select metrics it deems suitable to assess the project, so long as the data has integrity and clearly measures performance between pre- and post-implementation. During each subsequent phase the design is reviewed to ensure it continues to meet project goals and objectives. Once the BAR is completed in Phase I, metrics must not be modified. Modification of metrics after conclusion of the Baseline Analysis Report (BAR) will cause inconsistencies in measurement of results.

The metrics selected by workgroups must have data that is readily obtainable. AJV-14 worked with the MITRE Corp. to implement the PBN Dashboard which provides proponents and workgroups access to threaded track data from the National Offload Program (NOP), Traffic Flow Management System (TFMS), and Airport Surface Detection Equipment-Model X (ASDE-X) to measure current system status, predict post-implementation status, and measure actual performance during Phase V. The algorithms used in compiling this database have been validated and additional enhancements will be forthcoming in later releases. Some of the proposed metrics in the master spreadsheet are included in the Dashboard data.

Some proposed metric items such as air traffic controller and flight crew workload would require human interaction and time motion analysis in a "real time" environment that would take additional time and substantial funding that is not currently available. However, fuel burn metric data has recently become available to the FAA for analysis as a result of cooperation with the RTCA and airlines, and efforts are underway to begin using this data. Other significant work is also now underway as a result of the metrics recommendations by the RTCA.

In April 2015 the Metrics Harmonization work group under the direction of System Operations Services (AJR-G) and Office of NextGen Performance & Outreach (ANG-F), met to standardize externally reported metrics across the FAA. AJV-14 is a stakeholder in this effort and will participate in regular group and sub-group meetings in support of the process. Preliminary results of the harmonization group's effort with trajectory metrics will be detailed and briefed

to the FAA's Chief Operating Officer (COO) in Q3 2015. Initial discussions have already occurred between AJV-14 and AJR-G regarding level flight metrics. Upcoming talks will focus on Optimized Profile Descents (OPD) and reduction in level-offs of flights to conserve fuel and reduce carbon emissions. The fuel burn data collected by aircraft operators and provided to the FAA will help facilitate this effort. The FAA will consider the use of additional metrics from the proposed metrics master spreadsheet as this work proceeds.

Our response to the comments regarding timing of the post-implementation monitoring and lessons learned are addressed in the related sections that follow.

Recommendation 5: The FAA PBN Order calls out for a Post Implementation Analysis Report (PIAR) and also progress data is entered into the Project Tracking Tool (PTT) during each of the 5 phases of an implementation. The PBN Blueprint Task Group considers it important to tie the PTT phase data and the post implementation report together by creating the building blocks for the PIAR commencing at Phase 1 of a PBN project. The future contents of the PIAR will be developed in a cumulative fashion as the PBN proceeds such that by Phase 5 there will be in essence, a good summary including a set of lessons learned. In fact at the end of Phase 5 the primary outstanding action items will be centered on outcomes and metrics based on data derived from the operation and use of the fully implemented PBN.

The PBN Blueprint Task Group recommends two (2) different reports: during and post PBN implementation. 1) By Phase Implementation Summary (BPIS) for Phases 1-4, and 2) The existing Post Implementation Analysis Report (PIAR) that is part of Phase 5. Critically the PIAR remains 'in-progress' at the later stages of Phase 5 but may be usable as a summary to be shared between the internal stakeholders, including across FAA departments. Because it is a summary and not the final report, it should remain within the data repository, externally accessible via the FAA as de-identified lessons learned for other PBN Work Groups.

Report (1) – Implementation Summary – A by Phase Implementation Summary (BPIS): This is a brief high-level report specific to each phase (1-4), of a PBN project. The corresponding metrics template will vary by type, location, and phase of procedure implementation. The BPIS should be a concise report summarizing the current status of PBN Implementation process. Depending on the audience, it should be written as an internal report for both the FAA and local stakeholders. The BPIS should continually link the Initial goals and objectives with phase outcomes. It should identify the key stakeholders and their roles, as well as KPAs and KPIs selected to evaluate the process for each phase. The BPIS should outline the data sets and data sources required to inform the KPAs. Included in the BPIS would be lessons learned from each phase and any trade-offs identified. The Metrics PBN Blueprint Task Group recommends using the Master PBN Implementation Metrics Spreadsheet to create the BPIS.

Report (2) – A Post Implementation Analysis Report (PIAR): This is an existing FAA analytical, diagnostic report and an integral part of Phase 5 of a PBN project. It could

also become a recurring report containing continuously updated data using Performance Data Analysis and Reporting System (PDARS). The PBN Blueprint Task Group recommends the existing PIAR format should be updated from the Master PBN Implementation Metrics Spreadsheet to identify the PBN metrics to be considered for each location. Based on the complexity of the procedures, this should occur after a time period sufficient for a normalization of the use of the procedures recognizing there is a "burn-in period," and seasonal changes (temperatures, winds, etc.). The PBN Blueprint Task Group considers the current four month period provided in the FAA PBN Order may not be sufficient time to prepare the report and recommends the PIAR due date is set based on a specific burn in period for each PBN implementation considering its individual complexity, outcomes and metrics and other criteria.

FAA Response: Concur partially

FAAO 7100.41 requires specific tasks planned to occur at each step of the five phase process. Coordination between the project facilitator, project co-leads, CWG and FWG members, AJV-14, Aeronautical Information Services (AJV-5), NATCA, industry, and associated supporting entities occurs continually throughout the process. Project data is entered and tracked by the parties in the PTT. The project will not proceed to subsequent phases without co-lead agreement. Phase outcomes are monitored by the co-leads to ensure the initial goals and objectives of the project are supported. Key stakeholders and their roles are carried forward automatically from phase to phase. The processes defined in FAAO 7100.41 address the concerns identified by the RTCA. The selected metrics are scrutinized and measured against the data to establish a baseline and predict project outcomes during Phase I and are measured again during the Phase V post-implementation analysis. These results are captured in the PTT and are sufficient to meet the needs of the project.

The Post Implementation Analysis Report (PIAR) is not intended to be an ongoing monitoring report of the procedure. Rather it is a complete, final report on whether or not the procedure has met the goals and objectives of the project. AJV-14 believes that it can ideally be prepared using the steps outlined in the order.

Once the procedure is developed by FAA and progresses through post-implementation, it is a completed project and is monitored through normal processes. Procedures are continually monitored by the facilities and operators that use them. If it becomes apparent that modifications of a procedure are desirable to increase efficiency, amendments would be proposed under the process by a proponent.

The RTCA recommendation to extend the "burn in" period of the post implementation analysis will be considered for inclusion in future updates to FAAO 7100.41.

Lessons learned are addressed in the following sections.

Recommendation 6: Reports, findings, and lessons learned for the BPISs and PIAR should be kept in a secure repository and accessible at different levels. This will protect the sensitivity of the contributors and ensure the messaging is adapted for the audience. The BPISs may be kept in a local repository for phase implementation monitoring. They should be secure within the working structure of the local PBN WG. Stewards of the data and local PBN WGs should be comparing, analyzing, and refining data, metrics, indicators, and key performance areas, to ensure a nationwide incremental improvement of PBN.

FAA Response: Concur partially

There are different types of PBN data available. Access to this data is determined by the type. Raw data pertaining to implementation and usage statistics is available to all stakeholders via the NextGen PBN Dashboard. Additional raw data is available on the observer website only to those users which are authorized by AJV-14.

Reports (generated using the PBN Dashboard, or manually created) and findings relating to PBN projects are archived in the PTT and Lessons Learned Database. Both of these tools are accessible only by users which have been authorized by AJV-14. This access is typically granted to AJV-14 staff, the PBN project facilitators, and the PBN project co-leads. These users are responsible for following the PBN projects throughout the life of the project and the post-implementation period. This data is used to document the events, predict durations, identify risk areas, and key actions to increase productivity and improve process.

Recommendation 7: The PBN Blueprint Task Group determined the need for the FAA to either be or select a data management and analysis center. Responsibilities would include but not be limited to: Collecting, filtering, analyzing, storing, de-identification of data as deemed appropriate, as well as disseminating data and analysis results. The end result could be that all data, reports, outcomes and lessons learned, would end up within a single data steward and lessons learned repository. The source of the data will vary between different PBN implementations, so there is also a need for a defined process structuring and governing data collection, as well as, its transfer to a data analysis center.

Note: It is implied that the data management and analysis center could outsource data analysis and other activities as appropriate, but would manage and be held responsible for all data management activities.

Note: The intent of this report is that management, storage and continual tracking of lessons learned highlighted within the Capturing Lessons – Future Effort should be aligned with Outcomes and Metrics for Success recommendations and vice versa.

Recommendation 8: As with the Capturing Lessons – Future Efforts recommendation, a task group or action team, should be established that includes the appropriate stakeholders to collaboratively develop outcomes and metrics, methods, sources, analysis and de-identification of data and a suitable data repository overseen by a data steward, building on the recommendations and appendices of this report.

At the same time the task group or action team, should explore accessibility for both internal and external stakeholders and messaging of data to the general public. While firewalls and de-identification of data is essential to protect stakeholders, an easy method for approved users to access data is essential.

FAA Response to 7 and 8: Concur partially

Data used to populate the PBN Dashboard is produced quarterly by MITRE. The same sources and algorithms are used each quarter to maintain consistency. In the event that an inconsistency is noted and a change to the algorithm which produces the data is required, the new data is evaluated by the vendor and a separate independent evaluator (currently through the NextGen office). When all data produced is verified as accurate, all data contained within the Dashboard will be re-computed using the newly created algorithms.

Additionally, the information contained in the PTT and Lessons Learned tools is maintained by MITRE. AJV-14 is in the process of developing a new PTT tool that will reside in the FAA Business Process Center. This will move storage and maintenance of the data to the FAA and enable enhancements which will share information between AJV-5 and AJV-14.

The Lessons Learned Database is under review to evaluate the data currently stored. Items which are not applicable to lessons learned will be removed. Items which pertain to lessons learned and have been implemented in existing processes will be closed. Guidance will be created and given to the users on what items should be input and how they should be input in the future. This will expedite the review process as well as allow the users to easily focus on items which are of greater relevance to the task at hand.

Once the new PTT and Lessons Learned Databases are established, the information will be reviewed to determine which data is suitable for external stakeholders and the general public.

Recommendations for Capturing Lessons and Future Efforts

Recommendation 1: The PBN Blueprint Task Group recommends the FAA provide transparency and work closely with stakeholders to develop the key components of the Lessons Learned functions of the PTT. The PTT will require a clear vision of the needs,

roles, and responsibilities from the users of the system, as well as the operators. While there have been some facilitators used to demonstrate the tool and collect feedback, it is not clear how detailed this has been.

Recommendation 2: A task group or action team should be established to include the appropriate stakeholders to collaboratively develop the requirements for the Lessons Learned aspects of the PTT. This should also include the opportunity to provide feedback on how stakeholders interface with the system in order to input, search, and apply the information. Interface will need to be less complicated and user-friendly and developed to address a variety of needs. Given the broader interests of both non-technical and technical stakeholders, an expanded data entry, analysis and querying capability will need to be established.

FAA Consolidated Response to 1 and 2: Concur partially

It is important that lessons learned are maintained consistently across all PBN projects and that all users understand the importance of documenting and reviewing lessons learned. To ensure that this happens consistently, AJV-14 is in the process of creating guidance for the project co-leads that will describe what types of lessons learned entries should be made, how those entries should be input, and best ways to search the information contained in the repository. As we move forward, best practices and ways to improve the information will be captured and updated guidance provided to all users.

Recommendation 3: Identification of an automated communication chain that will require the development of a flow chart hierarchy to determine communication flow, e.g., AFS, ATC Facilities, Performance Based Operations Aviation Rulemaking Committee (PARC), A4A, National Business Aviation Association (NBAA), AOPA, etc. The communications also will require a categorization of issues that can foster effective and immediate dissemination of an issue. A process similar to the Unmanned Aircraft System (UAS) Certificate of Authorization (COA) application process might prove useful in guiding the development of such a capability so as to leverage a similar intuitiveness for assigning actions.

FAA Response: Concur partially

The current PTT has provisions for automatic notification of messages as the project progresses. However, the capabilities of the PTT are not as robust as those suggested in the recommendation. We are currently developing a newer version of the PTT using FAA Business Process Model (BPM) software which will have more advanced capability, and may better address these concerns. Additionally, we are assessing the feasibility of using the AJV-5 Aeronautical Information Services Products Workflow System (APWS) to address the recommendation. We have requested a briefing on its capabilities and will track the progress of the project. Currently it is designed to operate behind the FAA firewall, but will have the ability to push notifications outside the firewall.

Once connected to AJV-5 Aeronautical Information Services Business Management System, it will have the capability to gather all the procedures assigned to a project and push notifications to workgroup participants and others as desired by the project co-leads.

Recommendation 4: In order for the Lessons Learned platform of the PTT to be successful, it is recognized that dedicated management and oversight by the FAA will be required in order to ensure that the expanded objectives of the aviation community can be achieved. As part of this oversight and as a recommendation, databases will need to receive periodic updates on solutions underway and notification of when an issue has been resolved by the organization(s) responsible for taking action to address issues. This will alleviate hurdles in data collection centered on processing, managing, and following through on actionable items.

Recommendation 5: As an upcoming key component in successful PBN implementations, the FAA PTT should receive an appropriate level of management, support and resources with regular review for ongoing improvement, in order for it to remain a viable tool.

FAA Consolidated Response to 4 and 5: Concur

As AJV-14 has evolved into a Program Office model, people and processes have been put in place to accomplish these recommendations. A separate project management team was added whose responsibilities include development of improvements to the PTT and the Lessons Learned Database. Working with MITRE, these tools will be improved with more user friendly software to make data entry and searching easier. User training will be enhanced to improve consistency of data entry, and make entries to the lessons learned section more useful. Not only will problems encountered be entered, but the training will encourage the entry of best practices information to help future projects. AJV-14 will monitor the lessons learned entries for continuous improvement of the process and the integrity of the data contained therein.

Recommendation 6: To address the need to find better tools and methods for testing and validating flight procedures, the FAA should place a high priority on identifying the necessary resources and tools that can reduce the complexities of simulation and validation and thereby reduce the need for full motion flight simulations. (p.31)

FAA Response: Concur

While the need for full motion flight simulation for complex projects is not likely to be completely replaced in the near term, the FAA has been exploring ways to increase the use of desktop simulation in procedure design. For example, beta testing of Terminal Area Route Generation and Traffic Simulation (TARGETS) software, version 5.0.4, is underway which has an enhancement called Flight Evaluator. This is a significant enhancement over the Flyability tool in the current software package. FAA has not yet accepted

the Flight Evaluator requirements document, but this is expected once MITRE/CSSI has collected beta test results. Comments received thus far are very positive.

FAA intends to move toward more computer simulation for procedure development in the future. Simulation tools like Flight Evaluator, combined with FAA A330/340 and B737 full motion simulators in Oklahoma City, OK should reduce the need to use industry simulators in the future.

Recommendations for Checklist

Recommendation 1: It is the recommendation of the PBN Blueprint Task Group that this more holistic checklist be incorporated into FAA Order 7100.41. This will enable the checklist to be updated and refined as the PBN process itself is continuously refined through the capturing and dissemination of lessons learned from successive PBN development and implementation efforts.

FAA Response: Concur partially

AJV-14 implemented a Pre-Implementation Checklist to ensure the consistent and satisfactory roll-out of new and amended PBN procedures and routes across all OSG's. AJV-14 is also responsible for the continued satisfactory roll-out of Metroplex projects. To this end, AJV-14 continues to fully endorse the use of the Metroplex Play Book to ensure the comprehensive roll-out of PBN procedures and routes supporting Metroplex projects across the NAS. AJV-14 will review the Metroplex Play Book to ensure that all critical events and milestones are considered for inclusion in future updates to FAAO 7100.41. Similarly, items from the checklist referred to in the recommendation will be considered for inclusion in future updates.

In 2014, AJV-14 also completed a detailed project schedule that documents the timing of the steps necessary to ensure consistent PBN project implementation. This detailed schedule works in concert with the project checklists and may also be incorporated into future order updates.

A workgroup was formed in February 2015 to review and submit recommendations for change to FAAO 7100.41. Core participants include AJV-14, AJV-5, AFS-460, OSG's, NATCA, and Professional Aviation Safety Specialists (PASS). SMEs from other lines of business and industry partners will also be asked to provide input to the process. A revised document is expected to be in final review September 2015.

Recommendation 2: It is recommended that there be developed a best practice as to how to develop a Community Outreach Plan based upon local circumstances as well as the scope and scale of the particular PBN effort. This is necessary in order to provide guidance and direction to all stakeholders as they take into consideration local community interests, as well as the objective of and intended PBN implementation so as to enable understanding and support of PBN deployment in support of all stakeholder interests.

FAA Response: Concur

FAA will use the goals and tasks contained in its Community Involvement Policy Statement for determining the appropriate level of community notification and involvement for each proposed project. (See FAAO 7400.2, Chapter 32, Appendix 10.) The FAA will continue to use lessons learned from previous community interactions to refine its application of this policy.

AJV-14 will continue to participate in the NCI Team meetings to ensure that our community involvement activities are in line with those that may be recommended to FAA management by the NCI.

In addition, the FAA is undertaking an agency-wide effort to revise the *FAA Community Involvement Manual* to provide a high-level document that serves as a guide for a broad range of community involvement efforts. The manual will be revised to include current requirements, expectations, best practices, and technologies using a cross-FAA workgroup to leverage other related FAA efforts, facilitate alignment, and integrate these NAC recommendations.

Additional Recommendation

Recommendation 1: The following recommendations were not directly requested in the FAA's Tasking Letter to the NAC, but were identified by the Task Group.

Use of Temporary Special Procedures

Varying circumstances can make implementing PBN a challenge in some facilities and other portions of the national airspace. An effective tool has been the use of creating a "temporary special" procedure(s) that can be designed and implemented in much less time than a "public" procedure. This is accomplished with the assistance and resources of the AFS-400 group.

As an example, Charlotte Douglas Airport was "introduced" to an Optimized Profile Descent by working with the lead operator to develop a Special RNAV STAR under the guidance and support of AFS and coordinated with Air Traffic. It required the lead operator to bear the expense of tailored charting and a custom database. This allowed pre-coordinated validation flights and pre-specified times for operations on the procedure.

This type of development concept permitted the controllers from two ARTCCs and the Terminal Radar Approach Control facility (TRACON) to gain familiarity and comfort with the new operations without completely changing their overall operations. As operational experience was gained, recommended changes to the procedure were made to make it better for ATC and the operator. These changes could occur rapidly, as it did not require the normal pipeline process. Once the ATC facilities and the operator were satisfied with the operations and the procedure, it went through the normal public procedures process and was implemented for full-time operations by all users.

The Blueprint Task Group recommends the FAA establish a formal process to use this approach to procedures development when it is deemed necessary and beneficial. It could prove to be a very cost effective and time saving tool at many locations and PBN initiatives.

FAA Response: Concur

The FAA agrees with the recommendation. A formal process for the development of "temporary special" procedures has been developed under FAAO 8260.60, *Special Instrument Procedures*. Additional guidance is contained in Advisory Circular (AC) 90-112A, *Development and Submission of Special Instrument Procedures to the FAA*. Coordination for the development of these procedures across FAA lines of business is contained in FAAO 8260.43B, *Flight Procedures Management Program*. This order is incorporated into the FAAO 7100.41 process with Regional Airspace and Procedures Team (RAPT) coordination in Phases 1 and 2. General guidance is also contained in FAAO 8260.19, *Flight Procedures and Airspace*.

The FAA will consider adding to Lessons Learned the experiences of workgroups utilizing these orders so that they will receive consideration in the development of future projects.

Attachment 9

NextGen Works for America:

Chief NextGen Officer Update to Congress

June 3, 2015

Pursuant to Section 204 of the FAA Modernization and Reform Act of 2012 (P.L. 112-95)

Attachment 9

NEXTGEN WORKS FOR AMERICA:

Chief NextGen Officer Update to Congress

Michael G. Whitaker
Deputy Administrator

NextGen — an initiative to transform the way we fly — is on its way to fruition. In the past 12 months we have reached several key milestones in our multi-billion dollar transformation of the U.S. air transportation system. Through a combination of 21st century technology, new procedures, training and policy updates, we are building a more dynamic, scalable, networked and fully digital aviation system.

Our achievements, in many cases, have been the result of close collaboration with our stakeholders to understand their concerns and priorities and work together to deliver benefits.

WE'VE COMPLETED MAJOR PROGRAM MILESTONES

- En Route Automation Modernization (ERAM), the platform on which data sharing, digital communications and trajectory-based operations will reside, is now fully deployed at all 20 FAA en route air traffic control centers in the continental United States. ERAM processes flight and surveillance data, and provides communications and generates aircraft display data, improving situational awareness for air traffic controllers. ERAM enables better decision making and safer, more efficient routing of aircraft. We are focusing next on providing additional ERAM software releases to support future airspace capabilities.
- The Terminal Automation Modernization and Replacement (TAMR) program converts terminal air traffic control facilities to a single, common automation platform. TAMR is funding a technology refresh at 55 sites while replacing older automation platforms at 108 other facilities. Full deployment of TAMR will be completed in 2020.
- Automatic Dependent Surveillance–Broadcast (ADS-B) is now integrated at 22 of the 24 en route centers. Aircraft operating in most controlled U.S. airspace must be equipped for ADS-B Out by January 1, 2020. To date, more than 11,000 aircraft have been outfitted with the proper avionics. The value of ADS-B will grow as more aircraft equip prior to the 2020 deadline.
- In fall 2014, we made the final investment decision to develop the National Airspace System Voice System (NVS), which replaces the current voice switches operated independently at individual facilities. NVS will provide us with a nationwide capability for routing, monitoring and sharing communication assets among facilities.
- Prototype Data Communications (Data Comm) equipment, which is the first step toward transitioning pilot-controller communications from voice to data, has been used at Memphis and Newark airports since 2013. We plan to provide Data Comm at 56 airports by 2016, three years ahead of the program's baseline schedule.
- We developed more robust information sharing to support collaborative decision making. One element of Terminal Flight Data Manager, the Surface Visualization Tool, achieved initial operating capability in spring 2014. In fall 2014, we began offering industry access to data from FAA's Time-Based Flow Management and Traffic Flow Management System (TFMS) programs over our System Wide Information Management (SWIM) network. With SWIM in place, we need to be ready to meet expanded demand as our stakeholders discover all the potential benefits that SWIM has to offer.

These programs form the basis for all other NextGen capabilities through software and hardware upgrades and data exchanges. As we complete the infrastructure, we can focus on delivering even greater benefits.

WE COLLABORATED WITH STAKEHOLDERS TO ENCOURAGE ADS-B EQUIPAGE AND PRIORITIZE COMMITMENTS

ADS-B and Equip 2020

We have completed the infrastructure for ADS-B. Stakeholders must outfit their aircraft to complete the picture. In order to encourage equipage well before the 2020 deadline, we held a Call to Action summit in October 2014 for stakeholders and established Equip 2020. Equip 2020 is a government-industry steering group charged with addressing some of the challenges surrounding equipage, which include cost, equipment availability, and installation schedule. Representatives from the airlines, manufacturers, the general aviation community and all the major trade associations attended the summit and pledged to work with us to meet the deadline.

"NEXTGEN — AN INITIATIVE TO TRANSFORM THE WAY WE FLY — IS ON ITS WAY TO FRUITION."

Equip 2020 worked to address the cost concerns voiced by the general aviation community. Competition among avionics manufacturers has led to a dramatic cost reduction on equipage — more than a 50 percent price drop since October. Several sources now exist for units at prices lower than $2,000.

NextGen Priorities

Ongoing collaboration with our stakeholders is key to our success. We are listening to their concerns and working with them to refine plans and measure benefits. Along with our own assessments, we are focused on leveraging advice to further bolster NextGen momentum. For example, the 2014 MITRE report on NextGen implementation showed we made significant progress since 2008 and validated our focus on transitioning from executing programs to delivering capabilities.

Our efforts with the NextGen Advisory Committee (NAC) provide an excellent example of what we can accomplish when stakeholders and government work together. This 31-member federal advisory committee provides policy guidance to the FAA on NextGen implementation issues facing the aviation community. The NAC includes representatives from the airlines, airports, general aviation, manufacturers, pilots, air traffic controllers, the Department of Defense, environmental interests, international interests and air traffic control.

In 2014, we partnered with the NAC on a joint implementation plan that prioritized four NextGen areas where we can deliver concrete benefits over the next three years. We identified timelines, milestones, locations, costs and metrics for these areas. To date, we have delivered on 19 commitments — three ahead of schedule. Highlights from this work include:

1. Performance Based Navigation

Performance Based Navigation (PBN) uses satellites to enable pilots to fly with greater accuracy and efficiency. We have established a network of thousands of these precisely defined routes to make the flow of air traffic more efficient. We are working closely with operators in local areas to design routes that provide the greatest possible benefit. We have established these new routes in metroplexes throughout the country for all phases of flight: departure, en route, arrival and final approach.

We are receiving positive feedback about new Established on Required Navigation Performance (EoR) procedures we began testing at Denver in spring 2015. EoR enables controllers to reduce the separation between approaching aircraft, and for operators to fly shorter, more direct flight paths that save fuel, cut aircraft exhaust emissions and minimize delays.

EoR benefits airports that have parallel runways. Repeatable flight paths and reduced controller/pilot communication enhance safety. We have committed to publishing a national standard for EoR in 2017, which will make it possible to

implement it at eligible locations throughout the NAS.

Equivalent Lateral Spacing Operations (ELSO) enables controllers to space the routes of PBN-equipped aircraft closer together and safely clear aircraft for takeoff more efficiently because of the increased precision of PBN paths. ELSO translates to millions of dollars in fuel savings per year — nearly $20 million dollars per year in Atlanta. We plan to issue a national standard in June 2015 that will allow us to expand these benefits to other locations.

2. Data Communications

We have proven the operational feasibility of Data Comm thanks to ongoing testing at Memphis and Newark towers. Our commitment to deploy Data Comm at 56 airports begins this summer at Salt Lake City, Houston Intercontinental and Houston Hobby. The plan includes aggressive completion dates with a goal for deployment to be finished by the end of 2016, which is three years ahead of the official FAA baselined schedule.

Data Comm enables pilots to communicate digitally with controllers using a screen on the flight deck instead of radio. It offers significant benefits in safety and efficiency. Digital messages range from initial contact with a controller in a new sector to revised clearances from the controller telling the pilot to fly a new route or change altitude.

Data Comm provides a data link between ground automation and flight deck avionics for air traffic control clearances, instructions, traffic flow management and flight crew requests. Data Comm instructions are clear, quick and concise. Pilots read the instructions and with the push of a button load the message into the avionics and confirm to the controller that they will comply.

Data Comm provides many benefits to operators including improved efficiency, increased flexibility, reduced delays, reduced aircraft exhaust emissions, increased throughput and improved safety. The time saved by receiving digital clearances instead of voice instructions can make the difference between getting airborne before a thunderstorm closes the departure corridor and being stuck on the ground waiting for the storms to pass.

Our stakeholders have placed a high value on the en route component of the Data Comm program. We will begin introducing an initial set of en route services in 2019, and will make a final investment decision on the full suite of services later in 2015.

3. Improved Multiple Runway Operations

The efficiency of parallel runways, particularly those that are closely spaced, is limited by the interplay of wake vortices from nearby aircraft. By using Improved Multiple Runway Operations (IMRO) procedures and deploying wake recategorization (Wake Recat), we have lessened airport delays and increased capacity by safely reducing separation standards for dual and independent parallel runway operations.

Wake Recat is already making a difference at Atlanta Hartsfield-Jackson International Airport. The new standards, implemented in June 2014, allow tighter arrival and departure sequences, resulting in smoother surface flows and flight efficiency improvements especially during peak periods. Delta Airlines reports a range of 0.5-2 minute shorter taxi times for departures, and 0.5-1 minute shorter times in descent for arrivals. The airline estimates an annual operational cost savings of $14.8 to $38.1 million.

4. Surface Operations and Data Sharing

Some of the greatest efficiencies NextGen provides involve enhancements to surface operations and data sharing. SWIM offers easy access to a wide range of air traffic control and management information. Users of the NAS can tap into the information they need, when they need it, through a single connection. SWIM relies on a standard data format to more efficiently share information from disparate computer systems. Airlines no longer need to look at numerous sources to access weather and surface operations information. Stakeholders can also capitalize on SWIM-distributed air traffic control data to develop new software products that serve the aviation community.

With SWIM, the FAA and airlines can collaborate more effectively on daily flow control decisions.

Several major airlines, airports, companies and air traffic control research laboratories are already connected to SWIM and using the information.

We began offering a new SWIM-enabled information capability based on TFMS in 2014. TFMS monitors demand and capacity information, assesses the impact of system constraints, provides alerts and helps determine appropriate adjustments. Access to TFMS provides SWIM users with traffic data and flow information, including ground delays, ground stops, reroutes and traffic advisories.

We have made significant progress with Advanced Electronic Flight Strips (AEFS). At many airport towers, controllers use traditional paper flight strips, which record the progress of a flight, as they pass the flight from one controller to another. With AEFS, they will be able to use electronic messages on touch screens, improving coordination among controllers, traffic management units and front line managers. AEFS was implemented at Cleveland tower this year and will be delivered to Las Vegas and San Francisco towers in 2016. At the NAC's request, we assessed the feasibility of using AEFS in the New York region and decided to introduce the tool to the Newark tower in mid-2016.

WE'RE PARTNERING WITH GOVERNMENT AGENCIES ON NEXTGEN'S NEXT STEPS

The FAA's Interagency Planning Office (IPO) enables improved insight into the complexity of NextGen. The IPO plays a unique role by working hand-in-hand with our federal partners — NASA and the departments of Transportation, Defense, Commerce and Homeland Security — to prioritize research and integrate individual agency programs into a cross-functional NextGen environment. It was established this past year after Congress eliminated funding for the Joint Planning and Development Office, which had been responsible for multi-agency NextGen coordination.

The IPO is developing a far-term Unmanned Aircraft System vision and addressing NextGen cybersecurity issues. The FAA faces cybersecurity challenges such as protecting air traffic control systems and aircraft avionics, and clarifying cybersecurity roles and responsibilities among multiple FAA offices. Part of the IPO's role is leveraging expertise from academia and industry through its partnership with the NextGen Institute to address these cybersecurity issues.

LOOKING AHEAD

Although we have made significant progress in the past year by completing several of the keystones of NextGen and laying our foundation, NextGen is an ongoing transformation. Our progress depends on a shared vision of a better air transportation system driven by government-stakeholder collaboration, continuous funding from Congress and diligent work.

NextGen remains on track. The progress we have made in the past year is now starting to provide significant benefits to the traveling public. These benefits — in efficiency, economy and the environment — will be demonstrated and increase exponentially as we move ahead with NextGen.

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