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NextGen Mid-Term Implementation Task Force Report

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Table of Contents

List of Appendices

List of Figures

MESSAGE FROM THE TASK FORCE CHAIRMAN

It's Time to Embark on the *NowGenNext* Flight Plan to NextGen

By Captain Stephen Dickson, Senior Vice President of Flight Operations, Delta Air Lines and Chairman, NextGen Mid-Term Implementation Task Force

I am extremely proud of the professionalism, dedication and commitment of the membership of the NextGen Mid-Term Implementation Task Force, which has been demonstrated time after time and sustained over the past seven months. This report is the product of thousands of hours of time and "sweat equity" invested by nearly 300 dedicated aviation industry stakeholders, all working tirelessly to reach consensus on many thorny issues associated with the transition from the current system to NextGen. Industry stakeholder participants included users from the four major operating communities (airlines, business aviation, general aviation and military), ATA, NBAA, AOPA, IATA, FAA, DoD, NATCA, ALPA, ACI, manufacturers, suppliers and vendors, as well as the considerable analytical resources of MITRE/CAASD and others. Accompanying the recommendations is a vast amount of supporting data and rationale, making this process transparent and objective. That data is complemented by a rigorous financial analysis as well as the real-world operational perspective of the user community. At all times the Task Force remained focused on the opportunity to strengthen government-industry collaboration by delivering concrete, actionable and operationally beneficial recommendations to the FAA. I believe we have done just that.

After overseeing and examining the results of the aviation community stakeholders' deliberations over the past few months, I am struck by four key messages:

1. Users are willing to support FAA CNS infrastructure programs that require user investment only if those programs provide a clear and unambiguous path to immediate and tangible benefits. A "building block" approach from a NextGen platform will lead to real NextGen capabilities.
2. The FAA should primarily focus on delivering near-term operational benefits, rather than the delivery of infrastructure, as the best way for stakeholders to gain confidence in FAA plans and to encourage users to invest in NextGen equipage. Industry and FAA must agree on common metrics to measure achievement of benefits.
3. The FAA must commit to delivering benefits by assigning appropriate Responsibility, Accountability and Authority (RAA) and funding within the agency to accomplish all the associated and necessary non-infrastructure tasks (i.e., development of procedures and policy) critical to achieving those benefits. FAA should consider developing a NextGen Implementation Plan (NGIP) benefit delivery schedule that supports the recommendations in this report.
4. User community stakeholders must be active participants in the planning, implementation and measurement of these recommendations. This should be accomplished through the ATMAC and its standing working groups, using Task Force leadership and other resources as needed for consultation and as subject matter experts.

In order to appreciate the significance of these key messages, it is important to understand that the Task Force focused on the difficult near-term *transition* issues that must be resolved as soon as possible to provide a solid foundation for NextGen. These issues include policies, procedures, operational approval processes, certification, regulatory guidance, training, criteria and standards, along with equipage and

technology. In some cases, we found that technology has actually outpaced policies and procedures, diminishing or even eliminating the benefits realized from equipment already in the system. Equipage is but one piece of the puzzle, and we have not yet fully leveraged the technology in the system today. We know we must work together to improve the performance of the NAS during the next several years while we make the transition. That improved performance, in turn, will serve to build the confidence necessary to make the additional investments that will be required to achieve NextGen.

Equally important, the aviation community cannot afford to invest in technology without realizing a return on that investment. Three or four years from now, neither government nor industry wants to be answering the question, "since we have spent all this money to improve the infrastructure (whether airborne or ground), why do we still have all these delays and disruptions in the system?" That is why maintaining focus on a performance-based NAS (as opposed to technology-based) has been so important to the work of the Task Force.

Consequently, one of the guiding principles of the Task Force was to develop recommendations that would allow the FAA and industry to clearly demonstrate improvements in capacity, efficiency and access every 3-5 years. Improving the performance of the NAS will bolster the confidence of the user community to make the business case for the technology investments needed for later in the mid-term time frame. If we can get the technology investment timeline synchronized with the benefits timeline by addressing the foundational issues above, we will build the momentum for further investment in high benefit mid-term capabilities. At the same time we must ensure that the path we are taking is implementable on the part of FAA and that it is aligned with the plan for the end state of NextGen. As a result, the recommendations articulated in this report set a target for clear benefits within the next 3-5 years, starting mostly with existing equipage, and continue through 2018, while remaining aligned with the NextGen vision for 2025.

Some may ask why this report does not specifically recommend near-term or accelerated implementation of some of the higher-profile equipage programs and initiatives identified in the NextGen Implementation Plan. To answer this question, it is crucial to note two important points. First, the Task Force recognizes that there are FAA programs currently underway that are fundamental to NextGen, such as ERAM and ADS-B. Although the FAA might find it necessary to adjust some elements of these programs as a result of these recommendations, the Task Force did not purport to rewrite the NGIP. Second, the Task Force completed the entire assessment process and financial analysis assuming that no government funding, loans or incentive programs would be available for the user community, and that the business case for equipage would have to stand on its own. As a result, much of the answer lies in the fact that there is not consensus within the user community regarding the user benefits for some technologies within the mid-term time frame, even though some users in specific locations have made an investment and are receiving benefits.

As stated above, one of the goals of the Task Force is to provide recommendations that avoid putting government and industry in the position of answering the difficult "technology spend without benefit" questions. It is vitally important to begin the difficult task of *implementing* the transition. We all know there are no "miracle cures," "easy fixes," or "big bang" solutions to NextGen. This report provides the best pathway to incentivize foundational NextGen equipage, such as ADS-B, by taking advantage of existing technologies and equipment that are capable of generating real user benefits in the "NowGen."

User benefits generated by implementing the first transition steps of NextGen, such as leveraging existing enhanced surveillance capabilities, will expedite all stakeholders' plans and elevate confidence to invest in even more beneficial equipage and technologies. Extending these benefits, such as reduced separation criteria, to NextGen technologies through such an approach would provide greater

confidence to invest, since operators will know that the foundational work has already been done and can therefore be assured that benefits will begin to accrue shortly after the investment is made. Additionally, many of the challenges to implementation would already be resolved, such as procedure and criteria development. This approach could be combined with carefully structured financial incentives to accelerate the equipage process even further. This subject is addressed in more detail in the section of this report dealing with equipage incentives.

The report provides five specific recommendation domains, as well as two recommendations that cut across more than one domain. The concept of "Best-Equipped, Best-Served" is addressed within each of the domains. Additionally, the Task Force recommends addressing four over-arching enablers critical to the success of the transition. One of those enablers is the establishment of institutional mechanisms to facilitate continued transparency and collaboration both in the planning and execution of post-Task Force activities. The Task Force recognizes that the FAA will need time to digest the recommendations contained in this report, and that once it decides how to address the recommendations, the resulting task of modifying existing plans will also take time. One of the overarching themes driving the Task Force recommendations is the need to build confidence in the FAA's ability to implement NextGen. To the extent that the response to the recommendations and subsequent integration into the FAA's NextGen plans are transparent and collaborative, that confidence will take root and begin to drive the investments so critical to our collective success.

Another enabler is overcoming the significant risk imposed by cumbersome and "stovepiped" operational approval and certification processes. Failure to streamline these processes will likely have far-reaching implications and negatively impact FAA and industry progress toward NextGen implementation.

Among the additional considerations noted by the report is the aviation community's concern with the continued reliability and performance of the GPS constellation. The report highlights this risk, because any lack of confidence in the future performance of the constellation undermines the achievement of desired benefits and the associated business case for technology investment at the same time.

While pursuing improvements to the system during the transition to NextGen, we must ensure safety is embedded in everything we do. We must also be mindful of the opportunity to reduce emissions and maintain aviation's status as a responsible steward of the environment.

Finally, I would like to thank the Task Force Leadership Team, comprised of our four co-chairs and all of the sub-group chairs. I would also like to thank RTCA President Margaret Jenny and the RTCA staff for their tireless guidance and support. The RTCA process has served us well during the Task Force and provides many of the institutional mechanisms that will contribute to our ability to maintain consensus and track implementation of the recommendations moving forward. Our industry and our nation owe all of these outstanding folks a huge debt of gratitude.

In many respects, the Task Force represents a beginning rather than an end. Now that we have filed the *NowGenNext* flight plan, it is time to board the airplane together and continue the journey to our destination, NextGen. I look forward to the trip.

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Task Force Recommendations Chart a Course to the Successful Implementation of NextGen

It's not about Technology

Each Step Designed to Improve the Performance of the NAS

*Is Specific about **What**, **Who**, **Where**, and **When***

Focuses on Major Airports in Metropolitan Areas

Captures Commitments to Invest From Operators

Priorities are Driven by Financial and Operations Analysis and Data

Leverages Current Equipage to Provide Early Benefits

Proposes Financial Incentives for Technology only if Tied to Benefits

Addresses Institutional Challenges to Enhance Confidence in Outcome

Establishes Institutional Mechanism to Follow Up

This Approach Will Pave the Way to a Government-Industry Partnership Essential to Improving the Nation's Air Transportation System

EXECUTIVE SUMMARY

On January 16, 2009, Hank Krakowski, the Chief Operating Officer of the FAA Air Traffic Organization (ATO), and Peggy Gilligan, FAA Associate Administrator for Aviation Safety (AVS), sent a letter to RTCA requesting that a government-industry Task Force be established to forge community-wide consensus on the recommended NextGen operational improvements to be implemented during the transition between now and 2018. The Task Force was also asked to focus on maximizing NextGen benefits and facilitating the development of the business case for industry investment. The Task Force did not attempt to re-write the NextGen Implementation Plan and assumed that the baseline programs and technologies would continue to be developed by the FAA during the transition. The Task Force did look for opportunities to accelerate the transition where existing technologies could provide a "bridge" to NextGen programs that are still in development. Over 300 people from nearly every segment of the aviation community signed up to work toward a consensus set of recommendations on NextGen presented in this report.

In response to the FAA request, the Task Force:

- **Documented commitments by the FAA and Operators.**
- **Prioritized the Operational Capability Sets.**
- **Defined "What," "Where," "Who," and "When," for each capability.**
- **Recommended strategies and means to accelerate NAS-wide operational benefits for NextGen (e.g., consensus on preferred means of accommodating mixed-equipage operations).**
- **Recommended business strategies to ensure delivery of benefits and encourage equipage.**

The Task Force followed a clearly defined set of guiding principles aimed at transparency and data-driven prioritization. Members first considered candidate operational capabilities that take advantage of existing equipage that could evolve to capabilities using more sophisticated technologies over time. All capabilities considered had at least one operator committed to invest in its implementation, and all

capabilities identified the location and timeframe for delivery of benefit. To be clear, the Task Force completed the entire assessment process and financial analysis assuming that no government funding, loans or incentive programs would be available for the user community, and that the business case for equipage would have to stand on its own. Having said this, the Task Force also recognizes that in some cases funding or other incentive programs could accelerate the process of equipping with foundational NextGen technologies. The structuring of any incentive program is extremely important, however, in order for the system and users to realize tangible benefits within a reasonable timeframe. If possible, industry should have a role in designing any proposed incentive program to ensure that resources are efficiently directed and that intended benefits are achieved. This subject is addressed in greater detail in the section of the report on incentivizing equipage.

For each capability, the Task Force identified and documented all known challenges to implementation. These challenges included such things as changes in role of pilots, controllers, aircraft dispatchers, technology required, the requirement to establish new standards, lack of implementation bandwidth, the need for policy changes, requirements for certification and operational approvals, and other barriers to success.

A robust assessment process was established and used to assess the value of all candidate operational capabilities. Known benefits, costs and risks were captured and enabled the Task Force to look at the relative value of all capabilities. Expert opinion and operational experience supplemented the assessments where data was not readily available. All assessment information has been captured in the Task Force knowledge base, and will be delivered along with the recommendations. As new information is brought forward, the database will be updated. An evaluation matrix was used to capture the benefits, costs, risks, readiness and other assessments of each candidate operational capability. That evaluation matrix has been populated and was a key input into the final prioritization and recommendations of this Task Force.

Tiers: Subject to the rule that each operational capability considered for inclusion in the report had to contain a well-defined “What,” Where,” “Who” and “When,” the Task Force created an initial list of operational capabilities to be considered for implementation by 2018. This candidate list was assessed on numerous dimensions in the process of getting it to a shorter list. The Task Force placed the capabilities in bins (Tiers) based on expected benefit and perceived risk, cost and readiness. Capabilities assessed to be of high benefits and relatively low risk were place in Tier 1. Capabilities of relatively high benefit but some higher risk or cost were placed in Tier 2, and the rest of the capabilities were place in Tier 3. This report recommends the implementation of all Tier 1 operational capabilities. The Tiers are discussed further in Section 3.

TASK FORCE OPERATIONAL CAPABILITY RECOMMENDATIONS ARE SUMMARIZED BELOW:

The specific recommendation number(s) in parentheses can be used for tracking further information in the Appendices E, F, G and H.

1. Surface

Improve surface traffic management to reduce tarmac delays and enhance safety, efficiency and situational awareness by defining, standardizing requirements, and implementing the capture and dissemination of surface operations data to pilots, controllers, ramp towers and user operations centers. These actions should be undertaken under the auspices of one consolidated point of responsibility, authority and accountability within the FAA, in accordance with a coordinated execution plan jointly established by industry and government.

To resolve Surface problems, the Task Force recommends that the following operational capabilities be implemented:

- **Surface Situational Awareness Phase 1: Deploy ground infrastructure to capture and integrate surface activities (40)**
- **TFM Common Operational Picture: Define consistent views of operational data for collaborative decision-making (43)**
- **Surface Connectivity & Surface Situational Awareness Phase 2 among FOCs, FAA, Airports (38, 41)**

2. Runway Access

Increase runway access, especially in low visibility, to converging, intersecting and closely-spaced parallel runways. Accomplish this by leveraging potential capacity gains achievable through accurate and predictable flight paths, as well as enhanced surveillance methods. Foundational activities are based on existing ground and aircraft capabilities leading to a determination of needed additional investment.

To resolve Runway Access problems, the Task Force recommends that the following operational capabilities be implemented:

- **Increase capacity and throughput to converging and intersecting runways (9)**
- **Improve parallel runway operations in a phased manner, where near-term commitment and implementation successes dictate the need for mid-term investments (37a, 12, 13, 14)**

3. Metroplex

Relieve congestion and tarmac delays at major metropolitan area airports, inefficiencies at satellite airports, and surrounding airspace by instituting tiger teams that focus on quality of implementation at each location and deconflicting of adjacent airports. Core capabilities to leverage are RNAV, with RNP where needed (e.g., when RF turns are called for); optimized vertical profiles using vertical navigation; use of 3 NM and terminal separation rules in more airspace; integrated approach to airspace design and classification; and ATC, flow and surface traffic management tools.

To resolve Metroplex problems, the Task Force recommends that the following operational capabilities be implemented:

- **Optimize RNAV and RNP operations, institute tiger teams that focus on quality at each location (29, 32a, 32b)**

- **Integrate procedure design to deconflict airports and expand use of terminal separation rules (4, 21a)**

4. Cruise

Improve efficiency of cruise operations by increasing the ability to disseminate real-time airspace status and schedules (particularly with respect to Special Activity Airspace); improving flow management to better utilize time-based metering and flight operator capabilities; and implementing data communications between ATC systems and aircraft to more effectively manage traffic and exchange routing and clearance information.

To resolve Cruise problems, the Task Force recommends that the following operational capabilities be implemented:

- **Special Activity Airspace: Efficient management and use of SAA through real-time data exchange of status and schedules (35)**
- **Improve time-based metering and leverage operator capabilities (24, 25)**
- **Develop Area Navigation-Based En Route System (30)**

5. Access to the NAS:

Improve access to and services provided at non-OEP airports and to low altitude, non-radar airspace by implementing more precision-based approaches and departures, along with the expansion of surveillance services to areas not currently under radar surveillance.

To resolve Access problems, the Task Force recommends that the following operational capabilities be implemented:

- **Low Altitude Non-Radar: Extend radar-like services to low altitude airspace without radar surveillance (28)**
- **Implement LPV procedures for airports without precision approaches (22)**

Cross Cutting Recommendations

In addition, the Task Force submits recommendations in two capability areas that cut across the five domains outlined above:

1. Data Communications

Improve cruise and transition operations by using data communications to enable more efficient use of available or forecast capacity in the NAS. Increase the ability to better adapt to changing conditions through improved dissemination of tactical reroutes around weather forecast and congestion.

To resolve problems due to lack of digital data communications and associated applications, the Task Force recommends that the following operational capabilities be implemented:

- **Digital ATC-Aircraft Communications for Revised Departure Clearances, Weather Reroutes, and Routine Communications (16, 17, 39, 42a, 44)**

2. Integrated Air Traffic Management (I-ATM)

Create an Integrated Air Traffic Management System that leverages new technologies and collaboration with the users, and implements solutions to traffic flow problems that are effectively integrated across time and air traffic control domains, to achieve the efficiency goals of the service provider and the users.

To resolve problems due to lack of an Integrated ATM approach, the Task Force recommends that the following operational capabilities be implemented:

- **Integrated CDM/TFM/ATC Solution to traffic flow problems (47)**
- **Improved Collaborative ATM (C-ATM) Automation: C-ATM automation to negotiate user-preferred routes and alternative trajectories (7b, 8, 46)**

Overarching Recommendations

In addition to the five operational capability recommendations and the two cross-cutting recommendations, the Task Force recommends that the FAA consider the following Overarching Recommendations deemed critical to the success of implementing the recommended operational capabilities:

1. Achieving Existing 3 and 5 Mile Separation Standards

Implement a more collaborative approach to change management and build on relationships by increasing transparency, including robust use of the controller Air Traffic Safety Action Program (ATSAP), creating a program using incentives for operations that perform at most efficient levels and, finally, building metrics that best evaluate the highest performing locations by measuring efficiency and safety in each location's operation.

2. Incentivizing Equipage

Incentivize investments in NextGen capabilities by: 1) providing financial incentives either in the form of low-interest loans, direct subsidies of equipage, or other innovative mechanisms such as reduced user fees, fuel/excise taxes or income tax credits; 2) providing a timely, unambiguous set of processes (regulations, avionics certifications, operational procedures and approvals, engineering support, etc.) to assure the realization and timelines by NAS users of a sufficient level of operational benefits that justify investments in new avionics or new Flight Operations Centers technologies, i.e., to enable them to make the business case for those investments; and 3) establishing a National Airspace System (NAS) where system users who have aircraft with higher aircraft performance/capability levels get higher levels of service. This is referred to in the FAA's Next Generation Implementation Plan as the Best-Equipped, Best-Served (BEBS) concept.

3. Streamlining

Identify the operational approval and certification issues that may impede adoption and acceleration of NextGen capabilities and implement timely solutions to these challenges.

4. Post Task Force Follow-Up

To maintain the momentum created over the past seven months and to facilitate holding the community consensus intact through the implementation of NextGen, establish institutional mechanisms to facilitate continued transparency and collaboration in the planning, implementation, and post-execution assessment of future activities as well as updating NextGen priorities as research and development progresses on key capabilities.

All supporting data for the recommendations are contained in the appendices.

1. Introduction and Background

On January 16, 2009, Hank Krakowski, the Chief Operating Officer of the FAA Air Traffic Organization (ATO), and Peggy Gilligan, FAA Associate Administrator for Aviation Safety (AVS), sent a letter to RTCA requesting that a government-industry Task Force be established to serve as the mechanism for defining the steps needed to implement NextGen near-term and mid-term operational capabilities to 2018. This request was partly in response to a evaluation of the FAA's NextGen Implementation Plan by the Requirements and Planning Work Group (RPWG) of the Air Traffic Management Advisory Committee (ATMAC) and partly to solicit industry advice on ways to incentivize aircraft and Flight Operations Center (FOC) investments in equipage of NextGen technologies that will be required to achieve operational benefits by improving the performance of the National Airspace System (NAS).

The Terms of Reference (TOR) for the Task Force requested that RTCA deliver recommendations as follows:

- Resolve issues identified by the ATMAC RPWG (see below).
- Recommend strategies and means to accelerate NAS-wide operational benefits for NextGen (e.g., consensus on preferred means of accommodating mixed-equipage operations).
- Recommend business strategies to ensure delivery of benefits and encourage equipage.

The ATMAC RPWG critique is summarized here and expanded in Appendix J.

- Document commitments by the FAA and Operators.
- Prioritize the top 3-5 Operational Capability Sets.
- Define "What," "Where," "Who," "When," and "How" for each capability.
- Link recommended capabilities to technical documents, plans, analyses and decisions.

The Task Force addressed all of the above critiques of the NGIP, but stopped short of recommending "How" the FAA should position itself to implement these recommendations.