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June 18, 2012

Meeting Summary, May 24, 2012

NextGen Advisory Committee (NAC)

The May 24, 2012 meeting of the NextGen Advisory Committee (NAC) hosted by The Boeing Company in the TA Wilson Meeting Room, 1301 SW 16th St, Renton, WA convened at 9:00 a.m. The meeting discussions are summarized below. Attendees are identified in Attachment 1; the presentations for the Committee is Attachment 2 (containing much of the detail about the content of the material covered); Attachment 3 is the revised NAC Terms of Reference approved at the meeting; the Chairman's Report is Attachment 4; the FAA Report from Acting Administrator Michael Huerta is Attachment 5; the interim report "Measuring NextGen Performance" discussed by the Committee during the meeting is Attachment 6; the summary of NAC Discussions on BCBS and the Non-technical barriers to NextGen implementation is Attachment 7; and the recommendation "Refinement of Integrated Capabilities Definitions and Completion of Mapping Exercises" approved by the Committee is Attachment 8.

Welcome and Introductions

Mr. Dave Barger, President and CEO of JetBlue Airways, and the Chairman of the NextGen Advisory Committee, called the meeting to order and welcomed the NAC members and others in attendance. He then emphasized the importance of the Seattle Greener Skies initiative, referring to a briefing made prior to the NAC meeting by representatives from Alaska Airlines and the FAA about the collaborative and innovative approach to implementing Performance-Based Navigation (PBN) procedures in the Seattle area. The Greener Skies initiative, that engages all the stakeholders to develop procedures that are shorter, more direct and environmentally sensitive, can serve as a template for advancing NextGen in other, more complex locations in the country.

Chairman Barger then acknowledged Sherry Carbary, Vice President Flight Services Commercial Aviation Services, Boeing Commercial Airplanes, who welcomed the NAC members and members of the general public, expressing her appreciation for the NAC decision to conduct its meeting at the Boeing Renton Campus.

All NAC members were asked to introduce themselves. (NAC and General Public Attendees are identified in Attachment 1.) Chairman Barger welcomed new NAC member Stephanie Hill, President, Lockheed Martin IS&GS to the Committee.

Designated Federal Official Statement

Designated Federal Official (DFO) Michael Huerta, Acting Administrator FAA, read the Federal Advisory Committee Act notice governing the open meeting.

Approval of February 3, 2012 Meeting Summary and NAC Terms of Reference

Chairman Barger asked for consideration of the written summary of the February 3, 2012 meeting. The Committee approved the Summary with no revisions or objections. Chairman Barger also asked for consideration, and received approval of, the revised Terms of Reference (TOR) to incorporate changes eliminating the NAC Subcommittee Observer Category, but adding the Observers as Members of the Subcommittee (Attachment 3). The TORs also incorporate editorial "clean-ups."

Chairman's Remarks

Mr. Barger's detailed remarks are contained in Attachment 4. He addressed the following topics:

- Commitment
- Policies
- Implementation
- Certification
- Best-Capable, Best-Served
- Barriers

Concluding his remarks, Chairman Barger expressed his heartfelt thanks to the NAC members for all of their efforts to date and commitment to future activities.

FAA Report

Acting FAA Administrator Michael Huerta presented the FAA report and began by expressing his perspective that the national airspace system depends on NextGen. He also commented that collaboration is paramount.

Mr. Huerta covered the following areas (detailed comments are contained in Attachment 5):

- Organizational Update – focusing FAA leadership on making the safest aviation system in the world even safer and smarter, accelerating the benefits of new technology -- *benefits* for the public now, and empowering FAA employees to embrace innovation and to work efficiently.
- FAA Reauthorization – FAA is responding to new requirements for rulemakings and actions related to NextGen and Unmanned Aircraft Systems.
- NextGen Equipage – focusing efforts on specific, localized opportunities to test operational incentives.
- Metroplexes – assessing recommendations from the NAC.
- DataComm – moving forward with DataComm and continuing to make progress in finalizing the scope and planning for its implementation.
- NextGen Performance Snapshots – implementing the performance snap shots webpage based on metrics recommended by the NAC focusing on 21 Metroplexes and Core 30 airports and associated airspace.
- NextGen Implementation Plan – distributing copies of the 2012 edition that captures NAC recommendations and the FAA's response.

Mr. Huerta also expressed his perspective about expectations for the facilitated discussion that occurred later in the meeting.

- "In the "Best Equipped, Best Served" area, it would be particularly beneficial to hear your feedback on the position that benefits are local, and it is in conducting geographic trials or pilot programs that will help us quantify what NextGen is delivering as we continue to roll it out."
- "In the "Non-Technical Barriers" discussion, I'd be particularly interested in what this group feels are the cultural barriers to overcoming the implementation of NextGen, and what can we do with that knowledge. "

Several Committee Members subsequently commented on the need to apply lessons learned locally (i.e. Greener Skies Over Seattle) to other areas of the country. The points were made that this can be complicated by the need to understand the interest and concerns of the community and the aviation users. It was also emphasized by several committee members that collaboration among the various "parties" is critical to implementing NextGen successfully and important in addressing complexities of changes to the controller handbook as well as the need for establishing performance metrics to determine and measure success.

NextGen Implementation Metrics

Chairman Barger introduced the Co-Chairs of the NACSC – Steve Brown, Senior Vice President, Operations and Administration, National Business Aviation Association, and Tom Hendricks, Senior Vice President, Safety, Security and Operations, Airlines for America, who presented a briefing on preliminary recommendations developed by the NACSC for NAC consideration.

The Co-Chairs outlined that the purpose of NextGen is to improve the performance of the Air Traffic Management System. The Committee then discussed the six high-level performance metrics being developed to enable measurement of the impact of NextGen on high level system performance. Five metrics have been defined with the remaining work on the Access Metric to occur over the summer. The National System Objectives and associated Metrics recommended to the FAA by the NAC are:

National System Objective	NextGen High-Level Outcome Metric
Improved Situational Awareness	Change in Airborne/Ground Separation Alert Rate (Provisional)
Increased Efficiency	Mean trip time
Increased Capacity	Metroplex peak allowable throughput
Increased Fuel Efficiency	Ton-miles/gallon
Reduced NAS Costs	ATC cost per IFR hour
Improved Access to the NAS	Work in progress

In discussion of the metrics, an FAA Committee member expressed the view that the data exists for the safety metric of the Change in Airborne/Ground Separation Alert Rate and that this is a "good metric." There was also support for the ton miles/gallon fuel usage metric and its alignment with data available internationally. An important question is the airlines', military and general aviation willingness to provide the needed underlying information. In response to a specific request by the FAA to the NAC, the Business Case and Performance Metrics Work Group is looking into potential sources for these data. Several members of the Committee also stated that all but the Access metric are harmonized with those used in other parts of the world and ICAO.
Committee Action: The Committee approved forwarding the preliminary report, **Measuring NextGen Performance** (Attachment 6) to the FAA with the expectation that the full report will be presented for NAC consideration at the next Committee meeting in October.

Facilitated Discussion: Best-Capable, Best-Served (BCBS) Policy (Attachment 7)
The Committee engaged in a facilitated discussion covering BCBS policy. After extensive discussion, the Committee members collectively agreed that the goal of a BCBS policy is improved overall system efficiency while accommodating mixed equipage. There was also general agreement that the reality of a BCBS policy is that those not equipped will be relatively disadvantaged and that the application of BCBS will differ depending on location. Finally, to be successful it is imperative that all stakeholders work as a team, and the teams involve controllers early in the process of designing and implementing a BCBS policy at specific locations. The 10 points that summarize the BCBS discussion are:

1. All NAC members believe that the BCBS policy must accommodate mixed equipage.
2. There is general agreement that the reality of a BCBS policy is that those not equipped will be relatively disadvantaged. The aviation system demonstrates this principle in some locations and at some level each day (i.e. CATIII ILS approaches). However, ensuring equity will be a challenge as we move away from a first-come, first-served policy. The performance baseline should be equal to the current level of service for those not equipped.
3. Operators must receive a return on their investments in equipage. While unequipped aircraft may not be disadvantaged, operators who choose not to equip will not receive the direct benefit(s) for the specific capability.
4. The goal of a BCBS policy is improved overall efficiency. The increased percentage of equipped aircraft will likely drive increased efficiencies, but the National Airspace System (NAS) must continue to accommodate a mixed equipage environment.
5. Defining performance metrics is crucial for measuring and evaluating implementation of BCBS policy. This includes establishing a baseline from which improvements will be measured and defined targets for the intended performance goals.
6. BCBS policy differs depending upon capability and location, and is, therefore, applied locally and specifically to an operational capability. However, local application of BCBS must be reconciled with national NextGen implementation because it is important to ensure that the sum of local solutions does not create network inefficiencies.
7. For those who choose not to equip, the disadvantages and magnitude of the disadvantages that will be considered acceptable must be determined.

8. FAA policies will need to be updated to gain benefits. Some BCBS policies will require changes to the controller handbook to implement successfully. Where necessary, tools must be available for controllers and pilots to apply/implement BCBS policies.
9. Carriers will tend to operate at airports that can best accommodate them and provide advantages to those who have invested in NextGen equipage.
10. To implement new NextGen capabilities successfully, it is imperative that all stakeholders work as a team, and the teams should involve controllers early in the process of designing and implementing BCBS policy for specific locations and capabilities.

Mapping and Refining Metroplex Capabilities

NACSC Co-Chairs Mr. Brown and Mr. Hendricks outlined for the NAC members a package of Metroplex prioritization and capabilities recommendations developed in phases over the last 18 months by the Integrated Capabilities Work Group under the NAC Subcommittee. After discussion, the Committee approved a prioritization of 27 Metroplexes into Tier One and Tier Two ordered groupings along with mappings of the NextGen capabilities for implementation at each Metroplex in the mid-term time frame (2018). Among all NextGen capabilities that the NAC approved, the three areas of capabilities that were identified as delivering the highest benefits are surface management, PBN procedures and FAA's Time-Based Flow Management (TBFM).

Committee Action: The Committee agreed by consensus to approve the recommendation **Refinement of Integrated Capabilities Definitions and Completion of Mapping Exercises** (Attachment 8) for submission to the FAA.

Facilitated Discussion: Non-Technical Barriers to Implementing NextGen (Attachment 7)

At the request of the FAA, the Committee engaged in a facilitated discussion about cultural and other non-technical barriers to the implementation of NextGen. The need for fundamental policy changes was identified by the NAC as the chief non-technical barrier to NextGen implementation. Depending on the capabilities, policies and non-technical actions, such as decreased separation standards and delegation of aircraft spacing, etc., could require changes to the controller and pilot handbooks, development of technical performance standards, Advisory Circulars and Technical Standards Orders necessary to streamline the regulatory process. The Committee also acknowledged that safety cultures are by their nature resistant to change, therefore change management and early stakeholder engagement are important for successful NextGen implementation. The 10 points that summarize the Committee discussion of the Non-technical barriers to NextGen implementation are:

1. Policy changes are the most significant non-technical barrier to NextGen.
2. Culture: Early stakeholder engagement (e.g. controllers, pilots, airlines, local airport and Metroplex community, etc.) is essential for successful implementation of NextGen capabilities.
3. Success will require streamlining regulatory processes such as operational approvals, publication of Technical Standard Orders, Advisory Circulars and development of technical performance standards.
4. Because many NextGen capabilities (e.g., RNP, DataComm applications, ADS-B In applications) will require changes to the air traffic controller handbook, the FAA must determine ways to streamline that process.

5. Safety cultures are by their nature resistant to change. Change management will, therefore, be an essential element of a successful NextGen program.
6. Correlating local benefits directly to the local community is crucial to obtaining support from those communities and overcoming barriers to implementation.
7. Publicizing successes can help create enthusiasm for NextGen by highlighting accomplishments taking place now. For example, initiatives such as Greener Skies Over Seattle provide an important roadmap for tackling issues and resolving them, helping to create momentum and identifying the next opportunity for similar initiatives. The next challenge is replicating that success at higher-density Metroplexes in the continental U.S. The NAC should work with the FAA to select from the Tier 1 Metroplexes and mapped NextGen capabilities and work together to address the non-technical barriers, resolve them and implement NextGen capabilities successfully.
8. The aviation community must prioritize investments of time, talent and other resources for generating and maximizing investments for implementing NextGen. We cannot do everything everywhere, so we must prioritize activities.
9. Environmental review should not be an afterthought but must be built into the Nav-Lean process to create environmental benefits in the beginning instead of bi-products at the end.
10. The aviation industry has done hard things before – hard things are not impossible.

Chairman Barger requested that the summary of the discussions be developed for circulation and consideration by the NAC members.

Other Business/Anticipated Issues for NAC Consideration and Action at May 24, 2012 Meeting
Chairman Barger provided a brief overview of 2012 actions that will be considered by the Committee at its next meeting:

- NextGen Performance Metrics
- Follow-on discussion(s) of Best-Capable, Best-Served/Non-Technical Barriers to NextGen Implementation

Committee member General Williams also provided an overview of the activities being planned for the next meeting being hosted by the U.S. Air Force.

There was no new business.

Adjourn
Chairman Barger closed the meeting of the Committee at 2:57 p.m.

Next Meeting
The next meeting of the NAC is October 4, 2012 in Dayton, Ohio at Wright-Patterson Air Force Base.

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NAC May 24, 2012 Meeting Attendance

NAC Members		
Last Name	**First Name**	**Organization**
Ayer	Bill	Alaska Airlines
Baer	Susan	The Port Authority of NY & NJ
Barger	**Dave**	**JetBlue Airways**
Bolen	Edward M.	National Business Aviation Association
Brantley	Tom	Professional Aviation Safety Specialist
Carbary	Sherry A.	The Boeing Company
Cox	Vicki	Federal Aviation Administration
Day	Kim	Denver International Airport
Esposito	Carl	Honeywell Aerospace
Fornarotto	Christa	Federal Aviation Administration
Fuller	Craig	Aircraft Owners and Pilots Association
Grizzle	David	Federal Aviation Administration
Harris	John	Raytheon Technical Services Company
Hickey	John	Federal Aviation Administration
Hill	Stephanie	Lockheed Martin Corporation – IS & GS
Huerta	Michael	Federal Aviation Administration
Jenny	Margaret	RTCA, Inc.
Ky	Patrick	SESAR Joint Undertaking
McMillan	David	Eurocontrol
Moak	Lee	Airline Pilots Association
Mulder	Arlene	Village of Arlington Heights
Rankin	James	Air Wisconsin Airlines Corporation
Rinaldi	Paul	National Air Traffic Controllers Association
Sinha	Agam	The MITRE Corporation
Stefanello	Eric	AIRBUS
Williams	Brett	United States Air Force

NAC May 24, 2012 Meeting Attendance

Cebula	Andy	RTCA, NAC Secretary
Brown	Steve	NBAA (Co-Chair NACSC)
Hendricks	Tom	ATA (Co-Chair NACSC)

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NAC May 24, 2012 Meeting Attendance

Non-NAC Member Attendees		
Last Name	**First Name**	**Organization**
Allen	Stan	The Boeing Company
Baldwin	Bryan	JetBlue Airways
Beck	Gary	Alaska Airlines
Baum	Chris	ALPA
Bertapelle	Joe	JetBlue Airways
Bryant-Bertail	Jessica	GAO
Blazey	John	The Boeing Company
Broda	Don	The Boeing Company
Brown	Cyndy	RTCA, Inc.
Cardenas	Taffa	The Boeing Company
Cass	Lorne	FAA
Cassidy	Sean	ALPA
Casten	Meggan	Green River
Clark	Patty	Port Authority NY & NJ
Condelles	Don	The Boeing Company
Dalton	Sarah	Alaska Airlines
De Leon	Ben	Federal Aviation Administration
DeCleene	Bruce	Federal Aviation Administration
Denmark	Ray	DOT IG
Denning	Jana	Lockheed Martin Corporation
Fearnsides	Jack	MJF Strategies
Hagy	Keith	ALPA
Hintz	Sally	The Office of U.S. Senator Cantwell
Hyde	Shaunta	The Boeing Company
Iverson	Jennifer	RTCA
Keegan	Charlie	Raytheon Technical Services Company
Kinghorn	Eric	The Boeing Company
Land	Rob	JetBlue Airways
Laster	Molly	GAO
Lohr	Ed	Delta Air Lines

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NAC May 24, 2012 Meeting Attendance

Martin	Greg	The Boeing Company
McCardle	Matt	The Boeing Company
Mohler	Gisele	Federal Aviation Administration
Nadarski	Nick	GAO
Narvid	Juan	DOD
Newton	David	Southwest Airlines
Ovelmen	James	DOT OIG
Planzer	Neil	The Boeing Company
Ray	Elizabeth	Federal Aviation Administration
Ridgway	Debbie	The Boeing Company
Robbins	Michael	ALPA
Rocheleau	Chris	Federal Aviation Administration
Samuel	Sandy	Lockheed Martin Corp.
Sears	Bill	Beacon Management Group
Schimar	Brian	Federal Aviation Administration
Shapero	Ken	GE Aviation/Naverus
Smith	Molly	Federal Aviation Administration
Spurio	Kip	Federal Aviation Administration
Sypniewski	Jessica	Federal Aviation Administration
Taylor	Andy	Qineti Q NA
Thomgen	Christian	The Boeing Company
Treakle	Coletta	DOT IG
Vines	Pamela	GAO
White	Beth	Federal Aviation Administration
Williams	Heidi	AOPA
Wright	Dale	NATCA
Wynne	Richard	The Boeing Company

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Welcome to the Meeting of the NextGen Advisory Committee

May 24, 2012
The Boeing Company
TA Wilson Meeting Room
Renton, WA

Welcome & Introductions

NAC Chairman Dave Barger

President & CEO

JetBlue Airways

Welcome & Facility Overview

NAC Meeting Host

Sherry Carbary,
Vice President Flight Services
Commercial Aviation Services
Boeing Commercial Airplanes

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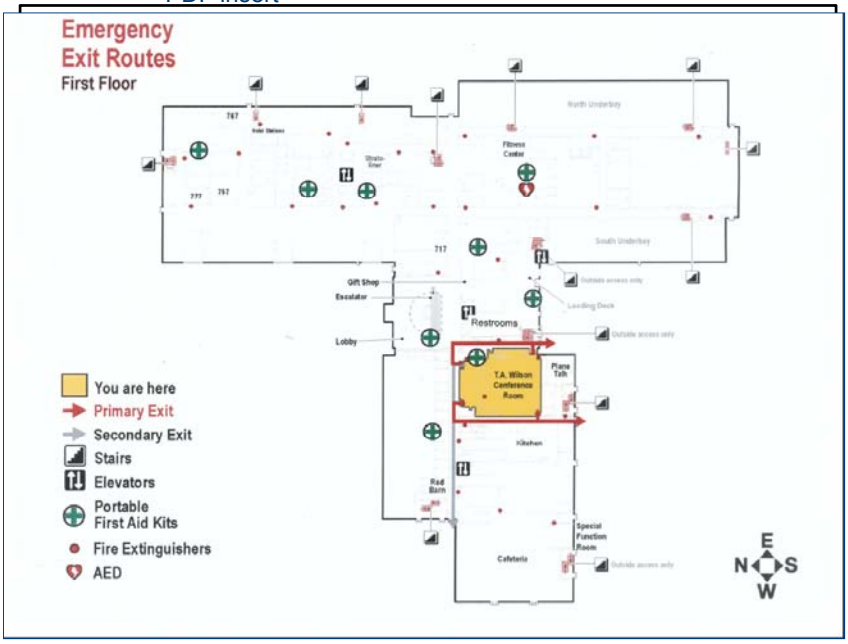

Meeting Agenda

- Welcome and Introductions
- DFO Statement
- Review & Approval of February 3, 2012 Meeting Summary/NAC Revised Terms of Reference
- NAC Chairman's Report
- FAA Report
- Measuring NextGen Performance
- Best Capable Best Served Facilitated Discussion
- Mapping and Refining Metroplex Capabilities
- Non-Technical Barriers to NextGen Implementation
- Other Business/Anticipated Issues for Next Meeting – October 4, 2012, Dayton, OH
- Adjourn

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PUBLIC MEETING ANNOUNCEMENT
Read by: Designated Federal Official Michael Huerta
NextGen Advisory Committee
May 24, 2012

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:

April 30, 2012

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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Review and Approval of:

February 3, 2012 Meeting Summary
NAC Revised Terms of Reference

Revised TORs – Eliminate Observer Category & Editorial Cleanups

- Aligns NAC TORs: All Observers made Members of NACSC by NAC at February meeting
- Editorial Clean-ups
  - Michael Huerta as Acting Administrator
  - References to NACSC
  - Organizational Chart

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Chairman's Report

NAC Chairman Dave Barger
President & CEO
JetBlue Airways

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FAA Report

Michael Huerta
Acting Administrator, FAA

FAA Update

- Organizational Update
- Reauthorization
  - New Requirements
  - Budget Implications

FAA NextGEN

FAA Update

- NextGen
  - Equipage
  - Data Comm
  - Performance Snapshot
- Going Forward

FAA NextGEN

DISCUSSION

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Business Case & Performance Metrics Work Group

Measuring NextGen Performance

Steve Brown/Tom Hendricks, NACSC Co-chairs

BCPMWG Co-chairs:
Debby Kirkman, The MITRE Corporation
Ed Lohr, Delta Air Lines

What are the Top Level NextGen Metrics?

- BCPMWG Tasking: Identify, from past recommendations and other related work, the key high-level metrics to capture NextGen progress
- Audience: Focus on Aviation-knowledgeable executives that are responsible for investment commitments
- Selection Criteria for High-Level Metrics
  - Capture the most significant impacts of NextGen
  - Six or fewer
  - Understandable to a broad spectrum of users and audiences

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High Level Metrics Product: Overall Findings and Observations:

- High-Level metrics help communicate to the broader public, but are indicators only, can't attribute NextGen impacts directly
- Identifying the right diagnostic metrics for NextGen requires significant analysis
- Link NextGen initiatives to medium & high level KPIs, do the analysis as initiatives are implemented

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High Level Metrics Product

Six key metrics categories endorsed by the NAC in February:

- Safety
- Efficiency
- Capacity
- Fuel Efficiency
- Cost-Effectiveness
- Access

Recommended High-Level Metrics

National System Objectives	**NextGen High-Level Outcome Metric**
Improved Situational Awareness	Change in Airborne/Ground Separation Alert Rate (Provisional)
Increased Efficiency	Mean trip time
Increased Capacity	Metroplex peak allowable throughput
Increased Fuel Efficiency	Ton-miles/gallon
Reduced NAS costs	ATC Cost per IFR hour
Improve Access to the NAS	Work in Progress

Safety Metric

- For February NAC meeting BCPMWG identified "Fatal Accident Rate" as recommended outcome safety metric
  - NAC feedback was that a metric more closely related to NextGen desired.
  - Subsequent inputs from NAC members proposed linkage to improved situational awareness
- Discussions with AVS confirmed difficulty in linking an outcome metric with NextGen directly

Safety

- NextGen is expected to improve situational awareness and reduce human errors
- Safety metrics are only weakly correlated with NextGen impacts
- Metric: **Change in Airborne / Ground Separation Alert Rate**
  - Measured at national level
  - Evaluates the normalized rate of TCAS Resolution Advisory and Terrain Alerting & Warning System ground proximity alerts

Efficiency

- NextGen is expected to reduce delays and improve predictability, leading to better schedule reliability
- Metric: **Mean Trip Time**
  - Part 121: Normalized across top 100 city pairs. Measures actual end-to-end time between pushback and destination gate arrival.
  - GA: Normalized across a set of Metroplex pairs (TBD). Measures actual block-to-block times.

Capacity

- NextGen is expected to improve capacity via deconfliction of traffic and reduced separation minimums
- Metric: **Metroplex Peak Allowable Throughput**
  - Sum of called arrival and departure rates (AARs and ADRs) in a Metroplex, measured across a set of peak hours to be determined for each Metroplex.
  - Reported for each of the Metroplexes in the NextGen Implementation Plan.

Fuel Efficiency

- NextGen is expected to improve fuel efficiency via shorter flight paths and more optimal profiles
- Metric: **Ton-Miles/Gallon**
  - Applies to flights with passengers, baggage, or cargo.
  - Fuel measured from the beginning of taxi to engine shutdown.
  - Uses a "baseline distance" between the origin and destination rather than actual track miles flown.

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Cost-Effectiveness

- NextGen is expected to eventually improve productivity and reduce ground-based infrastructure costs
- Metric: **ATC Cost Per IFR Flight Hour**
  - Unit cost, based on direct variable costs, as currently calculated by the FAA

Access

- Work in progress to develop a high-level metric
- Working Definitions:
  - **Access**: "A non-judgmental, objective measure of the level of utilization achieved by a set of users authorized to use a NAS asset or service (airspace, airport, approach, runway, etc).
  - **Equity**: A measure of consistency and transparency in the application of Access policies according to the agreed upon rules for service.

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Development of a High-Level Access Metric: Few quantitative measures

- ICAO's manual on Global AM Performance (doc 9883) suggests an indicator for access could be measured as "unsatisfied demand versus overall demand (measured in volume of airspace time)."
- SESAR has a design target for access and equity:
  - Shared use of airspace and airports by different classes of airspace users will be significantly improved (classes defined by type of user, type of aircraft, type of flight rule).
  - Where shared use is conflicting with other performance expectations (safety, security, capacity, etc.), viable airspace/airport alternatives will be provided to satisfy the airspace users' needs, in consultation with all affected stakeholders.
- …but does not include any specific measures

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NAC Action

Discuss Metrics:
Complete Recommendation
Measuring NextGen Performance
will be discussed
at October Meeting

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DISCUSSION

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BREAK

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The Boeing Company Video

Clearing the Congested Skies

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Best Capable, Best Served
A Facilitated Conversation

Background

- To encourage equipage for NG, FAA is considering a BCBS policy
- BCBC will provide ops incentives to equip and benefits to those who equip
- BCBS must be considered within context
  - What capability and location deployed
- Not financial incentive
  - NAC 9/11: "*most effective when used to encourage early equipage…or for …older aircraft…"*

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Goal of Discussion

- Identify major issues
- Identify overarching principles for BCBS policy
- Hear from all NAC members
- Help shape possible new tasking

- DISCUSSION IS NOT INTENDED TO LEAD TO FEDERAL ADVISORY COMMITTEE RECOMMENDATIONS TODAY!

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BCBS Questions

- Do you believe that the NAS will always need to accommodate mixed equipage?
- Should a BCBS policy ever disadvantage those not equipped?
- What are some of the most obvious disadvantages of applying BCBS policy?

FACILITATED DISCUSSION

Richard Wynne
Director – Aviation Policy
Boeing Commercial Airplanes

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Integrated Capabilities Work Group

Mapping and Refining Metroplex Capabilities

Steve Brown/Tom Hendricks, NACSC Co-chairs

ICWG Co-chairs:
Chris Oswald, ACI-NA
Sarah Dalton, Alaska Airlines

Applying the Metroplex Criteria

- Provide the FAA with industry guidance on which NextGen capabilities are most important to implement in the mid-term (2018)
- Considerations: What can be implemented in Mid-term?
- ICWG providing guidance on where & what capabilities should be provided
- Metroplex effort separate from Optimization of Airspace & Procedures in the Metroplex (OAPM) – merge in the mid-term

Mapping Exercises: Update

- Qualitative evaluation of benefits/needs and feasibility of operational capabilities in remaining 20 Metroplexes
- Tier One and Houston have already been evaluated
- Performed a “reconciliation” effort for all Metroplexes to ensure:
  - Consistent definitions of integrated capabilities were used
  - Capability ratings were consistently applied (consistent rating scale (1=L, 5=H) for ease of analysis)
  - Committed/implemented capabilities were evaluated uniformly

ICWG Capability Mapping Efforts

Tier	Metroplex (Note 1)	Core Airports	Other Airports
1	Atlanta	ATL	FTY, PDK, RYY
1	Charlotte	CLT	RDU, CAE, GSO, GSP, JQF, UZA
1	Chicago	MDW, ORD	DPA, MKE, UGN, AAR, ENW, GYY, IGQ, LOT, PWK, RFD
1	Dallas-Ft. Worth	DFW	DAL, ADS, AFW, DTO, FTW, GKY, TKI
1	Southern California	LAX, SAN	BUR, CNO, LGB, ONT, SNA, VNY, CRQ, HHR, MYS, OXR, POC, PSP, SDM, SEE, SMO, WHP
1	New York	EWR, JFK, LGA	FRG, HPN, ISP, MMU, SWF, TEB, ABE, CDW
1	Philadelphia	PHL	ILG, ACY, LOM, PNE
2	Boston	BOS	BDL, PVD, BED, BVY, MHT, OWD
2	Cincinnati		CMH, CVG, SDF, DAY, LEX, LUK
2	Cleveland		CLE, PIT, BKL, CGF, LEB
2	DC Metro	BWI, DCA, IAD	DMW, FDK, HEF, JYO, MTN, W66
2	Denver	DEN	APA, BJC
2	Detroit	DTW	DET, PTK, YIP
2	Hawaii	HNL	OGG
2	Houston	IAH	HOU, MSY, AXH, CXO, DWH, EFD, IWS, LVJ, MSY, SGR
2	Las Vegas Valley	LAS	HND, HND, VGT
2	Memphis	MEM	OLV
2	Minneapolis-St. Paul	MSP	21D, ANE, FCM, LVN, MIC, SGS, STP
2	Northern California	SFO	HWD, LVK, OAK, RNO, SJC, SMF, CCR, PAO, RHV, SQL
2	Orlando	MCO	JAX, ISM, ORL, SFB
2	Phoenix	PHX	TUS, CHD, DVT, EFZ, GEU, IWA, SDL
2	Portland		PDX, HIO
2	Salt Lake City	SLC	
2	Seattle	SEA	BFI, PAE, RNT, S50, S43, TIW
2	South Florida	FLL, MIA	DAB, PBI, RSW, FXE, LNA, OPF, TMB
2	St. Louis		STL, CPS, SUS
2	Tampa	TPA	PIE, SRQ

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Commonly Identified Capabilities in Metroplexes

- Surface Management – departure delays, managing runway use
- Performance-Based Navigation (PBN) procedures
- Time-Based Flow Management (TBFM) – internal to FAA

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Industry Engagement: FAA Planning

Goal: Interact in real time between the air traffic service provider and aircraft operator to enhance NextGen

- Provide valuable insights into FAA planning and industry response
- Acknowledge this is a work-in progress

Recommendation: Access to current version of FAA NextGen Segment Implementation Plan

DISCUSSION

NAC Action

Consider Recommendations on:

Refinement of Integrated Capabilities Definitions and Completion of Capability Mapping Exercises and Transmit to the FAA

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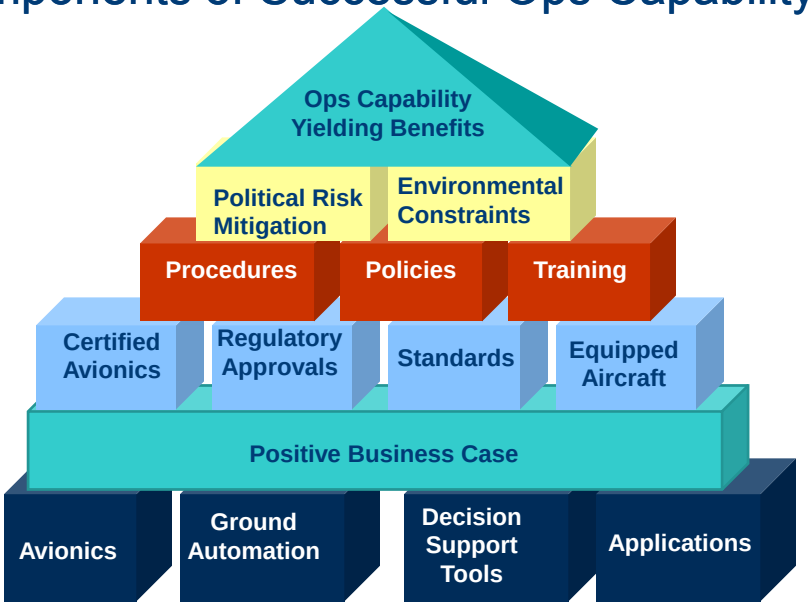
Non-Technical Challenges
A Facilitated Conversation

Background

- NextGen is more than technology
- The devil's in the details
- Path to NextGen is a partnership
  - Must work together to incorporate organizational and institutional changes necessary for success

47

Components of Successful Ops Capability



Goal of Discussion

- Identify non-technical barriers to NextGen
- Identify what each one of can do to overcome barriers
- Hear from all NAC members
- Help shape possible new tasking

- DISCUSSION IS NOT INTENDED TO LEAD TO FEDERAL ADVISORY COMMITTEE RECOMMENDATIONS TODAY!

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Prioritizing Non-Technical Barriers

- Blue – 1
- Yellow – 2
- Red – 3

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FACILITATED DISCUSSION

Richard Wynne
Director – Aviation Policy
Boeing Commercial Airplanes

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BREAK

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Other Business/Anticipated Issues for NAC Consideration and Action

Dave Barger
President & CEO JetBlue Airways

Headquarters U.S. Air Force

Integrity - Service - Excellence

Hosting the 3-4 Oct 12 NAC
Wright-Patterson AFB
Dayton, Ohio

U.S. AIR FORCE

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Adjourn

Next Meeting

Thursday, October 4, 2012

Dayton, OH

BACKUP

Revisiting the Safety Metric

- No mature metrics exist to measure situational awareness
- BCPMWG explored metrics that could serve as indicators of improved situational awareness, e.g.:
  - System Risk Event Rate (SRER)
  - Mandatory Occurrence Report Rate (MORR)
  - Rate of TCAS Resolution Advisories and TAWS alerts
- FAA work in progress includes the development of a NAS safety-risk metric via the System Safety Management Transformation (SSMT) initiative

Fuel Savings Metric Guidance

- Consensus at February NAC discussion was that primary focus should be aircraft movement related fuel savings vs. aircraft or engine technology investments
- NAC member interviewed thought that Fuel metric should be indicative of NextGen though not necessarily solely NextGen
  - Sampling or modeling of NextGen fuel impacts adequate for now; direct measurement can be inspirational goal

Fuel Metric Recommendation

- System Performance Metric: **Ton miles per Gallon**
  - Includes both a payload and distance component
  - Is relevant to passenger, cargo, and military operations
  - Like other high-level metrics, will be affected by multiple factors
- Calculation:
  - Uses a baseline distance between origin & destination
  - Metric captures benefits from reductions in flight path lengths
- Sampling, modeling, or lower level diagnostic metrics will be required to discretely attribute fuel savings from NextGen

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Cost Effectiveness

- Considerations for revision
  - Assessment of original proposal found too many factors were commingled
  - FAA Reauthorization bill calls for tracking of ATC cost effectiveness
  - Recommend additional, lower level metrics to capture user costs
- High-Level Metric: **ATC Cost per IFR Flight Hour**
  - Based on direct variable costs as currently calculated by FAA

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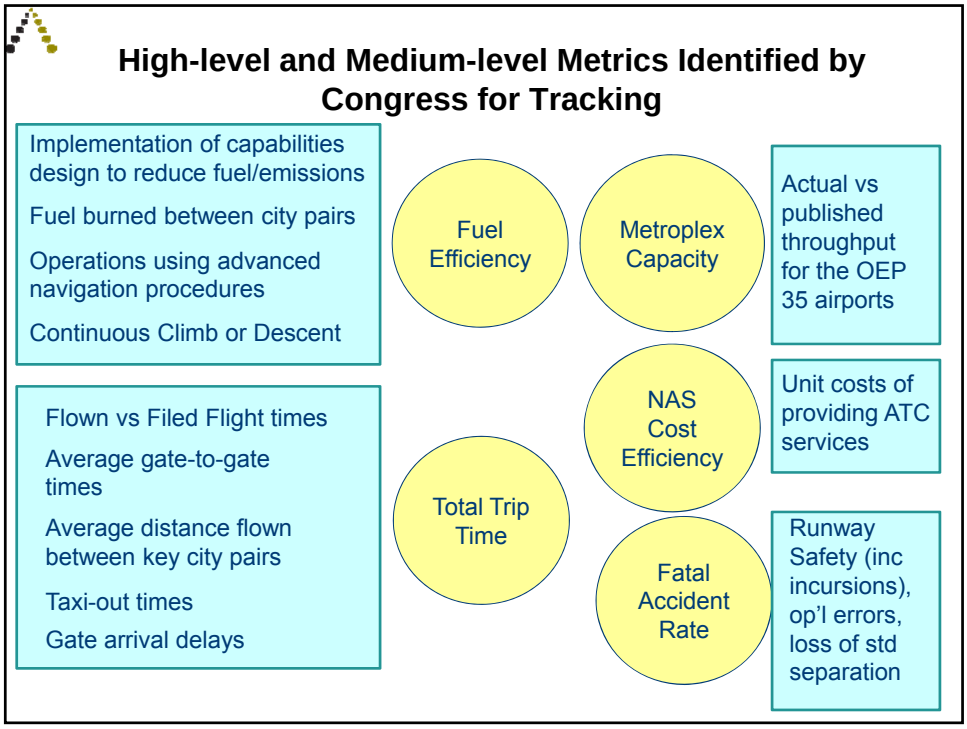
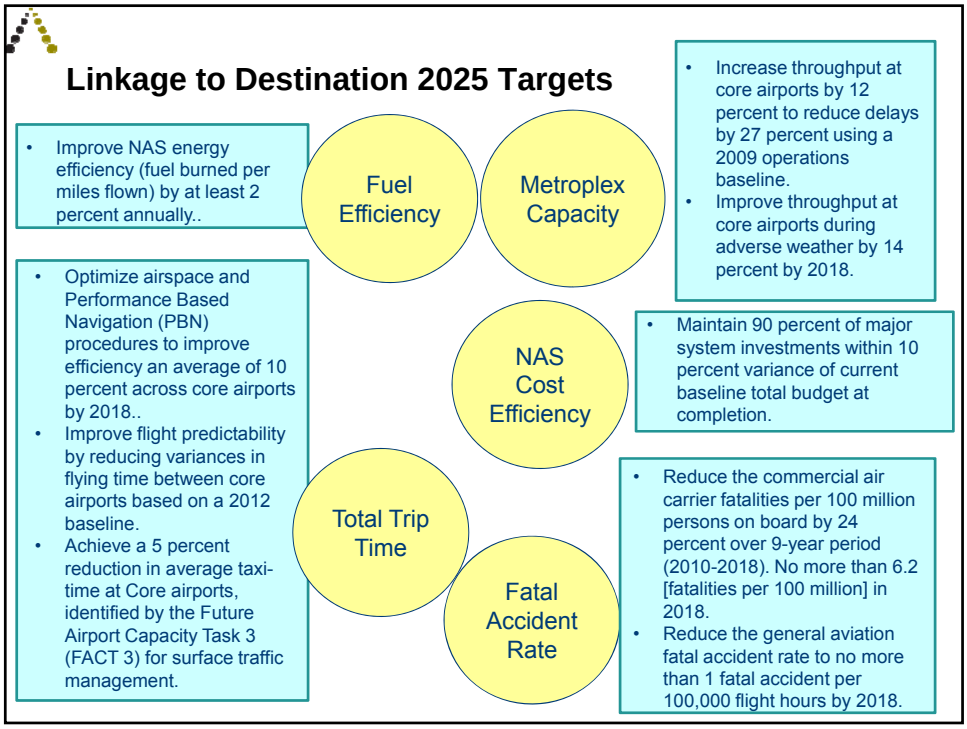
User Fuel Data Sharing Task Status

- Business Aviation
  - WG addressed the NBAA Access Committee 20 April
  - NBAA very interested in further collaboration, sees value in contributing data to inform fuel usage metrics
- Commercial Operators
  - Developing a survey on fuel usage data availability and collection issues
  - Plan to coordinate with A4A on survey goals and scope
  - Plan to distribute survey in May to NAC and NACSC airlines, other interested parties

Back up Slides – Comparing Against Congressional Metrics


High-level and Medium-level Metrics Identified by Congress for Tracking
Implementation of capabilities design to reduce fuel/emissions
Fuel burned between city pairs
Operations using advanced navigation procedures
Continuous Climb or Descent
Fuel Efficiency
Metroplex Capacity
Actual vs published throughput for the OEP 35 airports
NAS Cost Efficiency
Unit costs of providing ATC services
Flown vs Filed Flight times
Average gate-to-gate times
Average distance flown between key city pairs
Taxi-out times
Gate arrival delays
Total Trip Time
Fatal Accident Rate
Runway Safety (inc incursions), op'l errors, loss of std separation


Linkage to Destination 2025 Targets
• Improve NAS energy efficiency (fuel burned per miles flown) by at least 2 percent annually..
Fuel Efficiency
Metroplex Capacity
• Increase throughput at core airports by 12 percent to reduce delays by 27 percent using a 2009 operations baseline.
• Improve throughput at core airports during adverse weather by 14 percent by 2018.
• Optimize airspace and Performance Based Navigation (PBN) procedures to improve efficiency an average of 10 percent across core airports by 2018..
• Improve flight predictability by reducing variances in flying time between core airports based on a 2012 baseline.
• Achieve a 5 percent reduction in average taxi-time at Core airports, identified by the Future Airport Capacity Task 3 (FACT 3) for surface traffic management.
NAS Cost Efficiency
• Maintain 90 percent of major system investments within 10 percent variance of current baseline total budget at completion.
Total Trip Time
Fatal Accident Rate
• Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over 9-year period (2010-2018). No more than 6.2 [fatalities per 100 million] in 2018.
• Reduce the general aviation fatal accident rate to no more than 1 fatal accident per 100,000 flight hours by 2018.

Attachment 3 NAC TORs

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RTCA Paper No. 102-12/NAC-14
May 24, 2012

TERMS OF REFERENCE

NextGen Advisory Committee

Committee Leadership:

Position	Name	Organization	Telephone	Email
Chairman	Dave Barger	JetBlue Airways	(718) 709-2391	dave.barger@jetblue.com
Designated Federal Official	Michael Huerta, FAA Acting Administrator	FAA	(202) 267-3111	michael.huerta@faa.gov
Secretary	Andy Cebula	RTCA	(202) 330-0652	acebula@rtca.org

Background: NextGen offers the United States the unprecedented opportunity to increase the safety, predictability and environmental performance of aviation. The FAA seeks to establish an ongoing venue and process to enable stakeholders to advise the FAA on issues related to near- and mid-term implementation by providing a shared vision of NextGen for domestic and international arenas.

Purpose and Scope: The NextGen Advisory Committee will develop a common understanding of NextGen priorities in the context of overall NextGen capabilities and implementation constraints, with an emphasis on the near-term and mid-term (through 2018). The Committee provides a venue where the FAA can solicit a consensus-based set of recommendations on issues that are critical to the successful implementation of NextGen. It is also a forum to obtain a commitment of resources and/or synchronized planning between government and industry that will support and, when necessary, identify opportunities for industry participation in NextGen implementation. In conducting its work, the Committee will foster a common understanding of success with joint performance objectives and development milestones to be reviewed as implementation progresses. The Committee will primarily focus on implementation issues including prioritization criteria at a national level, joint investment priorities, location and timing of capability implementation. The Committee will provide a venue for the FAA as well as industry partners to report on progress on the implementation of NextGen operational capabilities and associated airspace performance improvements.

The Advisory Committee will include representation from affected user groups, including operators, manufacturers, air traffic management, aviation safety, airports and environmental, from civil and military perspectives, both domestically and internationally.

Tasking:
Within the bounds of the committee's purpose and scope, the FAA will issue specific tasking statements for consideration by the committee. Such tasks will generally reflect an FAA request for aviation community advice and recommendations on a particular operational, implementation, or investment topic. Current year tasks will be listed on the RTCA Committee website.

Envisioned Use of Deliverables: The deliverables of the Committee will document the consensus recommendations of the Committee informed by input from the FAA. These products will facilitate both the FAA and user community procedural planning and investments needed to achieve implementation of components of NextGen and criteria for successful implementation. The FAA will use the deliverables to inform its planning and execution of NextGen.

Representation: The Committee will include members who represent the following stakeholders in alphabetical order:

- Air Traffic Management Automation Providers
- Aircraft Manufacturers
- Airports
- Avionics Manufacturers
- DoD
- Environmental Interest
- Finance
- Labor
- Operators: General Aviation, Air Carriers, Business Aviation
- TSA

FAA (Air Traffic Operations, Aviation Safety, Airports, and Policy and Environment), MITRE and RTCA are non-voting members of the committee. They will take part in the committee's deliberations and provide input to final products; however, they do not represent affected user groups in reaching consensus.

Committee Characteristics: In addition to representing the aviation community segments described above, the NAC will have the following characteristics:

- Executive level membership who can speak for and commit their organizations

- Flexibility to reach out to necessary segments of the aviation community to answer specific requests from the FAA

- Leanness and efficiency, with membership not to exceed a reasonable number, to enable the Committee to have substantive dialog and reach timely consensus

- Appropriate expertise to include operations, policy, technology, labor relations, training and finance

Structure of the Committee (Attachment 1): The NextGen Advisory Committee will conduct its' deliberation on recommendations to be provided to the FAA in meetings that are open to the public. To meet the criteria described above, the Committee structure will be two-tiered with subordinate Work Groups established to develop recommendations and other documents for the Committee.

At the top level is the NextGen Advisory Committee comprised of top-level executives representing affected members of the community. Adjunct to the Advisory Committee is a Working Subcommittee (NAC Subcommittee) comprised of members with broad knowledge and expertise related to the implementation of NextGen. Some meetings of the NACSC will be open to the public to provide an early opportunity to identify potential concerns associated with draft recommendations.

In an effort to maintain an appropriate and manageable size, the number of NACSC members will be limited. The NACSC will utilize a rotating membership that will maximize the opportunity of participation among interested organizations. Interested parties should make their interest in serving on the Working Subcommittee known to the Designated Federal Official, the Chairman of NAC and the RTCA President.

The Advisory Committee may establish Work Groups (WG) and/or Task Groups (TG) to accomplish specific tasks as described above. WG products—including recommendations, where appropriate—are presented to the NACSC for review and deliberation, then forwarded to the Advisory Committee. Members of Work Groups and Task Groups will be appointed by the NACSC Co-Chairs in consultation with the RTCA President and NAC Chairman and DFO. Work Groups and Task Groups may not be open to the public. For each work group that is established, the Advisory Committee will approve Terms of Reference defining the objective, scope, membership, specific tasks and deliverables with a schedule. Unlike the Advisory Committee and NACSC, members of the Work Groups and Task Groups do not represent a particular affected entity and are selected for their expertise in the subject matter rather than their affiliation. Work Groups develop draft recommendations for consideration by the Working Subcommittee. Annually, Terms of Reference for Work Groups and Task Groups must be reviewed and updated as appropriate. Work Groups and Task Groups will disband upon delivery of their recommendations.

- **NextGen Advisory Committee**
    - Overall direction of Committee
    - Review and approve recommendations to FAA
    - Field requests from FAA
    - Review and approve creation of Work Groups, as appropriate

- Meet three times per year in Plenary (open to public)
- Direct work of NACSC

- **NAC Subcommittee**
  - Staff to Advisory Committee
  - Develop TORs, review work of WGs and TGs, present findings to NAC
  - Meet bi-monthly or as needed (not all open to public)
  - Forward recommendations and other deliverables to NAC for consideration

- **NAC Work Groups and Task Groups**
  - Created to address specific tasking
  - May be short-term or standing activities

Operating Norms: Advisory Committee members are appointed for a two-year term. Committee members may serve multiple terms. After the initial appointments, these will be made by the RTCA Policy Board in coordination with FAA. The RTCA President, FAA Air Traffic Organization Chief Operating Officer, and the Associate Administrator for Aviation Safety will review NextGen Advisory Committee membership yearly to ensure balanced representation that equitably represents, to the extent feasible, the aviation community. Membership is based on the ability to authoritatively and effectively represent the interests of an organization or constituency. Members will be expected to work toward consensus to the greatest extent possible.

The Advisory Committee will hold at least three plenary meetings per year (open to the public), as well as preparatory one-hour telecons (not open to the public) to ensure continuity and good preparation for public, decision-making meetings.

The NACSC will, at a minimum, meet every other month, with some of the meetings open to the public. All recommendations of the NACSC must be vetted through the Advisory Committee and forwarded to the FAA as appropriate. Recommendations will not be transmitted directly from the NACSC to the FAA.

Work Groups and Task Groups will meet as dictated by their Terms of Reference. As appropriate, Work Groups or Task Groups can reach out to individual experts and other outside groups providing advice to the FAA on NextGen implementation issues to facilitate the development of draft recommendations. Work Group and Task Group meetings are not open to the public.

Standard Advisory Committee Meeting Agenda: Proposed agenda items with approximate duration are to be submitted to the chair at least 45 days prior to the scheduled date of a meeting. The Chair, in consultation with the DFO, shall refine the scheduled duration of the meeting and promulgate the meeting agenda to the Committee members.

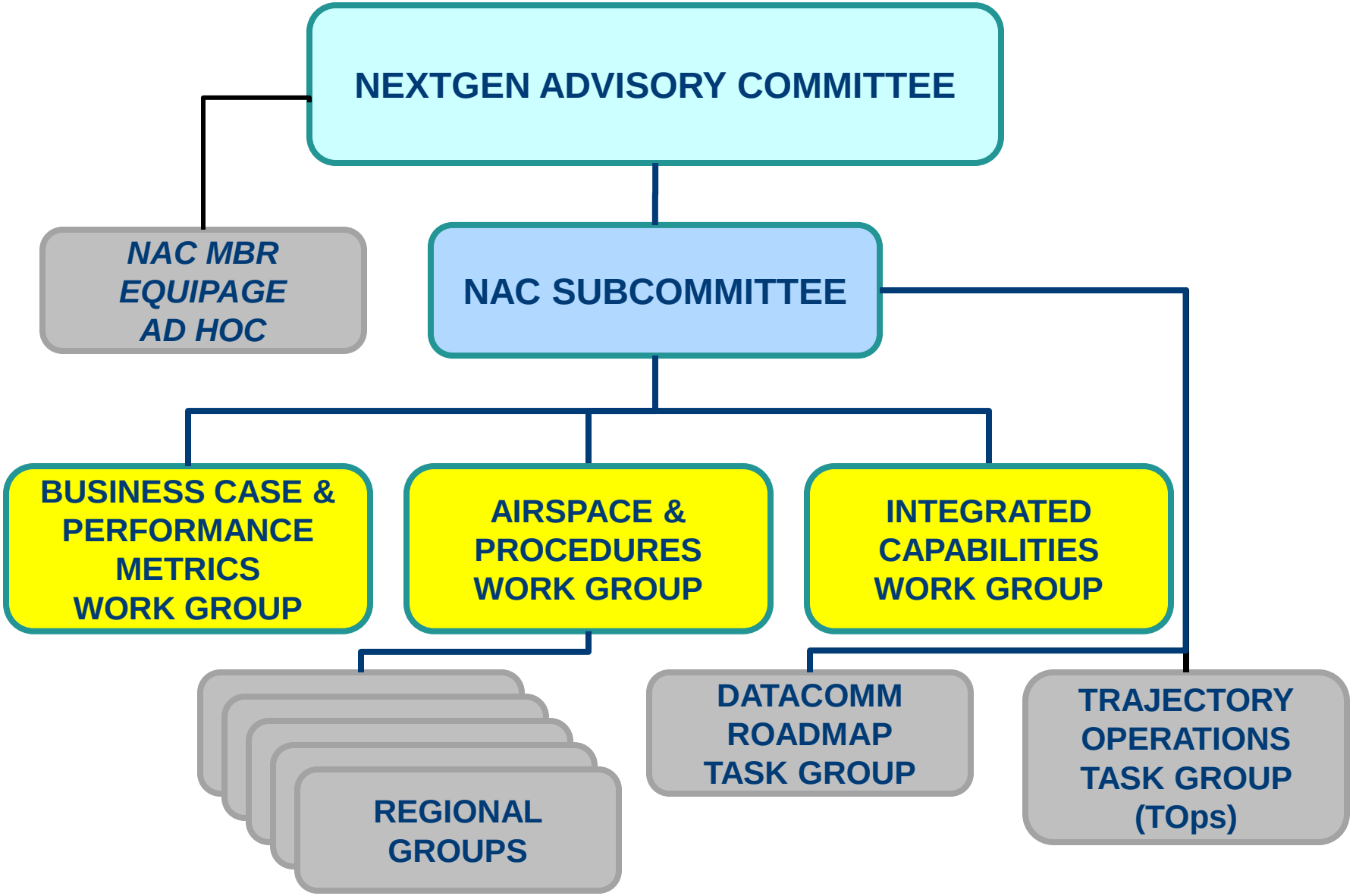
Conduct of the Meeting: Advisory Committee members will receive all information needed to prepare for the meeting (e.g., Work Group progress reports; Work Group products and

recommendations for Committee action) at least fifteen (15) calendar days prior to the meeting.

With the exception of routine administrative items, discussions of agenda items shall, in general, be supported by written reports or formal briefing material as appropriate.

Products and recommendations submitted for Advisory Committee action will be accompanied by a one-page Action Paper prepared by the NACSC.

NAC Structure



Remarks of NAC Chairman Dave Barger

May 24, 2012

Good Morning.

I am Dave Barger and honored to chair this FAA NextGen Advisory Committee and welcome each of you to this 6th meeting of our full committee.

Welcome to the magnificent campus of Boeing – a true giant in aviation and space technology and a company that epitomizes American industrial greatness all around the globe. Our host this morning, NAC member Sherry Carbary, Vice President Flight Services Commercial Aviation Services, Boeing Commercial Airplanes, and her entire team here at Boeing Renton, have been so gracious as they welcomed us on a tour yesterday and are hosting us here today.

The NAC has been assembled and accomplished it work thus far by providing thoughtful answers to the FAA's questions – what we call Taskings. We have addressed aircraft equipage, incentives, Metroplex capabilities and prioritization, DataComm, performance Metrics, business case analysis and issues associated with airspace and procedures. As we reflect on our work and look ahead to helping the FAA with future Taskings, I believe we are at an inflexion point.

Commitment

The aviation community, from General Aviation to Commercial Airlines to the Military, all are committed to see safer and far more efficient use of the skies – as managed by the consummate safety professionals, our air traffic controllers. We must ask ourselves, as we each partner with the FAA from our own vantage point of disparate users of the National Air System, how committed are we to "getting there" from here? Are we truly committed to seeing progress continue, quicker, even if by definition most of us cannot be the immediate beneficiaries of it first? In anything, *only one* can be first, right?

This is a fundamental question we all must wrestle with. Can each of us and those we represent unify behind an FAA plan to get us from here to there, safely, knowing our commitment may not equate to immediate benefits?

Even so, can we stay committed if the FAA continues at the current pace in delivering meaningful benefits? I look forward to hearing your views on this throughout the course of today.

Policies

Our work of replying to the FAA's Taskings has brought about rich debate and often consensus. But is this process, receiving Taskings and providing thoughtful feedback, effectuating new and enhanced policies to get us closer to our shared goal? Are today's policy priorities pushing forward the right policies? Are they moving quickly enough? How can we as a NAC remain vigilant not only in responding to the FAA but in using our collective "commitment" to ensure the right policies are advancing first, fastest and getting us closer to the advancements in delay reduction and fuel burn that we all seek?

Implementation

Is the work of the NAC enabling a more appropriate use of scarce FAA resources to foster better, faster and more efficient implementation where it matters most? As NAC members, is our goal solely to reply to Taskings but to also consider this more fundamental question?

Certification

Is the FAA using its position as the world's pre-eminent aviation safety regulator to unnecessarily delay certification of equipment, be it the cockpit or on the ground? Is the pursuit of perfection slowing down the acceptance of the perfectly good? Repeatedly, voices from different sectors in the aviation community point to approval of processes and certification of equipment as reasons for more delay than ought to be tolerated. Is this something we can help the FAA address and in order to bring about improvements in the certification process?

Best Capable Best Served

I come back to the concept of Commitment which I just alluded to. How deep is the commitment of every stakeholder – how deep is our own commitment? Are we truly ready to let go of our own parochial interests and let the best capable become the best served? If so, will the free marketplace work and incentivize all who are not "first", the vast majority, to want to eagerly become best capable or will the less capable continue to slow down and hinder the implementation of *best capable best served*?

Barriers

Each of these difficult set of choices and philosophies will determine whether barriers internal at the FAA and external across the aviation landscape speed up or slow down the work needed to get us to NextGen. We have discussed and agreed that today's NextGen is not the end game but rather, with technological innovation and evolution, only today's target, constantly moving right to the Next NextGen target.

As Chairman, I choose not to focus on the next version and the one after that, but rather only focus on achieving consensus to remove today's barriers and get us where we want to be. These first barriers we are wrestling with, these policy changes, equipage issues, prioritization choices are truly the hardest ones. Like running an airline, an airport, a city or manufacturer, this is not for the faint of heart.

I remain as optimistic as ever that we will continue to provide beneficial wisdom and advice to the FAA. I remain very optimistic that the FAA, under Michael's leadership and with his current leadership team, recognizing how high the stakes are, for safety, the environment and our economic health as a nation, will be open minded as they receive our advice and make the very difficult choices to advance the ball down the field.

Thank you.

I want to acknowledge each of you and your selfless dedication to our work and deliberations. While some of you are new to our group, most are charter members and have really given of yourselves and of your organizations – through others working on the subcommittee and task groups. My tenure as Chairman is almost up, but my passion and excitement for this group, its vital work and the NextGen initiative is at its peak.

So please accept my heartfelt “thanks” for all of your efforts to date and yet to come.

FINAL **05/23/2012 2:45 PM**

NextGen Advisory Committee
Michael Huerta
Seattle, WA
May 24, 2012

Reviewed by: Brie Sachse, Mary Lou Pickel, Vicki Cox, Jessica Sypniewski, Gisele Mohler, Chris Rocheleau, Peggy Gilligan, John Hickey, Mary Bisset, Barbara Cassidy, Carl Burleson, Bob Schramm, Peter Toman, Laura Brown, David Weingart, Victoria Wei, Beth White, Chris Metts, David Grizzle, Christa Fornarotto, Julie Oettinger, Shirley Miller, Roderick D. Hall, Molly Harris, Marc Warren

Thank you, Dave (*Barger*), for that kind introduction. It's good to see everyone again. We are at an important juncture in our NextGen path, and I am glad to have this time together today to detail where we are, and where we are going.

The future of the national airspace system depends on NextGen. We all know the FAA cannot do it flying solo. Our collaboration is paramount.

Organizational Update

We have a lot of work to do, and I remain squarely focused on our main mission: running the largest and safest air traffic control system in the world, and ensuring the safety of the traveling public.

To do this, I have asked my senior leadership to focus on three main areas this year as we face the challenges ahead:

- Number one, is making the safest aviation system in the world even safer and smarter, and I put the emphasis on *smarter*.
- Number two, is accelerating the benefits of new technology -- and here I have really emphasized *benefits* for the public now.
- And number three, is making sure that we empower our employees to embrace innovation and to work efficiently.

Since we were last together, the President has nominated me to serve as Administrator of this great agency. I am very honored, and thankful for the opportunity.

<u>Reauthorization</u>

As you are aware, Congress passed, and the President has signed, a four-year reauthorization for the FAA that puts an end to four-and-a-half years of stop-gap extensions.

It brings us through fiscal year 2015. The reauthorization provides the FAA the continuity and focus for our critical tasks – and this, of course, includes the implementation of NextGen.

With reauthorization come many new requirements, from Unmanned Aircraft Systems to NextGen procedures and equipage. Other requirements are nearly completed or are well underway. The new authorization also includes 23 new rulemakings on safety and other issues.

We are all aware of the challenging budget environment we are now facing. Authorized funding levels remain flat over the next four years. In line with the President's direction on efficient spending, we are taking a critical look at what we do, and identifying ways to do it more efficiently.

The reauthorization emphasizes the implementation of new Performance Based Navigation procedures, and mandates development of these procedures at America's 35 busiest airports by 2015. We are already working on this at several airports as part of our Metroplex initiative.

There are also new deadlines for ADS-B In, and additional performance metrics and streamlining of environmental processes that support NextGen.

As I mentioned, the legislation also addresses Unmanned Aircraft. These systems are cutting edge technology, and we are committed to safely integrating them into our national airspace.

There is a lot of interest in unmanned aircraft, and a lot of work remains to be done. We've established the FAA UAS Integration Office to lead that work, and we're identifying six test ranges that will support the integration of Unmanned Aircraft. And, we continue working on a rule for Small Unmanned Aircraft Systems.

NextGen Equipage

Let me now say a few words about NextGen equipage incentives, which are of particular interest here at the NAC. While the reauthorization requires the FAA to produce a plan for providing operational incentives and an equipage incentive program, a funding source was not identified. The idea, however, is to encourage a public-private

partnership. Work for both types of incentives is underway.

At the FAA, we've decided that we need to focus on specific, localized opportunities to test operational incentives. Earlier this year, we asked for the aviation community's technical feedback on 10 varying options for operational incentives which would be implemented in the next two years. The FAA appreciates the honest feedback on these proposals – it helps us to define the next steps.

For financial incentives, the goal for an equipage program would be to accelerate achievement of the benefits of the operation of NextGen in our national airspace. And, as a part of our due diligence, we've scheduled a public meeting for May 30 to facilitate a dialogue with industry. We are also consulting with other federal agencies that have implemented similar partnerships to understand what options may exist for establishing an effective program.

Metroplexes

Let me turn now to Metroplexes. One way to bring NextGen benefits right now to many stakeholders, using

existing equipment, is the Metroplex initiative. When we met last in February, you provided advice on operational improvements to Tier 1 metroplexes. We are working within the agency to assess these recommendations, and we expect to respond in October. This will give us time to fully absorb and study the recommendations.

We've already had useful discussions with the Integrated Capabilities Work Group. This has helped us get to a better understanding of what NextGen can accomplish. Today, we'll discuss the Tier 2 locations.

DataComm

While the Metroplex initiative is about creating more direct, fuel efficient routes and improving how we use congested airspace, DataComm is about improving the way we communicate. We are committed to moving forward with DataComm, and we continue to make progress in finalizing the scope and planning for its implementation.

In fact, we recently selected three sites for testing Data Comm. These are: Memphis with FedEx, Newark with United, and Atlanta with Delta. This collaboration between

the FAA and the airlines is the kind of public–private partnership that is crucial to moving us forward.

NextGen Performance Snapshots

We are implementing a lot of changes, and it's important to keep track of how these changes help improve our airspace. The NextGen Performance Snapshots are a real NAC success story. In March, we launched the performance snapshots web page based on metrics recommended by the NAC, and approved by FAA's NextGen Management Board. The performance snapshots provide a "rear-view mirror" look at post-implementation performance at specific locations. It also provides descriptions of some major operational successes. Currently, the snapshots focus on 21 metroplexes, as well as Core 30 airports and airspaces.

The metrics are based on ICAO key performance areas. We'll be reporting on metrics focused on capacity, efficiency, safety, and the environment. Later this year, we'll add predictability, efficiency and access.

I'd like to also address two areas that are always raised during discussion on the performance snapshots: targets and causality. First, the snapshots will incorporate targets in later releases.

The second is causality. We all know that it is difficult to determine exact correlation between cause and effect. Both government and industry play crucial roles in how NextGen operates. The full benefits of NextGen will only come if we both deliver on our respective tasks. The performance snapshots will help both government and industry assess the effects of NextGen implementation as we perform our individual yet collective roles. And, as you heard earlier this morning, Greener Skies is demonstrating what is possible when everyone plays their part.

While deciding what is most important to measure is a challenge in and of itself, we can't stop there. The perfect metric won't help unless reliable and complete data are available.

We each have pieces of the puzzle on why things work, or don't work, for that matter. We all need one another – we ask you to continue to help us identify and

obtain the necessary data to move forward. Let's keep this issue of data in mind today as we consider both metrics and other non-technical barriers to implementation.

NextGen Implementation Plan

Let me also mention that we have copies of the 2012 edition of the NextGen Implementation Plan for you. Please take a look. I'm hoping you'll be as pleased as I am to find that the discussions and the work we've done are captured here in this edition of the plan.

Closing

I'd like to close by acknowledging all of the staff work within our individual organizations and at the NAC Sub-Committee that helps prepare us to grapple with the important higher-level policy discussions.

I am confident that we'll leave here today with a greater collective understanding of where we are going, and how we can work together to remove barriers in both government and industry.

In fact, I look forward to the facilitated discussions that can help provide overarching principles on two key areas

for moving forward with NextGen, and also help shape any future undertakings we may consider. In the "Best Equipped, Best Served" area, it would be particularly beneficial to hear your feedback on the position that benefits are local, and it is in conducting geographic trials or pilot programs that will help us quantify what NextGen is delivering as we continue to roll it out.

In the "Non-Technical Barriers" discussion, I'd be particularly interested in what this group feels are the cultural barriers to overcoming the implementation of NextGen, and what can we do with that knowledge.

Again, NextGen will not happen without partnership and shared commitments between government and industry. I know that by continuing to work together, we can make additional progress this year.

Thank you again for attending today and now, let's turn to the agenda.

RTCA

THE GOLD STANDARD FOR AVIATION SINCE 1935

Approved by the NAC May 24, 2012
Interim Report
Measuring NextGen Performance

A Report of the NextGen Advisory Committee in Response to Tasking from The Federal Aviation Administration

May 2012

Contents

Background/Introduction

The NextGen Advisory Committee's (NAC) Business Case and Performance Metrics Work Group (BCPMWG) is responsible for developing metrics to measure the operational impact of NextGen initiatives. In 2011, the NAC provided the FAA with recommendations for a set of high- and medium-level metrics to address operational changes affecting capacity, efficiency, predictability, and access. These metrics have been accepted by the Federal Aviation Administration, which is implementing a web-based performance reporting capability building on these recommendations. In September 2011, the NAC also requested that the BCPMWG continue its work by refining the metrics recommendation to identify a smaller number of outcome-based metrics (approximately five) that capture an overall status of NextGen implementation.

At its meeting in February 2012, the NAC considered six high-level categories proposed by the BCPMWG. These included: Safety, Metroplex Capacity, Total Trip Time, Fuel Efficiency, NAS Cost Effectiveness, and Access. While these categories were endorsed by the NAC, the BCPMWG was requested to:

1. Identify a Safety metric more directly impacted by NextGen,
2. Refine the Fuel Efficiency metric
3. Develop an Access metric

This report responds to the NAC's request by refining the high-level metrics, identifying examples of NextGen initiatives that can impact the metrics, and providing an update on the development of a high-level access metric.

Executive Summary

To convey the impacts of NextGen, a small, selected set of metrics that are typically understandable by a broad audience are likely most meaningful to the public for communication and messaging about NextGen and its contribution to national policy goals, such as those captured in the FAA's Destination 2025 document (FAA, 2011).

The following high-level outcome metrics are proposed for capturing key NextGen impacts:

- Change in Airborne/Ground Separation Alert Rate
- Mean Trip Time

- Metroplex Peak Allowable Throughput
- Ton-Miles/Gallon
- ATC Cost/IFR Flight Hour

These metrics reflect likely impacts with NextGen implementation and contribute to national objectives, as illustrated in the table below:

National System Objectives	**NextGen High-Level Outcome Metric**
Improved Situational Awareness	Change in Airborne/Ground Separation Alert Rate*(Provisional)*
Increased Efficiency	Mean trip time
Increased Capacity	Metroplex peak allowable throughput
Increased Fuel Efficiency	Ton-miles/gallon
FAA Cost Efficiency	ATC Cost per IFR hour
Improved Access to NAS	*(In development)*

Summary of Key Findings

Since February 2012 the BCPMWG has revisited a subset of the high-level metrics for which the NAC expressed interest in further work. This paper summarizes the group's findings since that meeting.

Metrics exist on a spectrum that can range from broad indicators of general trends (lacking detail on the underlying drivers of change), to detailed diagnostic or accountability metrics directly correlated to a NextGen initiative. Different metrics and levels of metrics will be desired and suitable to different users and audiences depending on their own needs and goals. Note that no high-level metric can isolate NextGen impacts discretely – as high-level metrics by definition will be indicative of the NAS as a system with all the direct and indirect influencing factors therein.

With the NAC interest in a single-digit number of metrics, BCPMWG focused current work only on **high-level, outcome based metrics** which NextGen is meant to influence but will typically not be the sole driver for observed trends (whether positive or negative). Lower-level metrics – such as diagnostic metrics that can directly identify the impacts of NextGen initiatives – will require significant work to analyze and tailor to specific operational environments, possibly making advance identification of the appropriate metrics impractical. Instead, an iterative approach may be required as FAA and industry partners jointly analyze capabilities to refine diagnostic metrics in the post-implementation phase.

Thus, the BCPMWG concludes that FAA should identify, for initiatives listed in the NextGen Implementation Plan (NGIP), the anticipated high- and medium-level Key Performance Indicators (KPIs) that will be directly affected by those initiatives and report to the community as insights are gained regarding the identification of diagnostic metrics that can discretely measure the impacts of individual NextGen capabilities.

Key Findings: High-Level Metric Definitions

Safety-Improved Situational Awareness

The primary goals of NextGen are to enhance the safety and reliability of air transportation, improve efficiency in the NAS, and enable sustainable aviation growth. Safety is paramount in all aspects of the air transportation system and remains the driving force in all NextGen programs and decisions. Ultimately, the desired outcome for safety is the reduction in fatalities, and the FAA's Destination 2025 goals reflect this. Therefore, it is important to identify existing metric(s) that will help determine the effects on safety related to NextGen.

Strategies to reduce accidents and fatalities generally target the highest magnitude safety risks in parallel with data mining to better understand emerging risks. Because of this iterative nature, the focus for safety metrics will change over time as contributors to safety risk are identified and mitigated.

The FAA is working with a number of established venues to define high-, medium- and diagnostic-level metrics for safety. These venues include the Commercial Aviation Safety Team (CAST), the General Aviation Joint Safety Council (GAJSC), and the Aviation Safety Information Analysis and Sharing (ASIAS) Executive Board. BCPMWG defers to these groups for the definition of safety metrics, including those that will, in the future, isolate NextGen impacts.

The recommended provisional metric to reflect NextGen impacts on safety and situational awareness is the **Change in Airborne/Ground Separation Alert Rate**, reported at a national level aggregated across the NAS Core airports and en route operations. This metric would

capture the relative change, year-on-year, in the normalized rate of TCAS Resolution Advisories[1] (RAs) and TAWS alerts[2]. The recommended baseline year is 2011; changes in the normalized rate would be reported year-on-year, beginning in 2012. TCAS RAs and TAWS alerts are currently tracked by the FAA's ASIAS program. The normalized rate of TCAS RAs and TAWS alerts should be computed by dividing the total number of RAs and alerts detected for flights into or out of the NAS core airports by the total number of operations performed at those airports over a year.

> *For example, if in 2012 there is a 10% increase in operations and a 10% increase in the number of alerts, the normalized rate would be the same, and a zero percent change would be reported for 2012 in comparison to 2011. If in 2013 the number of operations stays the same but the number of alerts is reduced by 10%, the normalized rate would be 10% less in 2013 versus 2012.*

This metric is designated as a provisional metric because additional work is needed to refine data sources and the exact scope of measurement. The metric should capture both direct improvements in commercial operations (the primary users of TCAS and TAWS) and indirect improvements in general aviation situational awareness through the reduction of GA errors that result in TCAS alerts. By calculating this metric based on operations into or out of the NAS core airports, there will be a relatively direct link between year-on-year safety performance and changes initiated as a result of NextGen policies, procedures, and technology deployments related to those airports.

Note that NextGen will not affect every type of accident in the NAS, and that the occurrence rates of some accident types (unrelated to NextGen) could vary independently with NextGen implementation. It is important, therefore, to develop a baseline risk number that tracks the relevant accident risk for NextGen changes, and provides a reasonable basis to assess the

[1]TCAS Resolution Advisory (RA): A display indication given to the pilot by the traffic alert and collision avoidance system (TCAS) recommending a maneuver to increase vertical separation relative to intruding aircraft. The resolution advisories include positive, negative, and vertical speed limit advisors. A resolution advisory can be either preventive or corrective. (From the McGraw-Hill Dictionary of Aviation)

[2]TAWS Alert: The Terrain Awareness and Warning System uses a computer-based system that provides the flight crew with visual and acoustic alerts about the unintended approach to the terrain, taking into account the flight stage, flight crew response time, and aircraft speed. There are two types of TAWS—Class A and Class B. Class A equipment is for installations on large aircraft; it displays FLTA (forward-looking terrain alert), premature descent, excessive closure rate to terrain, flight into terrain when not in landing configuration, excessive downward deviation from an ILS (instrument landing system) glide slope, excessive rate of descent, and negative climb rate or altitude loss after takeoff alerts. It also displays a voice callout about the altitude above the terrain, terrain display, terrain/airport database, and a voice callout about the passing of a set altitude. Class B equipment does not require a display. The Class B system is required to provide FLTA, premature descent, excessive rate of descent, and negative climb rate or altitude loss after takeoff alerts and international voice callouts. The latter version is used in smaller aircraft and helicopters and does not require interfacing with the radio altimeter. (From the McGraw-Hill Dictionary of Aviation)

impact of the NextGen program. Development of metrics providing insights into risk is in progress as part of the FAA's System Safety Management Transformation (SSMT) initiative. BCPMWG will coordinate with the safety community on the status of developing a NAS-level risk assessment metric.

Increased Efficiency

Increased efficiency has consistently been a national system objective and the importance of improving efficiency and predictability while reducing delays is captured in the FAA's Destination 2025 document. Performance-Based Navigation (PBN), in particular, is identified as a key enabling technology for efficiency.

The recommended high-level metric is **Mean Trip Time**, which is defined as the actual end-to-end time between pushback and destination gate arrival.

For commercial flights, the flight data would be representative of the top 100 city pairs. For general aviation (GA) flights, total trip time data would be normalized to transit between (selected) Metroplex pairs that will be defined in future work.

This metric will be affected by many of the planned operational improvements of NextGen, including the RNAV SIDs and STARS and Optimized Profile Descents, among other PBN and airspace improvements, expected to result from the Optimization of Airspace and Procedures in the Metroplex (OAPM) Program, ADS-B (e.g., in the Gulf of Mexico), Surface Traffic Management Initiatives, ATC Digital Communications, Time-Based Flow Management (TBFM), and closely-spaced parallel runway operations (CSPO). For example, PBN procedures are expected to reduce flight times in the en-route and terminal airspace, while surface traffic management initiatives are expected to reduce aircraft taxiing times.

Increased Capacity

The problem of air traffic congestion and resulting limitations to economic growth is most apparent in large Metroplexes. Conflicting traffic from adjacent airports, miles-in-trail (MIT) restrictions, limited departure headings, and other airspace constraints limit the ability to maximize both current and future airfield and airspace capacity. Overall community attention has been on addressing Metroplex capacity (as well as efficiency) both in terms of overall priorities as well as the focus for NextGen.

The recommended metric for Metroplex Capacity is **Allowable Metroplex Throughput** as measured by the aggregate AARs and ADRs[3] during peak hours per Metroplex, measured across a set of peak hours to be determined for each Metroplex. The Metroplex peak capacity metric would be reported for each of the Metroplexes in the NGIP.

The concept of capacity as used in this metric is a measure of maximum throughput capability. This concept is why the Metroplex level of detail is recommended for this metric—one can estimate the maximum throughput capability of a Metroplex as the sum of the maximum throughput capabilities of the individual airports in that Metroplex. The other important dimension of this metric is "time"—it is most meaningfully measured or estimated for relatively short time intervals such as an hour or a 15-minute period.

This metric will be affected by many of the planned operational improvements of NextGen, including OAPM, airport deconfliction, PBN (for additional paths), reduced aircraft separation requirements (via ADS-B Surveillance, ADS-B In), and CSPOs. For example, PBN and CSPO are expected to increase runway throughput in adverse weather conditions by increasing the number of simultaneous movements that are possible. ADS-B In is expected to enable a reduction of certain aircraft separation requirements in adverse weather conditions. Integrated surface/arrival/departure operations are expected to increase overall throughput at an airport.

Increased Fuel Efficiency

NextGen is expected to improve aviation fuel efficiency via shorter flight paths and times, reduced delays, more optimum altitude profiles, and better flight planning predictability which reduces the need to carry reserve or contingency fuel. For the NAC we focus on operational (surface and air) fuel efficiency. The FAA has programs which assist manufacturers in developing more fuel efficient aircraft and engines – but we consider those beyond our scope.

The recommended high-level metric is **Ton Miles Per Gallon**, which indicates the fuel efficiency associated with carrying passengers, baggage, or cargo (aka, payload) from the beginning of taxi to engine shutdown (eg, from departure to the arrival gate) for monitored flights within the NAS. The miles represented in the numerator are the baseline distance between the origin and destination rather than actual track miles flown. Thus, improvements in actual flight paths will positively influence this metric.

[3] Airport Arrival Rates (AARs) and Airport Departure Rates (ADRs) are set by the FAA to reflect the maximum number of landings and takeoffs that can be handled under a given set of operating conditions including visibility, runway use, winds, facility and procedure availability, etc. AARs and ADRs are established on both an hourly and 15-minute basis. Data on existing AARs, ADRs, and (AARs+ADRs) are available from the FAA's ASPM database but only for the 22 reporting carriers operating to and from the 77 ASPM airports. Further work is required to collect such data for other flights in the NAS.

If NextGen improvements as outlined above are realized, the amount of fuel required to carry one ton one mile will decrease. However, as is the case with all high-level, outcome metrics, the proportion of fuel savings attributable to NextGen will not be easily discernible at this level of aggregation from among other factors, including aircraft and engine technological advancements. However, it is an important starting point to improve the understanding of system trends.

The data collection required to discretely identify fuel savings from NextGen procedures is sizable and the processes and procedures to collect this detailed data may be a longer-term aspiration rather than a near-term reality. Therefore, alternatives for modeling or estimating NextGen fuel savings should be explored in parallel.

FAA Cost Efficiency

One of the ways that NextGen can contribute to enhancing the economic viability of the air transportation system is to enable FAA to use its air traffic management resources more productively. Businesses typically use metrics that measure the productivity of their resources by looking at costs-per-output or output-per-unit-of-input. The Civil Air Navigation Services Organization (CANSO) includes IFR flight hours per controller and costs per flight hour in its system performance metric framework. Eurocontrol has also explored measures for evaluating the efficiency of providing air traffic services. Similarly, the FAA – which is already one of the more cost-effective ANSPs world-wide –seeks to improve long-term unit cost efficiency while recognizing that absolute costs could increase due to volume of traffic or short-term support of multiple systems during technological transitions.

The desired high-level metric for NAS Cost Efficiency is **ATC Cost per IFR Flight Hour**. IFR flight hours captures the number of hours that aircraft are under positive air traffic control and being provided direct service (output) by the FAA. Costs should ideally include only the variable costs to the ATO of controlling these flights.[4] Fixed costs could potentially be included as an amortized, per-period "cost of capital", but there are difficulties in calculating this number accurately. On the other hand, a unit cost measure based solely on direct variable costs is

[4]A unit cost metric could also theoretically be expanded to include the operating costs to system users, but we recommend against this. The most direct user cost component that is likely to be impacted by NextGen is fuel cost, but the dollar cost of fuel is highly volatile, and would be a poor indicator of NextGen performance. A more consistent measure of impact on operators is fuel usage, but this is already being proposed as a separate metric. Likewise, crew costs can be impacted by time savings, but time savings is also proposed as its own metric. The remaining aircraft direct and indirect operating costs are not likely to be impacted by NextGen, and including them would only serve to dilute the information provided by the metric.

already produced by the FAA; the BCPMWG recommends that it be used as the preferred high-level cost metric.

Recognizing that the user community may have additional needs for cost-related metrics, we suggest that additional metrics could be developed at a lower level, measuring such things as the level of user investment in avionics, or changes to the reported non-fuel operating costs that commercial operators must currently submit via DOT Form 41. These lower-level metrics would require more study, however, and we recommend that the FAA move forward with using the Direct Variable ATC cost per IFR flight hour as the primary measure of changes in FAA's NAS costs.

Improved Access to the NAS

Discussions about "Access" or "Access and Equity" can be complicated when participants approach the topic with differing definitions of these terms. BCPMWG uses these definitions to improve the clarity and quality of discussions about this topic:

> **Access:** A non-judgmental, objective measure of the level of utilization achieved by a set of users authorized to use a NAS asset or service (airspace, airport, approach, runway, etc).
>
> **Equity:** A measure of consistency and transparency in the application of Access policies according to the agreed upon rules for service.

Access for a set of users is increased, for example, when runway throughput is improved during Instrument Meteorological Conditions (IMC) to more closely match VMC levels (e.g., with the addition of LPV approaches that enable access to runway ends not served with an ILS). Access is also increased when a broader range of user capabilities can be accommodated within the NAS.

The BCPMWG is currently exploring the development of access metrics for the Metroplex environment (see Appendix 1). Like many of the other high level metrics identified, measurement at a Metroplex level provides a microcosm of how users are able to access the NAS. The Metroplex environment encompasses the diversity and operational needs of NAS operators and often has limits on capacity and efficiency that could see improvements brought about through the introduction of NextGen initiatives, such as the OAPM process, UAS integration, and airspace de-confliction.

Members of the Business Case and Performance Metrics WG

These recommendations were developed by the Business Case and Performance Metrics Work Group. Contributing members are: Chris Benich (Honeywell), Joe Bertapelle (JetBlue), Alex Burnett (UAL), Joe Burns (UAL), Carlos Cirilo (IATA), Forrest Colliver (MITRE), Jim Crites (Dallas Ft Worth International Airport), Tony Diana (FAA), Bill Dunlay (LeighFisher), Rob Eagles (IATA), Ken Elliott (Jetcraft Corp), Dan Elwell (AIA), Stephanie Fraser (Metron), Steve Fulton (GE Aviatin), Peggy Gervasi (FAA), Pamela Gomez (FAA), Pascal Joly (Airbus), Debby Kirkman (MITRE), Matt Klein (FAA), Mike Lewis (Jeppesen), Jim Littleton (FAA), Ed Lohr (Delta Air Lines), Cheryl Miner (FAA), Debi Minnick (Federal Express), Alma Ramadani (FAA), Kirk Rummel (Houston Airport System), Bill Sears (Beacon), Geoff Shearer (Boeing), Rico Short (Beacon), Stephen Smothers (Cessna), E.J. Spear (MITRE), Craig Spence (AOPA), Pat Stovall (DoD), Allison Talarek (FAA), and Eunsuk Yang (IATA). Many thanks as well to Steve Brown, Tom Hendricks, Margaret Jenny, and Andy Cebula of RTCA for their guidance.

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Appendix 1: Development of a Concept for Measuring Access

In its simplest terms, *Access* measures the ability of users to enter the NAS and utilize services needed to fulfill their operational requirements, whereas *Equity* is the ability of those users to receive fair and impartial treatment within the policy and rules established for the system.

Background

The ability of each user segment approved to operate in the NAS to achieve their individual goals is an integral component of all ATM modernization efforts. NextGen, SESAR, ICAO Block Upgrades all list access as a key performance indicator, yet a comprehensive measurement and metric that captures how this should be done has yet to be defined. Access to the NAS is important to all current as well as future users and is not exclusive to any one segment.

The SESAR performance framework states that the strategic objective for Access and Equity is to *"Ensure that shared use of airspace and airports by different classes of airspace users will be significantly improved (classes defined by type of user, type of aircraft, type of flight rule). Where shared use is conflicting with other performance expectations (safety, security, capacity, etc.), ensure that viable airspace/airport alternatives will be provided to satisfy the airspace users' needs, in consultation with all affected stakeholders*." See also Appendix D of the ICAO Air Traffic Management Operational Concept (document 9854), which defines expectations for access and equity.

Access, or the lack thereof in certain circumstances, can impact operators that do not even utilize ATC services, such as VFR operations, UAS, and even commercial space flight. Access measures the ability to use an existing resource and does not in and by itself lead to a capacity increase. For example airport de-confliction can increase access to an airport without changing the inherent capacity.

Performance metrics are also needed that accurately measure the extent the system can accommodate users of varying levels of capability and airframe characteristics according to the agreed upon rules for service. These metrics are especially important when addressing the concerns of all users during the transformation of the NAS through NextGen. They should identify how users have been impacted (positively or negatively), in their respective abilities to use the air transportation system. Additionally, these metrics should capture if system improvements are coming at the expense of one segment or airspace user over another or how constraints are applied to all users.

Like all other metrics, there are policy and tradespace issues that will impact the metric. Policy is the framework, Access is the outcome, and Equity measures the level of consistency in execution. This is an area of focus for resources where demand is close to, or exceeds capacity.

Note that Access and Equity issues are addressed today in the Collaborative Decision Making (CDM) process that takes place whenever adverse weather or other conditions affect airport or

airspace capacity. Extensive pre-planning is conducted by stakeholders in advance of seasonal weather to develop concurrence on how the impact of reduced capacity will be shared and distributed amongst the user community and how to accommodate specific user needs and special requests. With NextGen equipage enabling improved capacity to existing airspace as well as improved capacity during periods of adverse weather, there is a community desire to identify and report how equipped and non-equipped users might be affected by policies and procedures that will be implemented to make best use of this new capacity.

Considerations

The highest level indicator will measure the utilization of defined airspace and/or location by user in order to gauge access. Still to be determined is whether the metric should include all potential users of an asset or users who have previously used (or requested to use) an airspace or airport asset.

As with all high level metrics the Access metric is designed to measure if the "needle has moved" and is not intended to explain why the change has occurred. This can be determined by examining the lower level metrics that will need to be developed in follow-on work. Additionally, there is an inherent interdependency with other metrics such as capacity, flexibility, and efficiency that may need to be fully evaluated within the policy tradespace discussion.

Next Steps in Developing High-Level and Lower-level Access Metrics

There still remains a great deal of work to continue to mature this metric and the corresponding diagnostic metrics. With the guidance of the NAC, work will continue to close the following information gaps that have been identified:

- Definition of user groups for measurement at the highest level
- Exploration and clarification of diagnostic metrics
- Capturing VFR movements at some level to understand access changes to traffic that does not normally utilize ATC services.
- Definitions of both airframe and crew capability characteristics

Appendix 2: Destination 2025 Goals

FAA's Destination 2025 has established the following target metrics by 2018:

Safety

- Reduce the number of commercial air carrier fatalities per 100 million passengers by 24% over a 9 year period (no more than 6.2 fatalities per 100 million passengers)
- Reduce the GA fatal accident rate to be no more than 1 accident per 100,000 flight hours (Note: the FAA plans to achieve this goal via a non-regulatory, strategic approach).

Total Trip Time

- Optimize airspace & PBN procedures to improve efficiency by 10% across core airports
- Achieve a 5% reduction in average taxi time at core airports
- Improve predictability by reducing the variances in flight times between core airports (no date provided)

MetroplexCapacity

- Increase (allowable) throughput at core airports by 12% to reduce delays by 27% using 2009 as a baseline
- Improve throughput at core airports during adverse weather by 14%

Fuel

- Improve NAS energy efficiency (fuel burned per miles flown) by at least 2 percent annually.

Cost-Effectiveness

- Maintain 90 percent of major system investments within 10 percent variance of current baseline total budget at completion.

Access

FAA Destination 2025 does not address directly any high-level targets concerning access. However, Destination 2025 performance targets for 2018 do include the goal of having Localizer Performance procedures at 5218 runways by 2018.

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Summary of NextGen Advisory Committee Discussions
Best Capable Best Served
Non-technical Barriers to NextGen Implementation
May 24, 2012
Seattle, WA

Best-Capable, Best-Served (BCBS)

1. All NAC members believe that the BCBS policy must accommodate mixed equipage.
2. There is general agreement that the reality of a BCBS policy is that those not equipped will be relatively disadvantaged. The aviation system demonstrates this principle in some locations and at some level each day (i.e. CATIII ILS approaches). However, ensuring equity will be a challenge as we move away from a first-come, first-served policy. The performance baseline should be equal to the current level of service for those not equipped.
3. Operators must receive a return on their investments in equipage. While unequipped aircraft may not be disadvantaged, operators who choose not to equip will not receive the direct benefit(s) for the specific capability.
4. The goal of a BCBS policy is improved overall efficiency. The increased percentage of equipped aircraft will likely drive increased efficiencies, but the National Airspace System (NAS) must continue to accommodate a mixed equipage environment.
5. Defining performance metrics is crucial for measuring and evaluating implementation of BCBS policy. This includes establishing a baseline from which improvements will be measured and defined targets for the intended performance goals.
6. BCBS policy differs depending upon capability and location, and is, therefore, applied locally and specifically to an operational capability. However, local application of BCBS must be reconciled with national NextGen implementation because it is important to ensure that the sum of local solutions does not create network inefficiencies.
7. For those who choose not to equip, the disadvantages and magnitude of the disadvantages that will be considered acceptable must be determined.
8. FAA policies will need to be updated to gain benefits. Some BCBS policies will require changes to the controller handbook to implement successfully. Where necessary, tools must be available for controllers and pilots to apply/implement BCBS policies.
9. Carriers will tend to operate at airports that can best accommodate them and provide advantages to those who have invested in NextGen equipage.
10. To implement new NextGen capabilities successfully, it is imperative that all stakeholders work as a team, and the teams should involve controllers early in the process of designing and implementing BCBS policy for specific locations and capabilities.

Non-Technical Barriers to NextGen:

1. Policy changes are the most significant non-technical barrier to NextGen.
2. Culture: Early stakeholder engagement (e.g. controllers, pilots, airlines, local airport and Metroplex community, etc.) is essential for successful implementation of NextGen capabilities.
3. Success will require streamlining regulatory processes such as operational approvals, publication of Technical Standard Orders, Advisory Circulars and development of technical performance standards.
4. Because many NextGen capabilities (e.g., RNP, DataComm applications, ADS-B In applications) will require changes to the air traffic controller handbook, the FAA must determine ways to streamline that process.
5. Safety cultures are by their nature resistant to change. Change management will, therefore, be an essential element of a successful NextGen program.
6. Correlating local benefits directly to the local community is crucial to obtaining support from those communities and overcoming barriers to implementation.
7. Publicizing successes can help create enthusiasm for NextGen by highlighting accomplishments taking place now. For example, initiatives such as Greener Skies Over Seattle provide an important roadmap for tackling issues and resolving them, helping to create momentum and identifying the next opportunity for similar initiatives. The next challenge is replicating that success at higher-density Metroplexes in the continental U.S. The NAC should work with the FAA to select from the Tier 1 Metroplexes and mapped NextGen capabilities and work together to address the non-technical barriers, resolve them and implement NextGen capabilities successfully.
8. The aviation community must prioritize investments of time, talent and other resources for generating and maximizing investments for implementing NextGen. We cannot do everything everywhere, so we must prioritize activities.
9. Environmental review should not be an afterthought but must be built into the Nav-Lean process to create environmental benefits in the beginning instead of bi-products at the end.
10. The aviation industry has done hard things before – hard things are not impossible.

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Approved by the NAC May 24, 2012

Refinement of Integrated Capabilities Definitions and Completion of Capability Mapping Exercises

A Report of the NextGen Advisory Committee in Response to Tasking from The Federal Aviation Administration

May 2012

Contents

Background/Introduction

In February 2011, the NextGen Advisory Committee (NAC) requested the Integrated Capabilities Work Group (ICWG) to address two initial tasks—(1) Metroplex prioritization and (2) integrated capabilities scoping & requirements. As enumerated in the ICWG's Terms of Reference, issued by RTCA on February 3, 2011, the Metroplex prioritization task was defined as follows:

> *Review criteria and considerations approved by the [NAC] on September 23, 2010, for site prioritization for the Metroplex Optimization efforts. Determine the applicability and extensibility of the objective criteria with regard to the broader Metroplex and integrated capabilities view for implementation and integration of other NextGen capabilities. Provide specific recommendations on suitability of the criteria set and applicable adjustments.*

The integrated capabilities scoping & requirements task was defined as follows:

> *Create preliminary portfolio of integrated capability requirements, with time frames for implementation. Use the results of [the Metroplex prioritization task] to identify and prioritize the major Metroplexes. Map capabilities identified in the Task Force 5 Final Report and NextGen Implementation Plan (NGIP) Task Force 5 Action Plans to the identified Metroplexes.*

The purpose of these tasks was to provide the NAC and the FAA with actionable and supportable recommendations regarding what NextGen improvements should be implemented within which Metroplexes at what time within the mid-term future—defined as between now and 2018. Ultimately, it is hoped that these recommendations will help the FAA and industry prioritize mid-term NextGen implementation in a resource-constrained environment.

Executive Summary

This document summarizes the work that the ICWG has performed between January 2012 and April 2012 pursuant to the two tasks described above. This work includes the following:

- Qualitative evaluation of the benefits/need and implementation feasibility of integrated capabilities within the twenty Tier 2 groups of Metroplexes.
- Refinement of the qualitative evaluations integrated capabilities within the seven Tier 1 Metroplexes.[1]
- Ongoing refinement of the portfolio of integrated capabilities that the ICWG is considering in its work effort.

[1] Table 1 below lists the Metroplexes that are in Tiers 1 and 2.

Summary of Key Findings

- **Finding 1:** NSIP Increments have come to be the preferred frame of reference for integrated capability planning; the ICWG would rather work with them than OIs or other planning elements whenever practical.
- **Finding 2:** The ICWG's effectiveness would be greatly enhanced by visibility into NSIP version 4.0 increments from the "Alpha" and "Bravo" timeframes.
- **Finding 3:** Engagement with representatives of the FAA's capability planning team has been productive and the ICWG looks forward to continuing in it.

Summary of Recommendations

- **Recommendation 1:** Adopt revised capability evaluations for the 27 Metroplexes identified by the ICWG in September 2011. These results of these evaluations appear in Appendix A of this report.
- **Recommendation 2:** Arrange for the necessary approvals and measures to provide the ICWG with greater visibility into the NSIP, including future versions in "draft" status. This should include the "Alpha" and "Bravo" increments so the ICWG can effectively reference the range of integrated capabilities that pertain to its tasking. Doing so will help the ICWG make clear, relevant, and actionable recommendations regarding planned NextGen capabilities and ensure that limited ICWG resources are not expended on assessing obsolete or redefined capabilities.
- **Recommendation 3:** Continue ICWG-FAA meetings concerning the definition of capabilities and implementation planning.
- **Recommendation 4:** Identify interdependencies among high priority capabilities that have emerged from the ICWG's Metroplex mapping exercises to help the FAA understand which capabilities need to be implemented concurrently to achieve expected NextGen benefits.

Integrated Capability Evaluation by Metroplex

Methodology

Members of the ICWG held a two-day meeting on March 8-9, 2012 to complete the qualitative evaluation of the benefits/needs and feasibility of sixty-one NextGen operational capabilities at the remaining nineteen of twenty Tier 2 Metroplexes. Evaluation of the seven Tier 1 Metroplexes and Houston, a Tier 2 Metroplex, had been conducted between August and December 2011.

Table 1 summarizes the Tier 1 and Tier 2 Metroplexes that were considered in the ICWG's evaluations.

In early April, a subgroup of the ICWG met to reconcile the results of the 2011 evaluations with those that were performed in March 2012. The modifications that were made during this reconciliation exercise were as follows:

- The benefits/needs and feasibility of capabilities were explicitly rated using a five-point numerical scale, with 1 being least beneficial/least feasible and 5 being most beneficial/most feasible. This five point scale replaced a three point scale—low, moderate, and high—with half steps that was used in the 2011 mapping exercises. The five point scale was used recognizing that (1) the use of half steps (e.g., moderate-to-high) in earlier mapping exercises represented an informal five point scale and (2) use of numerical ratings made subsequent analysis and evaluation efforts easier. In this effort, the capability ratings from each 2011-evalauted Metroplexes were reexamined. Ratings were adjusted to match the five-point scale and for consistency with assumptions used in the March 2012 rating session.

Table 1
Tier 1 and Tier 2 Metroplexes

Tier 1	Tier 2
• New York • Atlanta • Chicago • Charlotte • Philadelphia • Dallas-Ft. Worth • Southern California	• Washington DC • Northern California, • South Florida • Houston • Denver • Las Vegas • Memphis • Phoenix • Seattle • Boston • Detroit • Minneapolis-St. Paul • Orlando • Salt Lake City • Cincinnati • Portland • Honolulu • Cleveland/Pittsburgh • Tampa • St. Louis

- A consistent and repeatable method was used to develop overall ratings of capabilities from their respective benefit/need and feasibility ratings. If the rating of a capability's benefit/need was greater or equal to the rating of a capability's feasibility, the overall rating was calculated as the numerical average—rounded down to the nearest whole number—of the two ratings. If the rating of a capability's benefit/need was less than the rating of a capability's feasibility, the overall rating was set equal to the benefit/need rating. This method weighted the overall rankings towards the benefit they would provide or the need they would fulfill, which the ICWG considered to be a prerequisite for capabilities to be priorities within a Metroplex.

- Capabilities that have been implemented or are well on their way to being implemented within a Metroplex were assigned numerical ratings of "0", which implies that the capabilities are already committed improvements within the Metroplex. These ratings do not imply that the capabilities associated with them are unimportant, but rather that the ICWG recommendations will have little or no bearing on whether the capabilities are/have been implemented within the Metroplex in question.

The set of operational capabilities considered in this exercise were summarized in the ICWG's September 2011 report, *ICWG Findings and Recommendations: Metroplex Prioritization and Integrated Capabilities Scoping & Requirements*.

Findings: Integrated Capability Evaluation

The detailed results of the Metroplex evaluation appear in Appendix A. The Appendix shows the benefit/need and feasibility ratings assigned to each of the integrated capabilities that were evaluated together with the calculated "Overall" rating. Please note that the results shown in this report supersede those shown in the ICWG's February 2012 report to the NAC.

The ICWG is currently in the process of summarizing the findings and recommendations from the completed evaluation exercise. However, we do not expect the results to alter the high level findings and recommendations that were presented in the ICWG's February 2012 Report, *Applying the Metroplex Prioritization Criteria & Mapping the Integrated Capabilities to Identified Metroplexes*.

Recommendation: Integrated Capability Evaluation

- Adopt revised capability evaluations for the 27 Metroplexes that appear in Appendix A of this report.

Refinement of Integrated Capabilities

Methodology

To date, the ICWG has relied on two sources of FAA capability definitions to frame the discussion of integrated capabilities. These sources date back to early 2011:

- NextGen Segment Implementation Plan (NSIP), Version 3, "Alpha" Increment, specifically the increments of operational improvements
- FAA NAS Enterprise Architecture (NAS EA), specifically Operational Improvements (OIs)

Early in its activities, the ICWG did a full review of available OIs and Increments to determine which were relevant to the WG's analysis and recommendations.

Recently, the FAA has released a new NGIP, and the ICWG understands that there are corresponding updates to the NextGen Segment Implementation Plan (NSIP) as well. It has been the ICWG's experience that the NSIP Increments provide a more specific and useful set of reference capabilities than the NAS EA OIs (which tend to be more general and visionary). Furthermore, the ICWG has consistently found it to be a limiting factor that the WG cannot

refer to increments beyond the "Alpha" timeframe. Therefore the need has emerged for the ICWG to gain visibility into the latest NSIP increments for both the "Alpha" and "Bravo" timeframes, in order to provide an effective foundation for communication with the FAA concerning integrated capabilities. In the WG's view, whatever concerns may exist concerning sharing "Bravo" increments should be surmountable, for example with appropriate caveats, redaction of sensitive dates, or other measures as warranted. The ICWG fully understands that Increments are planning elements that can and will change. For NextGen to be successful there has to be a cooperative venture between the FAA and industry. Complete sharing of information will enhance the cooperative understanding of all involved.

Regarding the definition and further development of capabilities, the ICWG has had very productive engagement with FAA representatives several times over the course of recent months. Some, though not all, of the findings and recommendations reported in February 2012 have been resolved through these discussions, and progress has been made on those that remain as well. The ICWG looks forward to continued collaboration in this area and the mutual benefits derived.

Findings: Refinement of Integrated Capabilities

- NSIP Increments have come to be the preferred frame of reference for integrated capability planning; the ICWG would rather work with them than OIs or other planning elements whenever practical.
- The ICWG's effectiveness would be greatly enhanced by visibility into NSIP version 4.0 Increments from the "Alpha" and "Bravo" timeframes.
- Engagement with representatives of the FAA's capability planning team has been productive and the ICWG looks forward to continuing in it.

Recommendations: Refinement of Integrated Capabilities

- Arrange for the necessary approvals and measures to provide the ICWG with greater visibility into the NSIP, including future versions in "draft" status. This should include the "Alpha" and "Bravo" increments so the ICWG can effectively reference the range of integrated capabilities that pertain to its tasking. Doing so will help the ICWG make clear, relevant, and actionable recommendations regarding planned NextGen capabilities and ensure that limited ICWG resources are not expended on assessing obsolete or redefined capabilities.
- Continue ICWG-FAA meetings concerning the definition of capabilities.

- Identify interdependencies among high priority capabilities that have emerged from the ICWG's Metroplex mapping exercises to help the FAA understand which capabilities need to be implemented concurrently to achieve expected NextGen benefits.

Bibliography

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NextGen Implementation Plan, Federal Aviation Administration, March 2011.

Appendix A
Metroplex Evaluation Results

Metroplex Evaluation Results

This appendix contains the results of the evaluations of sixty-one NextGen capabilities across 27 Metroplexes by the Integrated Capabilities Working Group (ICWG) of the NextGen Advisory Committee (NAC). The Metroplexes that were evaluated are shown in Table A-1.

Table A-1
Tier 1 and Tier 2 Metroplexes

Tier 1	Tier 2
• New York • Atlanta • Chicago • Charlotte • Philadelphia • Dallas-Ft. Worth • Southern California	• Washington DC • Northern California, • South Florida • Houston • Denver • Las Vegas • Memphis • Phoenix • Seattle • Boston • Detroit • Minneapolis-St. Paul • Orlando • Salt Lake City • Cincinnati • Portland • Honolulu • Cleveland/Pittsburgh • Tampa • St. Louis

These Metroplexes were selected for evaluation based on (1) the level of aviation activity that occurs within them and (2) their potential to benefit from NextGen capabilities. More detailed discussion of criteria that were used to select the 27 Metroplexes can be found in the ICWG's September 2011 report, *ICWG Findings and Recommendations: Metroplex Prioritization and Integrated Capabilities Scoping & Requirements*. The sixty-one NextGen capabilities considered in the evaluation are also described in the September 2011 report.

Tier 1 Metroplexes—those that were assessed by the ICWG to have the greatest operational need for NextGen improvements—and Houston were evaluated between August and December 2011 by ICWG members supplemented by additional subject matter experts as needed. Tier 2 Metroplexes, excepting Houston, were evaluated in March 2012 by the ICWG. In April 2012, the ICWG reviewed the evaluations of all 27 Metroplexes for consistency and finalized the results of the exercise.

The results presented in the tables that follow are organized alphabetically by Metroplex. Each Metroplex table shows the ICWGs evaluation of (1) how well NextGen capabilities would address operational needs and/or provide operational benefits within the Metroplex and (2) the feasibility of implementing the capabilities within the mid-term, defined by the ICWG as between now and 2018.

Benefits/operational need and feasibility were rated using a five-point numerical scale, with 1 being least beneficial/least feasible and 5 being most beneficial/most feasible. As discussed in the ICWG's September 2011 report, objective, quantitative data regarding the benefits and feasibility of many of the integrated capabilities was not available, particularly Metroplex-by-Metroplex. As a result, the ICWG relied primarily on qualitative, expert-judgment driven assessments of benefits and feasibility.

Capabilities that are already being implemented within a particular Metroplex or where implementation has been completed were assigned a rating of zero to denote that ICWG recognizes that these capabilities that are already in place or are well on their way to implementation.

Overall ratings of capabilities were developed based on their benefit/need and feasibility ratings. If the rating of a capability's benefit/need was greater or equal to the rating of a capability's feasibility, the overall rating was calculated as the numerical average—rounded down to the nearest whole number—of the two ratings. If the rating of a capability's benefit/need was less than the rating of a capability's feasibility, the overall rating was set equal to the benefit/need rating. This method weighted the overall rankings towards the benefit they would provide or the need they would fulfill, which the ICWG considered to be a prerequisite for capabilities to be priorities within a Metroplex.

ICWG Metroplex Mapping Results

Integrated Capability		Atlanta		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	5	4	4
	Delivery of Pre-Departure Reroutes/Controllers	3	3	3
	Mid-Term CDM Implementation	5	3	4
	Flexible Routing in the Mid-Term	3	5	3
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	0	5	0
	RWSL	0	5	0
	Revised Departure Clearance via Data Comm	5	5	5
	Airport Configuration Management Increment 1	2	5	2
	Taxi Routing Increment 1	5	5	5
	External Data Exchange	5	5	5
	Moving Map with Own-Ship Position	1	3	1
	CDTI/TIS-B for Surface	1	3	1
	Runway Assignments Increment 1	3	5	3
	Scheduling and Sequencing Increment 1	5	5	5
	Departure Routing Increment 1	5	5	5
	Provide Full Surface Situation Information	2	1	1
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	0	3	0
	Integrated Departure/Arrival Capability (IDAC)	5	5	5
	Extended Metering	5	5	5
	Implement TMA at Additional Airports	0	0	0
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	5	5	5
	Mid-Term Trajectory-Based Management, Gate-to-Gate	5	5	5
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	5	4	4
	Integrated Arrival/Departure Airspace Management	5	5	5
Runway Operations	Use Converging Runway Display Aid (CRDA)	1	5	1
	Additional 7110.308 Airports (WTMA Procedures)	1	5	1
	Amend Independent and Dependent Runway Standards in Order 7110.65	1	3	1
	CSPO Use of PRM-A	1	3	1
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	1	3	1
	Implement LPV/GLS or ILS for Parallel Runway Operations	3	3	3
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	3	5	3
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	0	0	0
	Initial Tailored Arrivals (ITAs)	1	5	1
	RNP and RNP AR Approaches	5	5	5
	GBAS Category II/III	1	3	1
	Expanded Radar-like Services/Secondary Airports	3	5	3
	OPDs Using RNAV and RNP STARs	5	5	5
	GBAS Category I Non-Federal System Approval	1	5	1
	LPV Approaches	1	5	1
	Low Visibility Surface Operations	1	1	1
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	1	1	1

ICWG Metroplex Mapping Results

	Integrated Capability	Atlanta		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	0	5	0
	Transition/PBN Routing for Cruise Operations	1	5	1
	Delegated Responsibility for Horizontal Separation and FIM-S	1	1	1
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	1	1	1
	Reduced Horizontal Separation Standards, En Route-3 Miles	5	3	4
	Relative Position Indicator (RPI)	5	3	4
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	5	3	4
	NextGen En Route DME Infrastructure	1	1	1
	FMC Route Offset	0	3	0
	Deconflict Operations Among Adjacent Airports	0	3	0
	Mid-Term Efficient Metroplex Merging and Spacing	5	3	4
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	1	3	1
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	1
	ANSP Real-Time Status for SUAs	1	5	1
	SAA Forecast of Capacity Constraints	1	3	1
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	3	3	3
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	1	1
	Full Improved Weather Information and Dissemination	1	1	1

Note: Integrated capabilities were rated by the ICWG using a five-point scale with 1 indicating low need/benefits or feasibility and 5 indicating high need/benefits or feasibility. Ratings of 0 represent integrated capabilities that are already well on their way to implementation or where implementation has been completed.

Integrated Capability		Boston		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	5	5	5
	Delivery of Pre-Departure Reroutes/Controllers	3	2	2
	Mid-Term CDM Implementation	5	3	4
	Flexible Routing in the Mid-Term	5	5	5
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	0	5	0
	RWSL	0	5	0
	Revised Departure Clearance via Data Comm	5	5	5
	Airport Configuration Management Increment 1	5	3	4
	Taxi Routing Increment 1	4	5	4
	External Data Exchange	4	4	4
	Moving Map with Own-Ship Position	3	3	3
	CDTI/TIS-B for Surface	3	3	3
	Runway Assignments Increment 1	3	5	3
	Scheduling and Sequencing Increment 1	5	5	5
	Departure Routing Increment 1	3	5	3
	Provide Full Surface Situation Information	4	2	3
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	0	3	0
	Integrated Departure/Arrival Capability (IDAC)	5	5	5
	Extended Metering	4	3	3
	Implement TMA at Additional Airports	0	3	0
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	5	5	5
	Mid-Term Trajectory-Based Management, Gate-to-Gate	5	3	4
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	3	2	2
	Integrated Arrival/Departure Airspace Management	4	3	3
Runway Operations	Use Converging Runway Display Aid (CRDA)	0	5	0
	Additional 7110.308 Airports (WTMA Procedures)	0	5	0
	Amend Independent and Dependent Runway Standards in Order 7110.65	0	3	0
	CSPO Use of PRM-A	2	3	2
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	3	3	3
	Implement LPV/GLS or ILS for Parallel Runway Operations	3	3	3
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	5	5	5
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	3	5	3
	Initial Tailored Arrivals (ITAs)	1	5	1
	RNP and RNP AR Approaches	5	5	5
	GBAS Category II/III	3	3	3
	Expanded Radar-like Services/Secondary Airports	4	5	4
	OPDs Using RNAV and RNP STARs	5	4	4
	GBAS Category I Non-Federal System Approval	3	3	3
	LPV Approaches	3	5	3
	Low Visibility Surface Operations	3	1	2
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	3	1	2

ICWG Metroplex Mapping Results

Integrated Capability		Boston		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	3	5	3
	Transition/PBN Routing for Cruise Operations	0	5	0
	Delegated Responsibility for Horizontal Separation and FIM-S	3	2	2
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	3	2	2
	Reduced Horizontal Separation Standards, En Route-3 Miles	4	2	3
	Relative Position Indicator (RPI)	5	3	4
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	4	2	3
	NextGen En Route DME Infrastructure	1	3	1
	FMC Route Offset	1	1	1
	Deconflict Operations Among Adjacent Airports	4	3	3
	Mid-Term Efficient Metroplex Merging and Spacing	2	2	2
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	1	3	1
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	1
	ANSP Real-Time Status for SUAs	4	5	4
	SAA Forecast of Capacity Constraints	4	3	3
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	1	3	1
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	2	1
	Full Improved Weather Information and Dissemination	1	2	1

Note: Integrated capabilities were rated by the ICWG using a five-point scale with 1 indicating low need/benefits or feasibility and 5 indicating high need/benefits or feasibility. Ratings of 0 represent integrated capabilities that are already well on their way to implementation or where implementation has been completed.

Integrated Capability		Charlotte		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	3	3	3
	Delivery of Pre-Departure Reroutes/Controllers	3	2	2
	Mid-Term CDM Implementation	5	3	4
	Flexible Routing in the Mid-Term	5	5	5
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	0	5	0
	RWSL	0	5	0
	Revised Departure Clearance via Data Comm	3	5	3
	Airport Configuration Management Increment 1	5	3	4
	Taxi Routing Increment 1	3	5	3
	External Data Exchange	5	3	4
	Moving Map with Own-Ship Position	3	5	3
	CDTI/TIS-B for Surface	3	5	3
	Runway Assignments Increment 1	4	5	4
	Scheduling and Sequencing Increment 1	4	5	4
	Departure Routing Increment 1	5	5	5
	Provide Full Surface Situation Information	3	1	2
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	0	3	0
	Integrated Departure/Arrival Capability (IDAC)	5	5	5
	Extended Metering	3	3	3
	Implement TMA at Additional Airports	0	5	0
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	3	5	3
	Mid-Term Trajectory-Based Management, Gate-to-Gate	3	3	3
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	5	4	4
	Integrated Arrival/Departure Airspace Management	5	3	4
Runway Operations	Use Converging Runway Display Aid (CRDA)	0	5	0
	Additional 7110.308 Airports (WTMA Procedures)	0	5	0
	Amend Independent and Dependent Runway Standards in Order 7110.65	1	3	1
	CSPO Use of PRM-A	0	3	0
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	0	3	0
	Implement LPV/GLS or ILS for Parallel Runway Operations	3	3	3
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	5	5	5
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	5	5	5
	Initial Tailored Arrivals (ITAs)	1	5	1
	RNP and RNP AR Approaches	5	5	5
	GBAS Category II/III	5	3	4
	Expanded Radar-like Services/Secondary Airports	5	5	5
	OPDs Using RNAV and RNP STARs	5	5	5
	GBAS Category I Non-Federal System Approval	3	3	3
	LPV Approaches	1	5	1
	Low Visibility Surface Operations	1	1	1
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	1	1	1

ICWG Metroplex Mapping Results

Integrated Capability		Charlotte		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	0	5	0
	Transition/PBN Routing for Cruise Operations	5	5	5
	Delegated Responsibility for Horizontal Separation and FIM-S	3	3	3
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	5	3	4
	Reduced Horizontal Separation Standards, En Route-3 Miles	5	3	4
	Relative Position Indicator (RPI)	3	3	3
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	5	3	4
	NextGen En Route DME Infrastructure	3	3	3
	FMC Route Offset	3	1	2
	Deconflict Operations Among Adjacent Airports	3	3	3
	Mid-Term Efficient Metroplex Merging and Spacing	4	4	4
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	3	3	3
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	1
	ANSP Real-Time Status for SUAs	5	5	5
	SAA Forecast of Capacity Constraints	5	3	4
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	3	3	3
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	2	1
	Full Improved Weather Information and Dissemination	3	2	2

Note: Integrated capabilities were rated by the ICWG using a five-point scale with 1 indicating low need/benefits or feasibility and 5 indicating high need/benefits or feasibility. Ratings of 0 represent integrated capabilities that are already well on their way to implementation or where implementation has been completed.

ICWG Metroplex Mapping Results

Integrated Capability		Chicago		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	5	5	5
	Delivery of Pre-Departure Reroutes/Controllers	3	2	2
	Mid-Term CDM Implementation	5	3	4
	Flexible Routing in the Mid-Term	3	5	3
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	1	5	1
	RWSL	1	5	1
	Revised Departure Clearance via Data Comm	3	5	3
	Airport Configuration Management Increment 1	3	3	3
	Taxi Routing Increment 1	3	5	3
	External Data Exchange	5	3	4
	Moving Map with Own-Ship Position	3	3	3
	CDTI/TIS-B for Surface	3	5	3
	Runway Assignments Increment 1	5	5	5
	Scheduling and Sequencing Increment 1	5	5	5
	Departure Routing Increment 1	5	5	5
	Provide Full Surface Situation Information	1	1	1
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	0	3	0
	Integrated Departure/Arrival Capability (IDAC)	5	5	5
	Extended Metering	5	3	4
	Implement TMA at Additional Airports	0	3	0
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	5	5	5
	Mid-Term Trajectory-Based Management, Gate-to-Gate	3	3	3
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	5	4	4
	Integrated Arrival/Departure Airspace Management	3	3	3
Runway Operations	Use Converging Runway Display Aid (CRDA)	3	5	3
	Additional 7110.308 Airports (WTMA Procedures)	1	5	1
	Amend Independent and Dependent Runway Standards in Order 7110.65	3	3	3
	CSPO Use of PRM-A	1	3	1
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	1	3	1
	Implement LPV/GLS or ILS for Parallel Runway Operations	3	3	3
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	3	5	3
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	5	5	5
	Initial Tailored Arrivals (ITAs)	1	5	1
	RNP and RNP AR Approaches	5	5	5
	GBAS Category II/III	1	3	1
	Expanded Radar-like Services/Secondary Airports	5	5	5
	OPDs Using RNAV and RNP STARs	4	4	4
	GBAS Category I Non-Federal System Approval	1	5	1
	LPV Approaches	3	5	3
	Low Visibility Surface Operations	1	1	1
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	1	1	1

ICWG Metroplex Mapping Results

Integrated Capability		Chicago		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	5	5	5
	Transition/PBN Routing for Cruise Operations	1	5	1
	Delegated Responsibility for Horizontal Separation and FIM-S	1	2	1
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	1	2	1
	Reduced Horizontal Separation Standards, En Route-3 Miles	3	2	2
	Relative Position Indicator (RPI)	3	3	3
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	3	3	3
	NextGen En Route DME Infrastructure	1	3	1
	FMC Route Offset	1	1	1
	Deconflict Operations Among Adjacent Airports	5	3	4
	Mid-Term Efficient Metroplex Merging and Spacing	3	2	2
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	3	3	3
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	1
	ANSP Real-Time Status for SUAs	3	5	3
	SAA Forecast of Capacity Constraints	3	3	3
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	3	3	3
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	2	1
	Full Improved Weather Information and Dissemination	1	2	1

Note: Integrated capabilities were rated by the ICWG using a five-point scale with 1 indicating low need/benefits or feasibility and 5 indicating high need/benefits or feasibility. Ratings of 0 represent integrated capabilities that are already well on their way to implementation or where implementation has been completed.

ICWG Metroplex Mapping Results

Integrated Capability		Cinncinnati		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	5	5	5
	Delivery of Pre-Departure Reroutes/Controllers	3	2	2
	Mid-Term CDM Implementation	5	3	4
	Flexible Routing in the Mid-Term	5	5	5
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	3	5	3
	RWSL	2	5	2
	Revised Departure Clearance via Data Comm	3	3	3
	Airport Configuration Management Increment 1	3	3	3
	Taxi Routing Increment 1	4	5	4
	External Data Exchange	4	4	4
	Moving Map with Own-Ship Position	3	3	3
	CDTI/TIS-B for Surface	3	3	3
	Runway Assignments Increment 1	3	5	3
	Scheduling and Sequencing Increment 1	4	5	4
	Departure Routing Increment 1	4	5	4
	Provide Full Surface Situation Information	4	1	2
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	4	3	3
	Integrated Departure/Arrival Capability (IDAC)	5	5	5
	Extended Metering	4	3	3
	Implement TMA at Additional Airports	4	3	3
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	5	5	5
	Mid-Term Trajectory-Based Management, Gate-to-Gate	5	3	4
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	4	3	3
	Integrated Arrival/Departure Airspace Management	4	4	4
Runway Operations	Use Converging Runway Display Aid (CRDA)	0	5	0
	Additional 7110.308 Airports (WTMA Procedures)	0	5	0
	Amend Independent and Dependent Runway Standards in Order 7110.65	0	3	0
	CSPO Use of PRM-A	0	3	0
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	0	3	0
	Implement LPV/GLS or ILS for Parallel Runway Operations	3	3	3
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	5	5	5
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	3	5	3
	Initial Tailored Arrivals (ITAs)	1	5	1
	RNP and RNP AR Approaches	5	5	5
	GBAS Category II/III	3	3	3
	Expanded Radar-like Services/Secondary Airports	3	5	3
	OPDs Using RNAV and RNP STARs	5	5	5
	GBAS Category I Non-Federal System Approval	2	3	2
	LPV Approaches	2	5	2
	Low Visibility Surface Operations	3	1	2
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	3	1	2

ICWG Metroplex Mapping Results

Integrated Capability		Cinncinnati		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	3	5	3
	Transition/PBN Routing for Cruise Operations	4	5	4
	Delegated Responsibility for Horizontal Separation and FIM-S	3	2	2
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	3	2	2
	Reduced Horizontal Separation Standards, En Route-3 Miles	4	2	3
	Relative Position Indicator (RPI)	4	3	3
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	2	3	2
	NextGen En Route DME Infrastructure	1	3	1
	FMC Route Offset	1	1	1
	Deconflict Operations Among Adjacent Airports	2	3	2
	Mid-Term Efficient Metroplex Merging and Spacing	3	2	2
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	1	3	1
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	1
	ANSP Real-Time Status for SUAs	4	5	4
	SAA Forecast of Capacity Constraints	4	3	3
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	1	3	1
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	2	1
	Full Improved Weather Information and Dissemination	1	2	1

Note: Integrated capabilities were rated by the ICWG using a five-point scale with 1 indicating low need/benefits or feasibility and 5 indicating high need/benefits or feasibility. Ratings of 0 represent integrated capabilities that are already well on their way to implementation or where implementation has been completed.

Integrated Capability		Cleveland		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	5	5	5
	Delivery of Pre-Departure Reroutes/Controllers	3	2	2
	Mid-Term CDM Implementation	5	3	4
	Flexible Routing in the Mid-Term	5	5	5
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	4	5	4
	RWSL	3	5	3
	Revised Departure Clearance via Data Comm	3	3	3
	Airport Configuration Management Increment 1	3	3	3
	Taxi Routing Increment 1	3	5	3
	External Data Exchange	4	4	4
	Moving Map with Own-Ship Position	2	3	2
	CDTI/TIS-B for Surface	3	3	3
	Runway Assignments Increment 1	3	5	3
	Scheduling and Sequencing Increment 1	4	5	4
	Departure Routing Increment 1	4	5	4
	Provide Full Surface Situation Information	3	1	2
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	4	3	3
	Integrated Departure/Arrival Capability (IDAC)	3	5	3
	Extended Metering	3	3	3
	Implement TMA at Additional Airports	0	3	0
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	5	5	5
	Mid-Term Trajectory-Based Management, Gate-to-Gate	4	3	3
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	3	3	3
	Integrated Arrival/Departure Airspace Management	3	4	3
Runway Operations	Use Converging Runway Display Aid (CRDA)	0	5	0
	Additional 7110.308 Airports (WTMA Procedures)	0	5	0
	Amend Independent and Dependent Runway Standards in Order 7110.65	0	3	0
	CSPO Use of PRM-A	2	3	2
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	3	3	3
	Implement LPV/GLS or ILS for Parallel Runway Operations	3	3	3
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	5	5	5
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	3	5	3
	Initial Tailored Arrivals (ITAs)	1	5	1
	RNP and RNP AR Approaches	5	5	5
	GBAS Category II/III	3	3	3
	Expanded Radar-like Services/Secondary Airports	3	5	3
	OPDs Using RNAV and RNP STARs	5	5	5
	GBAS Category I Non-Federal System Approval	2	3	2
	LPV Approaches	4	5	4
	Low Visibility Surface Operations	3	1	2
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	3	1	2

ICWG Metroplex Mapping Results

Integrated Capability		Cleveland		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	4	5	4
	Transition/PBN Routing for Cruise Operations	0	5	0
	Delegated Responsibility for Horizontal Separation and FIM-S	3	2	2
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	3	2	2
	Reduced Horizontal Separation Standards, En Route-3 Miles	4	2	3
	Relative Position Indicator (RPI)	4	3	3
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	4	3	3
	NextGen En Route DME Infrastructure	1	3	1
	FMC Route Offset	1	1	1
	Deconflict Operations Among Adjacent Airports	2	3	2
	Mid-Term Efficient Metroplex Merging and Spacing	3	2	2
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	1	3	1
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	1
	ANSP Real-Time Status for SUAs	3	5	3
	SAA Forecast of Capacity Constraints	3	3	3
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	1	3	1
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	2	1
	Full Improved Weather Information and Dissemination	1	2	1

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Integrated Capability		Dallas/Fort Worth		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	2	3	2
	Delivery of Pre-Departure Reroutes/Controllers	3	2	2
	Mid-Term CDM Implementation	5	3	4
	Flexible Routing in the Mid-Term	3	5	3
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	3	5	3
	RWSL	0	5	0
	Revised Departure Clearance via Data Comm	3	5	3
	Airport Configuration Management Increment 1	3	3	3
	Taxi Routing Increment 1	3	5	3
	External Data Exchange	5	3	4
	Moving Map with Own-Ship Position	3	2	2
	CDTI/TIS-B for Surface	3	5	3
	Runway Assignments Increment 1	5	5	5
	Scheduling and Sequencing Increment 1	5	5	5
	Departure Routing Increment 1	5	5	5
	Provide Full Surface Situation Information	1	1	1
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	2	2	2
	Integrated Departure/Arrival Capability (IDAC)	5	5	5
	Extended Metering	2	3	2
	Implement TMA at Additional Airports	0	3	0
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	5	5	5
	Mid-Term Trajectory-Based Management, Gate-to-Gate	3	3	3
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	5	4	4
	Integrated Arrival/Departure Airspace Management	3	3	3
Runway Operations	Use Converging Runway Display Aid (CRDA)	0	5	0
	Additional 7110.308 Airports (WTMA Procedures)	1	5	1
	Amend Independent and Dependent Runway Standards in Order 7110.65	3	3	3
	CSPO Use of PRM-A	1	3	1
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	1	3	1
	Implement LPV/GLS or ILS for Parallel Runway Operations	3	3	3
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	3	4	3
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	5	5	5
	Initial Tailored Arrivals (ITAs)	1	5	1
	RNP and RNP AR Approaches	5	5	5
	GBAS Category II/III	1	3	1
	Expanded Radar-like Services/Secondary Airports	5	5	5
	OPDs Using RNAV and RNP STARs	4	4	4
	GBAS Category I Non-Federal System Approval	1	4	1
	LPV Approaches	3	5	3
	Low Visibility Surface Operations	1	1	1
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	1	1	1

ICWG Metroplex Mapping Results

Integrated Capability		Dallas/Fort Worth		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	0	5	0
	Transition/PBN Routing for Cruise Operations	1	5	1
	Delegated Responsibility for Horizontal Separation and FIM-S	1	2	1
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	1	1	1
	Reduced Horizontal Separation Standards, En Route-3 Miles	3	2	2
	Relative Position Indicator (RPI)	3	3	3
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	3	3	3
	NextGen En Route DME Infrastructure	1	3	1
	FMC Route Offset	1	1	1
	Deconflict Operations Among Adjacent Airports	5	3	4
	Mid-Term Efficient Metroplex Merging and Spacing	3	2	2
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	3	3	3
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	1
	ANSP Real-Time Status for SUAs	3	5	3
	SAA Forecast of Capacity Constraints	3	3	3
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	3	3	3
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	2	1
	Full Improved Weather Information and Dissemination	1	2	1

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Integrated Capability		Denver		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	5	5	5
	Delivery of Pre-Departure Reroutes/Controllers	3	2	2
	Mid-Term CDM Implementation	5	3	4
	Flexible Routing in the Mid-Term	5	5	5
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	0	5	0
	RWSL	0	5	0
	Revised Departure Clearance via Data Comm	4	3	3
	Airport Configuration Management Increment 1	5	3	4
	Taxi Routing Increment 1	4	5	4
	External Data Exchange	5	4	4
	Moving Map with Own-Ship Position	2	3	2
	CDTI/TIS-B for Surface	3	3	3
	Runway Assignments Increment 1	3	5	3
	Scheduling and Sequencing Increment 1	4	5	4
	Departure Routing Increment 1	3	5	3
	Provide Full Surface Situation Information	4	1	2
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	0	3	0
	Integrated Departure/Arrival Capability (IDAC)	5	5	5
	Extended Metering	3	3	3
	Implement TMA at Additional Airports	0	3	0
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	5	5	5
	Mid-Term Trajectory-Based Management, Gate-to-Gate	5	3	4
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	5	4	4
	Integrated Arrival/Departure Airspace Management	4	4	4
Runway Operations	Use Converging Runway Display Aid (CRDA)	0	5	0
	Additional 7110.308 Airports (WTMA Procedures)	0	5	0
	Amend Independent and Dependent Runway Standards in Order 7110.65	0	3	0
	CSPO Use of PRM-A	0	3	0
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	0	3	0
	Implement LPV/GLS or ILS for Parallel Runway Operations	0	3	0
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	0	5	0
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	2	5	2
	Initial Tailored Arrivals (ITAs)	1	5	1
	RNP and RNP AR Approaches	5	5	5
	GBAS Category II/III	2	3	2
	Expanded Radar-like Services/Secondary Airports	3	5	3
	OPDs Using RNAV and RNP STARs	5	5	5
	GBAS Category I Non-Federal System Approval	2	3	2
	LPV Approaches	3	5	3
	Low Visibility Surface Operations	3	1	2
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	3	1	2

ICWG Metroplex Mapping Results

Integrated Capability		Denver		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	2	5	2
	Transition/PBN Routing for Cruise Operations	0	5	0
	Delegated Responsibility for Horizontal Separation and FIM-S	3	2	2
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	3	2	2
	Reduced Horizontal Separation Standards, En Route-3 Miles	3	2	2
	Relative Position Indicator (RPI)	4	3	3
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	3	3	3
	NextGen En Route DME Infrastructure	1	3	1
	FMC Route Offset	1	1	1
	Deconflict Operations Among Adjacent Airports	2	3	2
	Mid-Term Efficient Metroplex Merging and Spacing	2	2	2
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	1	3	1
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	1
	ANSP Real-Time Status for SUAs	3	5	3
	SAA Forecast of Capacity Constraints	3	3	3
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	1	3	1
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	2	1
	Full Improved Weather Information and Dissemination	1	2	1

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Integrated Capability		Detroit		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	5	5	5
	Delivery of Pre-Departure Reroutes/Controllers	3	2	2
	Mid-Term CDM Implementation	5	3	4
	Flexible Routing in the Mid-Term	5	5	5
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	0	5	0
	RWSL	0	5	0
	Revised Departure Clearance via Data Comm	4	4	4
	Airport Configuration Management Increment 1	5	3	4
	Taxi Routing Increment 1	5	5	5
	External Data Exchange	5	4	4
	Moving Map with Own-Ship Position	3	3	3
	CDTI/TIS-B for Surface	3	3	3
	Runway Assignments Increment 1	4	5	4
	Scheduling and Sequencing Increment 1	4	5	4
	Departure Routing Increment 1	4	5	4
	Provide Full Surface Situation Information	4	1	2
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	4	3	3
	Integrated Departure/Arrival Capability (IDAC)	5	5	5
	Extended Metering	4	3	3
	Implement TMA at Additional Airports	0	3	0
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	5	5	5
	Mid-Term Trajectory-Based Management, Gate-to-Gate	5	3	4
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	4	3	3
	Integrated Arrival/Departure Airspace Management	4	4	4
Runway Operations	Use Converging Runway Display Aid (CRDA)	0	5	0
	Additional 7110.308 Airports (WTMA Procedures)	3	5	3
	Amend Independent and Dependent Runway Standards in Order 7110.65	4	3	3
	CSPO Use of PRM-A	0	5	0
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	3	3	3
	Implement LPV/GLS or ILS for Parallel Runway Operations	3	3	3
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	5	5	5
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	4	5	4
	Initial Tailored Arrivals (ITAs)	1	5	1
	RNP and RNP AR Approaches	5	5	5
	GBAS Category II/III	3	3	3
	Expanded Radar-like Services/Secondary Airports	4	5	4
	OPDs Using RNAV and RNP STARs	5	5	5
	GBAS Category I Non-Federal System Approval	2	3	2
	LPV Approaches	3	5	3
	Low Visibility Surface Operations	3	1	2
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	3	1	2

ICWG Metroplex Mapping Results

Integrated Capability		Detroit		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	4	5	4
	Transition/PBN Routing for Cruise Operations	4	5	4
	Delegated Responsibility for Horizontal Separation and FIM-S	3	2	2
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	3	2	2
	Reduced Horizontal Separation Standards, En Route-3 Miles	4	2	3
	Relative Position Indicator (RPI)	4	3	3
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	4	3	3
	NextGen En Route DME Infrastructure	1	3	1
	FMC Route Offset	1	1	1
	Deconflict Operations Among Adjacent Airports	2	3	2
	Mid-Term Efficient Metroplex Merging and Spacing	3	2	2
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	1	3	1
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	1
	ANSP Real-Time Status for SUAs	3	5	3
	SAA Forecast of Capacity Constraints	3	3	3
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	1	3	1
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	2	1
	Full Improved Weather Information and Dissemination	1	2	1

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Integrated Capability		Hawaii		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	5	5	5
	Delivery of Pre-Departure Reroutes/Controllers	3	2	2
	Mid-Term CDM Implementation	5	3	3
	Flexible Routing in the Mid-Term	5	5	5
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	0	5	5
	RWSL	2	5	4
	Revised Departure Clearance via Data Comm	2	5	3
	Airport Configuration Management Increment 1	3	3	3
	Taxi Routing Increment 1	3	5	4
	External Data Exchange	3	4	3
	Moving Map with Own-Ship Position	2	3	2
	CDTI/TIS-B for Surface	3	3	3
	Runway Assignments Increment 1	3	5	4
	Scheduling and Sequencing Increment 1	3	5	4
	Departure Routing Increment 1	3	5	4
	Provide Full Surface Situation Information	2	1	1
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	0	3	3
	Integrated Departure/Arrival Capability (IDAC)	2	5	3
	Extended Metering	1	3	2
	Implement TMA at Additional Airports	2	2	3
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	5	5	5
	Mid-Term Trajectory-Based Management, Gate-to-Gate	4	3	3
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	4	3	3
	Integrated Arrival/Departure Airspace Management	3	4	3
Runway Operations	Use Converging Runway Display Aid (CRDA)	1	5	5
	Additional 7110.308 Airports (WTMA Procedures)	0	5	5
	Amend Independent and Dependent Runway Standards in Order 7110.65	0	3	3
	CSPO Use of PRM-A	0	3	3
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	0	3	2
	Implement LPV/GLS or ILS for Parallel Runway Operations	3	3	3
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	5	5	5
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	1	5	4
	Initial Tailored Arrivals (ITAs)	4	5	3
	RNP and RNP AR Approaches	5	5	5
	GBAS Category II/III	1	3	3
	Expanded Radar-like Services/Secondary Airports	2	5	4
	OPDs Using RNAV and RNP STARs	5	5	5
	GBAS Category I Non-Federal System Approval	2	3	2
	LPV Approaches	4	5	3
	Low Visibility Surface Operations	1	1	1
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	1	1	1

ICWG Metroplex Mapping Results

	Integrated Capability	Hawaii		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	3	5	4
	Transition/PBN Routing for Cruise Operations	0	5	3
	Delegated Responsibility for Horizontal Separation and FIM-S	3	2	2
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	3	2	2
	Reduced Horizontal Separation Standards, En Route-3 Miles	2	2	2
	Relative Position Indicator (RPI)	3	3	2
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	2	3	2
	NextGen En Route DME Infrastructure	1	3	2
	FMC Route Offset	1	1	1
	Deconflict Operations Among Adjacent Airports	1	3	2
	Mid-Term Efficient Metroplex Merging and Spacing	3	2	2
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	2
	Broadcast Flight and Status Data/Pilots/AOCs	1	3	2
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	2
	ANSP Real-Time Status for SUAs	4	5	4
	SAA Forecast of Capacity Constraints	4	3	3
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	1	3	2
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	2	1
	Full Improved Weather Information and Dissemination	1	2	1

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Integrated Capability		Houston		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	5	5	5
	Delivery of Pre-Departure Reroutes/Controllers	5	3	4
	Mid-Term CDM Implementation	5	3	4
	Flexible Routing in the Mid-Term	5	5	5
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	1	5	1
	RWSL	1	5	1
	Revised Departure Clearance via Data Comm	5	5	5
	Airport Configuration Management Increment 1	5	5	5
	Taxi Routing Increment 1	5	5	5
	External Data Exchange	5	5	5
	Moving Map with Own-Ship Position	1	3	1
	CDTI/TIS-B for Surface	1	3	1
	Runway Assignments Increment 1	5	5	5
	Scheduling and Sequencing Increment 1	5	5	5
	Departure Routing Increment 1	5	5	5
	Provide Full Surface Situation Information	3	1	2
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	1	3	1
	Integrated Departure/Arrival Capability (IDAC)	5	3	4
	Extended Metering	5	5	5
	Implement TMA at Additional Airports	0	5	0
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	5	3	4
	Mid-Term Trajectory-Based Management, Gate-to-Gate	5	3	4
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	0	3	0
	Integrated Arrival/Departure Airspace Management	5	3	4
Runway Operations	Use Converging Runway Display Aid (CRDA)	3	5	3
	Additional 7110.308 Airports (WTMA Procedures)	3	5	3
	Amend Independent and Dependent Runway Standards in Order 7110.65	3	3	3
	CSPO Use of PRM-A	1	3	1
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	3	3	3
	Implement LPV/GLS or ILS for Parallel Runway Operations	0	3	0
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	5	5	5
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	5	5	5
	Initial Tailored Arrivals (ITAs)	3	5	3
	RNP and RNP AR Approaches	5	5	5
	GBAS Category II/III	3	3	3
	Expanded Radar-like Services/Secondary Airports	1	5	1
	OPDs Using RNAV and RNP STARs	5	5	5
	GBAS Category I Non-Federal System Approval	3	5	3
	LPV Approaches	1	5	1
	Low Visibility Surface Operations	1	1	1
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	1	1	1

ICWG Metroplex Mapping Results

Integrated Capability		Houston		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	0	5	0
	Transition/PBN Routing for Cruise Operations	5	5	5
	Delegated Responsibility for Horizontal Separation and FIM-S	1	1	1
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	1	1	1
	Reduced Horizontal Separation Standards, En Route-3 Miles	5	3	4
	Relative Position Indicator (RPI)	5	3	4
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	1	3	1
	NextGen En Route DME Infrastructure	1	1	1
	FMC Route Offset	3	2	2
	Deconflict Operations Among Adjacent Airports	3	2	2
	Mid-Term Efficient Metroplex Merging and Spacing	5	2	3
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	1	3	1
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	3	3	3
	ANSP Real-Time Status for SUAs	5	5	5
	SAA Forecast of Capacity Constraints	5	3	4
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	1	3	1
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	3	2	2
	Full Improved Weather Information and Dissemination	3	2	2

Note: Integrated capabilities were rated by the ICWG using a five-point scale with 1 indicating low need/benefits or feasibility and 5 indicating high need/benefits or feasibility. Ratings of 0 represent integrated capabilities that are already well on their way to implementation or where implementation has been completed.

ICWG Metroplex Mapping Results

Integrated Capability		Las Vegas		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	5	5	5
	Delivery of Pre-Departure Reroutes/Controllers	3	2	2
	Mid-Term CDM Implementation	5	3	4
	Flexible Routing in the Mid-Term	5	5	5
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	0	5	0
	RWSL	0	5	0
	Revised Departure Clearance via Data Comm	2	3	2
	Airport Configuration Management Increment 1	5	3	4
	Taxi Routing Increment 1	5	5	5
	External Data Exchange	5	4	4
	Moving Map with Own-Ship Position	2	3	2
	CDTI/TIS-B for Surface	3	3	3
	Runway Assignments Increment 1	4	5	4
	Scheduling and Sequencing Increment 1	4	5	4
	Departure Routing Increment 1	4	5	4
	Provide Full Surface Situation Information	3	1	2
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	4	3	3
	Integrated Departure/Arrival Capability (IDAC)	4	5	4
	Extended Metering	4	3	3
	Implement TMA at Additional Airports	4	3	3
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	5	5	5
	Mid-Term Trajectory-Based Management, Gate-to-Gate	5	3	4
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	4	4	4
	Integrated Arrival/Departure Airspace Management	5	4	4
Runway Operations	Use Converging Runway Display Aid (CRDA)	3	5	3
	Additional 7110.308 Airports (WTMA Procedures)	4	5	4
	Amend Independent and Dependent Runway Standards in Order 7110.65	0	3	0
	CSPO Use of PRM-A	0	3	0
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	3	3	3
	Implement LPV/GLS or ILS for Parallel Runway Operations	3	3	3
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	5	5	5
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	1	5	1
	Initial Tailored Arrivals (ITAs)	1	5	1
	RNP and RNP AR Approaches	5	5	5
	GBAS Category II/III	1	3	1
	Expanded Radar-like Services/Secondary Airports	5	5	5
	OPDs Using RNAV and RNP STARs	5	5	5
	GBAS Category I Non-Federal System Approval	1	3	1
	LPV Approaches	5	5	5
	Low Visibility Surface Operations	1	1	1
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	1	1	1

ICWG Metroplex Mapping Results

Integrated Capability		Las Vegas		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	2	5	2
	Transition/PBN Routing for Cruise Operations	0	5	0
	Delegated Responsibility for Horizontal Separation and FIM-S	3	2	2
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	3	2	2
	Reduced Horizontal Separation Standards, En Route-3 Miles	4	2	3
	Relative Position Indicator (RPI)	5	3	4
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	5	4	4
	NextGen En Route DME Infrastructure	2	3	2
	FMC Route Offset	1	1	1
	Deconflict Operations Among Adjacent Airports	4	3	3
	Mid-Term Efficient Metroplex Merging and Spacing	3	2	2
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	1	3	1
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	1
	ANSP Real-Time Status for SUAs	5	5	5
	SAA Forecast of Capacity Constraints	5	3	4
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	1	3	1
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	2	1
	Full Improved Weather Information and Dissemination	1	2	1

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Integrated Capability		Memphis		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	5	5	5
	Delivery of Pre-Departure Reroutes/Controllers	3	2	2
	Mid-Term CDM Implementation	5	3	4
	Flexible Routing in the Mid-Term	5	5	5
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	0	5	0
	RWSL	3	5	3
	Revised Departure Clearance via Data Comm	5	5	5
	Airport Configuration Management Increment 1	0	3	0
	Taxi Routing Increment 1	0	5	0
	External Data Exchange	5	4	4
	Moving Map with Own-Ship Position	2	3	2
	CDTI/TIS-B for Surface	3	3	3
	Runway Assignments Increment 1	0	5	0
	Scheduling and Sequencing Increment 1	4	5	4
	Departure Routing Increment 1	4	5	4
	Provide Full Surface Situation Information	3	1	2
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	0	3	0
	Integrated Departure/Arrival Capability (IDAC)	5	5	5
	Extended Metering	3	3	3
	Implement TMA at Additional Airports	0	3	0
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	5	5	5
	Mid-Term Trajectory-Based Management, Gate-to-Gate	5	3	4
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	4	3	3
	Integrated Arrival/Departure Airspace Management	2	3	2
Runway Operations	Use Converging Runway Display Aid (CRDA)	0	5	0
	Additional 7110.308 Airports (WTMA Procedures)	0	5	0
	Amend Independent and Dependent Runway Standards in Order 7110.65	0	3	0
	CSPO Use of PRM-A	0	3	0
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	0	3	0
	Implement LPV/GLS or ILS for Parallel Runway Operations	3	3	3
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	5	5	5
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	2	5	2
	Initial Tailored Arrivals (ITAs)	1	5	1
	RNP and RNP AR Approaches	5	5	5
	GBAS Category II/III	2	3	2
	Expanded Radar-like Services/Secondary Airports	3	5	3
	OPDs Using RNAV and RNP STARs	5	5	5
	GBAS Category I Non-Federal System Approval	2	3	2
	LPV Approaches	4	5	4
	Low Visibility Surface Operations	3	1	2
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	3	1	2

ICWG Metroplex Mapping Results

Integrated Capability		Memphis		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	3	5	3
	Transition/PBN Routing for Cruise Operations	0	5	0
	Delegated Responsibility for Horizontal Separation and FIM-S	3	2	2
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	3	2	2
	Reduced Horizontal Separation Standards, En Route-3 Miles	5	2	3
	Relative Position Indicator (RPI)	5	3	4
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	3	3	3
	NextGen En Route DME Infrastructure	1	3	1
	FMC Route Offset	1	1	1
	Deconflict Operations Among Adjacent Airports	1	3	1
	Mid-Term Efficient Metroplex Merging and Spacing	2	2	2
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	1	3	1
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	1
	ANSP Real-Time Status for SUAs	5	5	5
	SAA Forecast of Capacity Constraints	5	3	4
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	1	3	1
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	2	1
	Full Improved Weather Information and Dissemination	1	2	1

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Integrated Capability		Minneapolis-St. Paul		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	5	5	5
	Delivery of Pre-Departure Reroutes/Controllers	3	2	2
	Mid-Term CDM Implementation	5	3	4
	Flexible Routing in the Mid-Term	5	5	5
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	0	5	0
	RWSL	0	5	0
	Revised Departure Clearance via Data Comm	4	4	4
	Airport Configuration Management Increment 1	5	3	4
	Taxi Routing Increment 1	4	5	4
	External Data Exchange	5	4	4
	Moving Map with Own-Ship Position	3	3	3
	CDTI/TIS-B for Surface	3	3	3
	Runway Assignments Increment 1	5	5	5
	Scheduling and Sequencing Increment 1	5	5	5
	Departure Routing Increment 1	4	5	4
	Provide Full Surface Situation Information	4	1	2
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	3	3	3
	Integrated Departure/Arrival Capability (IDAC)	5	5	5
	Extended Metering	4	3	3
	Implement TMA at Additional Airports	0	3	0
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	5	5	5
	Mid-Term Trajectory-Based Management, Gate-to-Gate	5	3	4
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	4	3	3
	Integrated Arrival/Departure Airspace Management	4	4	4
Runway Operations	Use Converging Runway Display Aid (CRDA)	3	5	3
	Additional 7110.308 Airports (WTMA Procedures)	0	5	0
	Amend Independent and Dependent Runway Standards in Order 7110.65	4	2	3
	CSPO Use of PRM-A	4	3	3
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	0	3	0
	Implement LPV/GLS or ILS for Parallel Runway Operations	3	5	3
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	5	5	5
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	4	5	4
	Initial Tailored Arrivals (ITAs)	1	5	1
	RNP and RNP AR Approaches	5	5	5
	GBAS Category II/III	3	3	3
	Expanded Radar-like Services/Secondary Airports	5	5	5
	OPDs Using RNAV and RNP STARs	5	5	5
	GBAS Category I Non-Federal System Approval	2	5	2
	LPV Approaches	5	5	5
	Low Visibility Surface Operations	3	1	2
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	3	1	2

ICWG Metroplex Mapping Results

	Integrated Capability	Minneapolis-St. Paul		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	2	5	2
	Transition/PBN Routing for Cruise Operations	3	5	3
	Delegated Responsibility for Horizontal Separation and FIM-S	3	2	2
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	3	2	2
	Reduced Horizontal Separation Standards, En Route-3 Miles	4	2	3
	Relative Position Indicator (RPI)	4	3	3
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	3	3	3
	NextGen En Route DME Infrastructure	1	3	1
	FMC Route Offset	1	1	1
	Deconflict Operations Among Adjacent Airports	2	3	2
	Mid-Term Efficient Metroplex Merging and Spacing	3	2	2
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	1	3	1
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	1
	ANSP Real-Time Status for SUAs	4	5	4
	SAA Forecast of Capacity Constraints	4	3	3
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	1	3	1
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	2	1
	Full Improved Weather Information and Dissemination	1	2	1

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Integrated Capability		New York		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	5	2	3
	Delivery of Pre-Departure Reroutes/Controllers	3	3	3
	Mid-Term CDM Implementation	5	3	4
	Flexible Routing in the Mid-Term	5	1	3
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	0	5	0
	RWSL	0	0	0
	Revised Departure Clearance via Data Comm	5	3	4
	Airport Configuration Management Increment 1	5	5	5
	Taxi Routing Increment 1	5	5	5
	External Data Exchange	5	5	5
	Moving Map with Own-Ship Position	3	1	2
	CDTI/TIS-B for Surface	3	1	2
	Runway Assignments Increment 1	5	5	5
	Scheduling and Sequencing Increment 1	5	5	5
	Departure Routing Increment 1	5	5	5
	Provide Full Surface Situation Information	1	1	1
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	3	3	3
	Integrated Departure/Arrival Capability (IDAC)	5	5	5
	Extended Metering	5	1	3
	Implement TMA at Additional Airports	3	5	3
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	3	5	3
	Mid-Term Trajectory-Based Management, Gate-to-Gate	5	3	4
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	4	3	3
	Integrated Arrival/Departure Airspace Management	5	3	4
Runway Operations	Use Converging Runway Display Aid (CRDA)	3	5	3
	Additional 7110.308 Airports (WTMA Procedures)	3	5	3
	Amend Independent and Dependent Runway Standards in Order 7110.65	5	5	5
	CSPO Use of PRM-A	5	5	5
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	5	3	4
	Implement LPV/GLS or ILS for Parallel Runway Operations	1	3	1
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	1	5	1
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	3	5	3
	Initial Tailored Arrivals (ITAs)	3	5	3
	RNP and RNP AR Approaches	5	3	4
	GBAS Category II/III	3	1	2
	Expanded Radar-like Services/Secondary Airports	1	5	1
	OPDs Using RNAV and RNP STARs	5	2	3
	GBAS Category I Non-Federal System Approval	1	5	1
	LPV Approaches	1	5	1
	Low Visibility Surface Operations	1	5	1
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	1	1	1

ICWG Metroplex Mapping Results

	Integrated Capability	New York		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	3	1	2
	Transition/PBN Routing for Cruise Operations	3	3	3
	Delegated Responsibility for Horizontal Separation and FIM-S	1	2	1
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	1	2	1
	Reduced Horizontal Separation Standards, En Route-3 Miles	5	3	4
	Relative Position Indicator (RPI)	3	1	2
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	0	5	0
	NextGen En Route DME Infrastructure	1	1	1
	FMC Route Offset	1	1	1
	Deconflict Operations Among Adjacent Airports	5	3	4
	Mid-Term Efficient Metroplex Merging and Spacing	5	3	4
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	1	3	1
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	1
	ANSP Real-Time Status for SUAs	1	5	1
	SAA Forecast of Capacity Constraints	3	3	3
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	3	3	3
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	2	1
	Full Improved Weather Information and Dissemination	1	2	1

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Integrated Capability		National Capital		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	5	5	5
	Delivery of Pre-Departure Reroutes/Controllers	3	2	2
	Mid-Term CDM Implementation	5	3	4
	Flexible Routing in the Mid-Term	5	5	5
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	0	5	0
	RWSL	0	5	0
	Revised Departure Clearance via Data Comm	5	3	4
	Airport Configuration Management Increment 1	4	3	3
	Taxi Routing Increment 1	3	5	3
	External Data Exchange	5	4	4
	Moving Map with Own-Ship Position	2	3	2
	CDTI/TIS-B for Surface	3	3	3
	Runway Assignments Increment 1	4	5	4
	Scheduling and Sequencing Increment 1	4	5	4
	Departure Routing Increment 1	5	5	5
	Provide Full Surface Situation Information	3	1	2
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	3	3	3
	Integrated Departure/Arrival Capability (IDAC)	5	5	5
	Extended Metering	4	3	3
	Implement TMA at Additional Airports	0	3	0
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	5	5	5
	Mid-Term Trajectory-Based Management, Gate-to-Gate	5	3	4
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	5	3	4
	Integrated Arrival/Departure Airspace Management	5	4	4
Runway Operations	Use Converging Runway Display Aid (CRDA)	0	5	0
	Additional 7110.308 Airports (WTMA Procedures)	0	5	0
	Amend Independent and Dependent Runway Standards in Order 7110.65	0	3	0
	CSPO Use of PRM-A	0	3	0
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	0	3	0
	Implement LPV/GLS or ILS for Parallel Runway Operations	3	3	3
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	4	5	4
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	4	5	4
	Initial Tailored Arrivals (ITAs)	2	5	2
	RNP and RNP AR Approaches	5	5	5
	GBAS Category II/III	4	3	3
	Expanded Radar-like Services/Secondary Airports	5	5	5
	OPDs Using RNAV and RNP STARs	5	5	5
	GBAS Category I Non-Federal System Approval	3	3	3
	LPV Approaches	5	5	5
	Low Visibility Surface Operations	3	1	2
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	3	1	2

ICWG Metroplex Mapping Results

Integrated Capability		National Capital		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	0	5	0
	Transition/PBN Routing for Cruise Operations	0	5	0
	Delegated Responsibility for Horizontal Separation and FIM-S	3	2	2
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	3	2	2
	Reduced Horizontal Separation Standards, En Route-3 Miles	5	2	3
	Relative Position Indicator (RPI)	5	3	4
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	5	3	4
	NextGen En Route DME Infrastructure	1	3	1
	FMC Route Offset	1	1	1
	Deconflict Operations Among Adjacent Airports	5	3	4
	Mid-Term Efficient Metroplex Merging and Spacing	3	2	2
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	1	3	1
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	1
	ANSP Real-Time Status for SUAs	5	5	5
	SAA Forecast of Capacity Constraints	5	3	4
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	1	3	1
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	2	1
	Full Improved Weather Information and Dissemination	1	2	1

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Integrated Capability		Northern Cal		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	5	5	5
	Delivery of Pre-Departure Reroutes/Controllers	3	2	2
	Mid-Term CDM Implementation	5	3	4
	Flexible Routing in the Mid-Term	5	5	5
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	0	5	0
	RWSL	0	5	0
	Revised Departure Clearance via Data Comm	3	5	3
	Airport Configuration Management Increment 1	4	3	3
	Taxi Routing Increment 1	5	5	5
	External Data Exchange	5	4	4
	Moving Map with Own-Ship Position	2	3	2
	CDTI/TIS-B for Surface	3	3	3
	Runway Assignments Increment 1	5	5	5
	Scheduling and Sequencing Increment 1	5	5	5
	Departure Routing Increment 1	3	5	3
	Provide Full Surface Situation Information	3	1	2
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	3	3	3
	Integrated Departure/Arrival Capability (IDAC)	5	5	5
	Extended Metering	4	3	3
	Implement TMA at Additional Airports	0	3	0
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	5	5	5
	Mid-Term Trajectory-Based Management, Gate-to-Gate	5	3	4
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	5	3	4
	Integrated Arrival/Departure Airspace Management	5	4	4
Runway Operations	Use Converging Runway Display Aid (CRDA)	3	5	3
	Additional 7110.308 Airports (WTMA Procedures)	5	5	5
	Amend Independent and Dependent Runway Standards in Order 7110.65	4	3	3
	CSPO Use of PRM-A	0	3	0
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	5	4	4
	Implement LPV/GLS or ILS for Parallel Runway Operations	3	3	3
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	5	5	5
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	5	5	5
	Initial Tailored Arrivals (ITAs)	0	5	0
	RNP and RNP AR Approaches	5	5	5
	GBAS Category II/III	3	3	3
	Expanded Radar-like Services/Secondary Airports	4	5	4
	OPDs Using RNAV and RNP STARs	5	5	5
	GBAS Category I Non-Federal System Approval	2	3	2
	LPV Approaches	5	5	5
	Low Visibility Surface Operations	3	1	2
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	3	1	2

ICWG Metroplex Mapping Results

Integrated Capability		Northern Cal		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	0	5	0
	Transition/PBN Routing for Cruise Operations	0	5	0
	Delegated Responsibility for Horizontal Separation and FIM-S	3	2	2
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	3	2	2
	Reduced Horizontal Separation Standards, En Route-3 Miles	5	2	3
	Relative Position Indicator (RPI)	5	3	4
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	4	3	3
	NextGen En Route DME Infrastructure	1	3	1
	FMC Route Offset	1	1	1
	Deconflict Operations Among Adjacent Airports	5	3	4
	Mid-Term Efficient Metroplex Merging and Spacing	3	2	2
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	1	3	1
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	1
	ANSP Real-Time Status for SUAs	5	5	5
	SAA Forecast of Capacity Constraints	5	3	4
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	1	3	1
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	2	1
	Full Improved Weather Information and Dissemination	1	2	1

Note: Integrated capabilities were rated by the ICWG using a five-point scale with 1 indicating low need/benefits or feasibility and 5 indicating high need/benefits or feasibility. Ratings of 0 represent integrated capabilities that are already well on their way to implementation or where implementation has been completed.

ICWG Metroplex Mapping Results

Integrated Capability		Orlando		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	5	5	5
	Delivery of Pre-Departure Reroutes/Controllers	3	2	2
	Mid-Term CDM Implementation	5	3	4
	Flexible Routing in the Mid-Term	5	5	5
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	0	5	0
	RWSL	0	5	0
	Revised Departure Clearance via Data Comm	4	4	4
	Airport Configuration Management Increment 1	3	3	3
	Taxi Routing Increment 1	4	5	4
	External Data Exchange	4	4	4
	Moving Map with Own-Ship Position	3	3	3
	CDTI/TIS-B for Surface	3	3	3
	Runway Assignments Increment 1	3	5	3
	Scheduling and Sequencing Increment 1	4	5	4
	Departure Routing Increment 1	4	5	4
	Provide Full Surface Situation Information	3	1	2
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	4	3	3
	Integrated Departure/Arrival Capability (IDAC)	3	5	3
	Extended Metering	4	3	3
	Implement TMA at Additional Airports	0	3	3
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	5	5	5
	Mid-Term Trajectory-Based Management, Gate-to-Gate	5	3	4
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	4	3	3
	Integrated Arrival/Departure Airspace Management	4	4	4
Runway Operations	Use Converging Runway Display Aid (CRDA)	0	5	0
	Additional 7110.308 Airports (WTMA Procedures)	0	5	0
	Amend Independent and Dependent Runway Standards in Order 7110.65	0	3	0
	CSPO Use of PRM-A	0	3	0
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	0	3	0
	Implement LPV/GLS or ILS for Parallel Runway Operations	3	3	3
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	5	5	5
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	2	5	2
	Initial Tailored Arrivals (ITAs)	1	5	1
	RNP and RNP AR Approaches	5	5	5
	GBAS Category II/III	2	3	2
	Expanded Radar-like Services/Secondary Airports	4	5	4
	OPDs Using RNAV and RNP STARs	5	5	5
	GBAS Category I Non-Federal System Approval	2	3	2
	LPV Approaches	4	5	4
	Low Visibility Surface Operations	3	1	2
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	3	1	2

ICWG Metroplex Mapping Results

Integrated Capability		Orlando		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	0	5	0
	Transition/PBN Routing for Cruise Operations	2	5	2
	Delegated Responsibility for Horizontal Separation and FIM-S	3	2	2
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	3	2	2
	Reduced Horizontal Separation Standards, En Route-3 Miles	4	2	3
	Relative Position Indicator (RPI)	3	3	3
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	3	3	3
	NextGen En Route DME Infrastructure	1	3	1
	FMC Route Offset	2	1	1
	Deconflict Operations Among Adjacent Airports	2	3	2
	Mid-Term Efficient Metroplex Merging and Spacing	3	2	2
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	1	3	1
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	1
	ANSP Real-Time Status for SUAs	5	5	5
	SAA Forecast of Capacity Constraints	5	3	4
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	1	3	1
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	2	1
	Full Improved Weather Information and Dissemination	1	2	1

Note: Integrated capabilities were rated by the ICWG using a five-point scale with 1 indicating low need/benefits or feasibility and 5 indicating high need/benefits or feasibility. Ratings of 0 represent integrated capabilities that are already well on their way to implementation or where implementation has been completed.

Integrated Capability		Philadelphia		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	3	3	3
	Delivery of Pre-Departure Reroutes/Controllers	3	2	2
	Mid-Term CDM Implementation	5	5	5
	Flexible Routing in the Mid-Term	5	5	5
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	1	5	1
	RWSL	1	5	1
	Revised Departure Clearance via Data Comm	3	3	3
	Airport Configuration Management Increment 1	5	3	4
	Taxi Routing Increment 1	3	5	3
	External Data Exchange	5	3	4
	Moving Map with Own-Ship Position	3	5	3
	CDTI/TIS-B for Surface	3	5	3
	Runway Assignments Increment 1	4	4	4
	Scheduling and Sequencing Increment 1	4	4	4
	Departure Routing Increment 1	5	5	5
	Provide Full Surface Situation Information	3	1	2
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	0	3	0
	Integrated Departure/Arrival Capability (IDAC)	5	5	5
	Extended Metering	3	3	3
	Implement TMA at Additional Airports	0	5	0
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	3	5	3
	Mid-Term Trajectory-Based Management, Gate-to-Gate	3	3	3
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	5	4	4
	Integrated Arrival/Departure Airspace Management	5	3	4
Runway Operations	Use Converging Runway Display Aid (CRDA)	5	5	5
	Additional 7110.308 Airports (WTMA Procedures)	5	5	5
	Amend Independent and Dependent Runway Standards in Order 7110.65	3	3	3
	CSPO Use of PRM-A	3	1	2
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	5	3	4
	Implement LPV/GLS or ILS for Parallel Runway Operations	3	3	3
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	5	5	5
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	5	5	5
	Initial Tailored Arrivals (ITAs)	3	5	3
	RNP and RNP AR Approaches	5	5	5
	GBAS Category II/III	5	3	4
	Expanded Radar-like Services/Secondary Airports	5	5	5
	OPDs Using RNAV and RNP STARs	5	5	5
	GBAS Category I Non-Federal System Approval	3	3	3
	LPV Approaches	3	5	3
	Low Visibility Surface Operations	1	1	1
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	1	1	1

ICWG Metroplex Mapping Results

Integrated Capability		Philadelphia		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	5	5	5
	Transition/PBN Routing for Cruise Operations	5	5	5
	Delegated Responsibility for Horizontal Separation and FIM-S	3	3	3
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	5	3	4
	Reduced Horizontal Separation Standards, En Route-3 Miles	5	3	4
	Relative Position Indicator (RPI)	3	3	3
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	0	5	0
	NextGen En Route DME Infrastructure	3	3	3
	FMC Route Offset	3	1	2
	Deconflict Operations Among Adjacent Airports	5	3	4
	Mid-Term Efficient Metroplex Merging and Spacing	4	3	3
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	3	3	3
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	1
	ANSP Real-Time Status for SUAs	5	5	5
	SAA Forecast of Capacity Constraints	5	3	4
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	3	3	3
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	2	1
	Full Improved Weather Information and Dissemination	3	2	2

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Integrated Capability		Phoenix		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	5	5	5
	Delivery of Pre-Departure Reroutes/Controllers	3	2	2
	Mid-Term CDM Implementation	5	3	4
	Flexible Routing in the Mid-Term	5	5	5
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	0	5	0
	RWSL	0	5	0
	Revised Departure Clearance via Data Comm	3	3	3
	Airport Configuration Management Increment 1	3	3	3
	Taxi Routing Increment 1	3	5	3
	External Data Exchange	4	4	4
	Moving Map with Own-Ship Position	2	3	2
	CDTI/TIS-B for Surface	3	3	3
	Runway Assignments Increment 1	3	5	3
	Scheduling and Sequencing Increment 1	3	5	3
	Departure Routing Increment 1	4	5	4
	Provide Full Surface Situation Information	3	1	2
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	0	3	0
	Integrated Departure/Arrival Capability (IDAC)	5	5	5
	Extended Metering	3	3	3
	Implement TMA at Additional Airports	0	3	0
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	5	5	5
	Mid-Term Trajectory-Based Management, Gate-to-Gate	5	3	4
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	5	4	4
	Integrated Arrival/Departure Airspace Management	4	4	4
Runway Operations	Use Converging Runway Display Aid (CRDA)	0	5	0
	Additional 7110.308 Airports (WTMA Procedures)	0	5	0
	Amend Independent and Dependent Runway Standards in Order 7110.65	0	3	0
	CSPO Use of PRM-A	0	3	0
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	0	3	0
	Implement LPV/GLS or ILS for Parallel Runway Operations	3	3	3
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	4	5	4
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	1	5	1
	Initial Tailored Arrivals (ITAs)	1	5	1
	RNP and RNP AR Approaches	4	5	4
	GBAS Category II/III	1	3	1
	Expanded Radar-like Services/Secondary Airports	3	5	3
	OPDs Using RNAV and RNP STARs	5	5	5
	GBAS Category I Non-Federal System Approval	1	3	1
	LPV Approaches	5	5	5
	Low Visibility Surface Operations	1	1	1
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	1	1	1

ICWG Metroplex Mapping Results

Integrated Capability		Phoenix		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	3	5	3
	Transition/PBN Routing for Cruise Operations	0	5	0
	Delegated Responsibility for Horizontal Separation and FIM-S	3	2	2
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	3	2	2
	Reduced Horizontal Separation Standards, En Route-3 Miles	4	2	3
	Relative Position Indicator (RPI)	4	3	3
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	3	3	3
	NextGen En Route DME Infrastructure	1	3	1
	FMC Route Offset	1	1	1
	Deconflict Operations Among Adjacent Airports	2	3	2
	Mid-Term Efficient Metroplex Merging and Spacing	2	2	2
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	1	3	1
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	1
	ANSP Real-Time Status for SUAs	5	5	5
	SAA Forecast of Capacity Constraints	5	3	4
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	1	3	1
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	2	1
	Full Improved Weather Information and Dissemination	1	2	1

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Integrated Capability		Portland		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	5	5	5
	Delivery of Pre-Departure Reroutes/Controllers	3	2	2
	Mid-Term CDM Implementation	5	3	4
	Flexible Routing in the Mid-Term	5	5	5
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	3	5	0
	RWSL	2	5	3
	Revised Departure Clearance via Data Comm	3	3	3
	Airport Configuration Management Increment 1	3	3	3
	Taxi Routing Increment 1	3	5	3
	External Data Exchange	4	4	3
	Moving Map with Own-Ship Position	2	3	2
	CDTI/TIS-B for Surface	3	3	3
	Runway Assignments Increment 1	3	5	3
	Scheduling and Sequencing Increment 1	4	5	3
	Departure Routing Increment 1	4	5	3
	Provide Full Surface Situation Information	3	1	2
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	0	3	0
	Integrated Departure/Arrival Capability (IDAC)	2	5	2
	Extended Metering	2	3	2
	Implement TMA at Additional Airports	0	3	0
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	5	5	5
	Mid-Term Trajectory-Based Management, Gate-to-Gate	3	3	3
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	3	3	3
	Integrated Arrival/Departure Airspace Management	3	4	3
Runway Operations	Use Converging Runway Display Aid (CRDA)	1	5	0
	Additional 7110.308 Airports (WTMA Procedures)	0	5	0
	Amend Independent and Dependent Runway Standards in Order 7110.65	3	2	0
	CSPO Use of PRM-A	3	3	0
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	0	3	2
	Implement LPV/GLS or ILS for Parallel Runway Operations	3	3	3
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	5	5	5
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	4	5	3
	Initial Tailored Arrivals (ITAs)	1	5	1
	RNP and RNP AR Approaches	5	5	5
	GBAS Category II/III	3	3	3
	Expanded Radar-like Services/Secondary Airports	4	5	3
	OPDs Using RNAV and RNP STARs	5	5	5
	GBAS Category I Non-Federal System Approval	3	3	2
	LPV Approaches	5	5	2
	Low Visibility Surface Operations	3	1	2
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	3	1	2

ICWG Metroplex Mapping Results

Integrated Capability		Portland		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	3	5	3
	Transition/PBN Routing for Cruise Operations	0	5	1
	Delegated Responsibility for Horizontal Separation and FIM-S	3	2	2
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	3	2	2
	Reduced Horizontal Separation Standards, En Route-3 Miles	3	2	2
	Relative Position Indicator (RPI)	3	3	2
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	2	3	2
	NextGen En Route DME Infrastructure	1	3	1
	FMC Route Offset	1	1	1
	Deconflict Operations Among Adjacent Airports	2	3	1
	Mid-Term Efficient Metroplex Merging and Spacing	3	2	2
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	1	3	1
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	1
	ANSP Real-Time Status for SUAs	3	5	3
	SAA Forecast of Capacity Constraints	3	3	3
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	1	3	1
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	2	1
	Full Improved Weather Information and Dissemination	1	2	1

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Integrated Capability		Salt Lake		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	5	5	5
	Delivery of Pre-Departure Reroutes/Controllers	3	2	2
	Mid-Term CDM Implementation	5	3	4
	Flexible Routing in the Mid-Term	5	5	5
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	0	5	0
	RWSL	3	5	3
	Revised Departure Clearance via Data Comm	3	3	3
	Airport Configuration Management Increment 1	3	3	3
	Taxi Routing Increment 1	3	5	3
	External Data Exchange	4	4	4
	Moving Map with Own-Ship Position	3	3	3
	CDTI/TIS-B for Surface	3	3	3
	Runway Assignments Increment 1	3	5	3
	Scheduling and Sequencing Increment 1	4	5	4
	Departure Routing Increment 1	4	5	4
	Provide Full Surface Situation Information	4	1	2
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	3	3	3
	Integrated Departure/Arrival Capability (IDAC)	4	5	4
	Extended Metering	3	3	3
	Implement TMA at Additional Airports	0	3	0
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	5	5	5
	Mid-Term Trajectory-Based Management, Gate-to-Gate	4	3	3
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	3	3	3
	Integrated Arrival/Departure Airspace Management	3	4	3
Runway Operations	Use Converging Runway Display Aid (CRDA)	0	5	0
	Additional 7110.308 Airports (WTMA Procedures)	1	5	1
	Amend Independent and Dependent Runway Standards in Order 7110.65	3	3	3
	CSPO Use of PRM-A	0	3	0
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	1	3	1
	Implement LPV/GLS or ILS for Parallel Runway Operations	3	3	3
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	5	5	5
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	4	5	4
	Initial Tailored Arrivals (ITAs)	1	5	1
	RNP and RNP AR Approaches	5	5	5
	GBAS Category II/III	3	3	3
	Expanded Radar-like Services/Secondary Airports	5	5	5
	OPDs Using RNAV and RNP STARs	5	5	5
	GBAS Category I Non-Federal System Approval	2	3	2
	LPV Approaches	5	5	5
	Low Visibility Surface Operations	3	1	2
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	3	1	2

ICWG Metroplex Mapping Results

Integrated Capability		Salt Lake		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	3	5	3
	Transition/PBN Routing for Cruise Operations	0	5	0
	Delegated Responsibility for Horizontal Separation and FIM-S	3	2	2
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	3	2	2
	Reduced Horizontal Separation Standards, En Route-3 Miles	3	2	2
	Relative Position Indicator (RPI)	3	3	3
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	2	3	2
	NextGen En Route DME Infrastructure	2	3	2
	FMC Route Offset	1	1	1
	Deconflict Operations Among Adjacent Airports	1	3	1
	Mid-Term Efficient Metroplex Merging and Spacing	3	2	2
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	1	3	1
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	1
	ANSP Real-Time Status for SUAs	5	5	5
	SAA Forecast of Capacity Constraints	5	3	4
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	1	3	1
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	2	1
	Full Improved Weather Information and Dissemination	1	2	1

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Integrated Capability		Seattle		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	5	5	5
	Delivery of Pre-Departure Reroutes/Controllers	3	2	2
	Mid-Term CDM Implementation	5	3	4
	Flexible Routing in the Mid-Term	5	5	5
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	0	5	0
	RWSL	0	5	0
	Revised Departure Clearance via Data Comm	3	5	3
	Airport Configuration Management Increment 1	4	3	3
	Taxi Routing Increment 1	5	5	5
	External Data Exchange	5	4	4
	Moving Map with Own-Ship Position	3	3	3
	CDTI/TIS-B for Surface	3	3	3
	Runway Assignments Increment 1	5	5	5
	Scheduling and Sequencing Increment 1	5	5	5
	Departure Routing Increment 1	3	5	3
	Provide Full Surface Situation Information	4	1	2
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	0	3	0
	Integrated Departure/Arrival Capability (IDAC)	5	5	5
	Extended Metering	3	3	3
	Implement TMA at Additional Airports	0	3	0
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	5	5	5
	Mid-Term Trajectory-Based Management, Gate-to-Gate	5	3	4
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	5	3	4
	Integrated Arrival/Departure Airspace Management	3	3	3
Runway Operations	Use Converging Runway Display Aid (CRDA)	0	5	0
	Additional 7110.308 Airports (WTMA Procedures)	0	5	0
	Amend Independent and Dependent Runway Standards in Order 7110.65	5	3	4
	CSPO Use of PRM-A	5	3	4
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	5	4	4
	Implement LPV/GLS or ILS for Parallel Runway Operations	3	5	3
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	5	5	5
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	5	5	5
	Initial Tailored Arrivals (ITAs)	3	5	3
	RNP and RNP AR Approaches	5	5	5
	GBAS Category II/III	3	3	3
	Expanded Radar-like Services/Secondary Airports	3	5	3
	OPDs Using RNAV and RNP STARs	5	5	5
	GBAS Category I Non-Federal System Approval	3	5	3
	LPV Approaches	4	5	4
	Low Visibility Surface Operations	4	1	2
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	4	1	2

ICWG Metroplex Mapping Results

Integrated Capability		Seattle		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	2	5	2
	Transition/PBN Routing for Cruise Operations	0	5	0
	Delegated Responsibility for Horizontal Separation and FIM-S	3	2	2
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	3	2	2
	Reduced Horizontal Separation Standards, En Route-3 Miles	3	2	2
	Relative Position Indicator (RPI)	5	3	4
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	3	3	3
	NextGen En Route DME Infrastructure	1	3	1
	FMC Route Offset	1	1	1
	Deconflict Operations Among Adjacent Airports	5	3	4
	Mid-Term Efficient Metroplex Merging and Spacing	3	2	2
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	1	3	1
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	1
	ANSP Real-Time Status for SUAs	3	5	3
	SAA Forecast of Capacity Constraints	3	3	3
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	1	3	1
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	2	1
	Full Improved Weather Information and Dissemination	1	2	1

Note: Integrated capabilities were rated by the ICWG using a five-point scale with 1 indicating low need/benefits or feasibility and 5 indicating high need/benefits or feasibility. Ratings of 0 represent integrated capabilities that are already well on their way to implementation or where implementation has been completed.

Integrated Capability		Southern Cal		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	5	5	5
	Delivery of Pre-Departure Reroutes/Controllers	3	3	3
	Mid-Term CDM Implementation	3	3	3
	Flexible Routing in the Mid-Term	5	5	5
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	1	5	1
	RWSL	5	5	5
	Revised Departure Clearance via Data Comm	3	5	3
	Airport Configuration Management Increment 1	3	5	3
	Taxi Routing Increment 1	1	5	1
	External Data Exchange	5	5	5
	Moving Map with Own-Ship Position	1	3	1
	CDTI/TIS-B for Surface	1	3	1
	Runway Assignments Increment 1	3	5	3
	Scheduling and Sequencing Increment 1	3	5	3
	Departure Routing Increment 1	3	5	3
	Provide Full Surface Situation Information	1	3	1
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	5	3	4
	Integrated Departure/Arrival Capability (IDAC)	5	3	4
	Extended Metering	5	5	5
	Implement TMA at Additional Airports	5	5	5
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	5	3	4
	Mid-Term Trajectory-Based Management, Gate-to-Gate	5	3	4
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	5	3	4
	Integrated Arrival/Departure Airspace Management	5	3	4
Runway Operations	Use Converging Runway Display Aid (CRDA)	1	5	1
	Additional 7110.308 Airports (WTMA Procedures)	3	5	3
	Amend Independent and Dependent Runway Standards in Order 7110.65	1	3	1
	CSPO Use of PRM-A	1	3	1
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	1	3	1
	Implement LPV/GLS or ILS for Parallel Runway Operations	3	3	3
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	3	5	3
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	3	5	3
	Initial Tailored Arrivals (ITAs)	3	1	2
	RNP and RNP AR Approaches	5	5	5
	GBAS Category II/III	1	3	1
	Expanded Radar-like Services/Secondary Airports	5	5	5
	OPDs Using RNAV and RNP STARs	5	5	5
	GBAS Category I Non-Federal System Approval	1	5	1
	LPV Approaches	5	5	5
	Low Visibility Surface Operations	1	1	1
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	1	1	1

ICWG Metroplex Mapping Results

Integrated Capability		Southern Cal		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	0	5	0
	Transition/PBN Routing for Cruise Operations	5	5	5
	Delegated Responsibility for Horizontal Separation and FIM-S	1	1	1
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	1	1	1
	Reduced Horizontal Separation Standards, En Route-3 Miles	3	3	3
	Relative Position Indicator (RPI)	4	3	3
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	5	1	3
	NextGen En Route DME Infrastructure	3	3	3
	FMC Route Offset	1	3	1
	Deconflict Operations Among Adjacent Airports	5	5	5
	Mid-Term Efficient Metroplex Merging and Spacing	3	2	2
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	3	3	3
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	1
	ANSP Real-Time Status for SUAs	5	5	5
	SAA Forecast of Capacity Constraints	5	3	4
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	3	2	2
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	2	1
	Full Improved Weather Information and Dissemination	1	1	1

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Integrated Capability		South Florida		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	5	5	5
	Delivery of Pre-Departure Reroutes/Controllers	3	2	2
	Mid-Term CDM Implementation	5	3	4
	Flexible Routing in the Mid-Term	5	5	5
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	0	5	0
	RWSL	2	5	2
	Revised Departure Clearance via Data Comm	5	4	4
	Airport Configuration Management Increment 1	3	3	3
	Taxi Routing Increment 1	3	5	3
	External Data Exchange	4	4	4
	Moving Map with Own-Ship Position	2	3	2
	CDTI/TIS-B for Surface	3	3	3
	Runway Assignments Increment 1	3	5	3
	Scheduling and Sequencing Increment 1	3	5	3
	Departure Routing Increment 1	3	5	3
	Provide Full Surface Situation Information	3	1	2
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	0	3	0
	Integrated Departure/Arrival Capability (IDAC)	5	5	5
	Extended Metering	3	3	3
	Implement TMA at Additional Airports	0	3	0
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	5	5	5
	Mid-Term Trajectory-Based Management, Gate-to-Gate	5	3	4
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	3	3	3
	Integrated Arrival/Departure Airspace Management	5	4	4
Runway Operations	Use Converging Runway Display Aid (CRDA)	0	5	0
	Additional 7110.308 Airports (WTMA Procedures)	3	5	3
	Amend Independent and Dependent Runway Standards in Order 7110.65	3	3	3
	CSPO Use of PRM-A	3	3	3
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	3	3	3
	Implement LPV/GLS or ILS for Parallel Runway Operations	3	3	3
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	3	5	3
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	2	5	2
	Initial Tailored Arrivals (ITAs)	4	5	4
	RNP and RNP AR Approaches	5	5	5
	GBAS Category II/III	2	3	2
	Expanded Radar-like Services/Secondary Airports	3	5	3
	OPDs Using RNAV and RNP STARs	5	5	5
	GBAS Category I Non-Federal System Approval	2	3	2
	LPV Approaches	4	5	4
	Low Visibility Surface Operations	3	1	2
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	3	1	2

ICWG Metroplex Mapping Results

Integrated Capability		South Florida		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	4	5	4
	Transition/PBN Routing for Cruise Operations	0	5	0
	Delegated Responsibility for Horizontal Separation and FIM-S	3	2	2
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	3	2	2
	Reduced Horizontal Separation Standards, En Route-3 Miles	4	2	3
	Relative Position Indicator (RPI)	4	3	3
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	2	3	2
	NextGen En Route DME Infrastructure	1	3	1
	FMC Route Offset	2	1	1
	Deconflict Operations Among Adjacent Airports	4	3	3
	Mid-Term Efficient Metroplex Merging and Spacing	3	2	2
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	1	3	1
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	1
	ANSP Real-Time Status for SUAs	5	5	5
	SAA Forecast of Capacity Constraints	5	3	4
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	1	3	1
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	2	1
	Full Improved Weather Information and Dissemination	1	2	1

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Integrated Capability		St. Louis		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	5	5	5
	Delivery of Pre-Departure Reroutes/Controllers	3	2	2
	Mid-Term CDM Implementation	5	3	4
	Flexible Routing in the Mid-Term	5	5	5
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	0	5	0
	RWSL	3	5	3
	Revised Departure Clearance via Data Comm	3	3	3
	Airport Configuration Management Increment 1	3	3	3
	Taxi Routing Increment 1	3	5	3
	External Data Exchange	3	4	3
	Moving Map with Own-Ship Position	2	3	2
	CDTI/TIS-B for Surface	3	3	3
	Runway Assignments Increment 1	3	5	3
	Scheduling and Sequencing Increment 1	3	5	3
	Departure Routing Increment 1	3	5	3
	Provide Full Surface Situation Information	3	1	2
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	0	3	0
	Integrated Departure/Arrival Capability (IDAC)	2	5	2
	Extended Metering	2	3	2
	Implement TMA at Additional Airports	0	3	0
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	5	5	5
	Mid-Term Trajectory-Based Management, Gate-to-Gate	3	3	3
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	3	3	3
	Integrated Arrival/Departure Airspace Management	3	4	3
Runway Operations	Use Converging Runway Display Aid (CRDA)	0	5	0
	Additional 7110.308 Airports (WTMA Procedures)	0	5	0
	Amend Independent and Dependent Runway Standards in Order 7110.65	0	3	0
	CSPO Use of PRM-A	0	3	0
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	2	3	2
	Implement LPV/GLS or ILS for Parallel Runway Operations	3	3	3
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	5	5	5
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	3	5	3
	Initial Tailored Arrivals (ITAs)	1	5	1
	RNP and RNP AR Approaches	5	5	5
	GBAS Category II/III	3	3	3
	Expanded Radar-like Services/Secondary Airports	3	5	3
	OPDs Using RNAV and RNP STARs	5	5	5
	GBAS Category I Non-Federal System Approval	2	3	2
	LPV Approaches	2	5	2
	Low Visibility Surface Operations	3	1	2
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	3	1	2

ICWG Metroplex Mapping Results

Integrated Capability		St. Louis		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	3	5	3
	Transition/PBN Routing for Cruise Operations	1	5	1
	Delegated Responsibility for Horizontal Separation and FIM-S	3	2	2
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	3	2	2
	Reduced Horizontal Separation Standards, En Route-3 Miles	2	2	2
	Relative Position Indicator (RPI)	2	3	2
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	2	3	2
	NextGen En Route DME Infrastructure	1	3	1
	FMC Route Offset	1	1	1
	Deconflict Operations Among Adjacent Airports	1	3	1
	Mid-Term Efficient Metroplex Merging and Spacing	3	2	2
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	1	3	1
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	1
	ANSP Real-Time Status for SUAs	3	5	3
	SAA Forecast of Capacity Constraints	3	3	3
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	1	3	1
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	2	1
	Full Improved Weather Information and Dissemination	1	2	1

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Integrated Capability		Tampa		
		Needs/ Benefits	Feasibility	Overall
Collaborative air traffic management	Electronic Negotiations	5	5	5
	Delivery of Pre-Departure Reroutes/Controllers	3	2	3
	Mid-Term CDM Implementation	5	3	4
	Flexible Routing in the Mid-Term	5	5	5
	Provide Interactive Flight Planning from Anywhere	1	1	1
Improved Surface Operation	ASDE-X/Additional Airports	3	5	2
	RWSL	2	5	3
	Revised Departure Clearance via Data Comm	3	3	3
	Airport Configuration Management Increment 1	3	3	3
	Taxi Routing Increment 1	3	5	3
	External Data Exchange	3	4	3
	Moving Map with Own-Ship Position	2	3	2
	CDTI/TIS-B for Surface	3	3	3
	Runway Assignments Increment 1	3	5	3
	Scheduling and Sequencing Increment 1	3	5	3
	Departure Routing Increment 1	3	5	3
	Provide Full Surface Situation Information	2	1	2
Time-Based Flow Management	Implement TMA's ACM Capability at Additional Locations	3	3	1
	Integrated Departure/Arrival Capability (IDAC)	2	5	2
	Extended Metering	2	3	2
	Implement TMA at Additional Airports	2	3	0
	Use RNAV Route Data/Calculate Trajectories Used/Conduct TBM Operations	5	5	5
	Mid-Term Trajectory-Based Management, Gate-to-Gate	3	3	3
	Time-Based Metering with Efficient 3D Paths and RNAV/RNP	3	3	3
	Integrated Arrival/Departure Airspace Management	3	4	3
Runway Operations	Use Converging Runway Display Aid (CRDA)	0	5	0
	Additional 7110.308 Airports (WTMA Procedures)	0	5	0
	Amend Independent and Dependent Runway Standards in Order 7110.65	0	3	0
	CSPO Use of PRM-A	0	3	1
	Expand the 7110.308 Procedure/Heavy/757 Aircraft	0	3	2
	Implement LPV/GLS or ILS for Parallel Runway Operations	3	3	3
	Implement SATNAV (RNAV) or ILS for Parallel Runway Operations	5	5	5
Improved Approaches and Low Visibility Operations	Low-Visibility Operations Using Lower RVR Minima	2	5	3
	Initial Tailored Arrivals (ITAs)	1	5	1
	RNP and RNP AR Approaches	5	5	5
	GBAS Category II/III	2	3	3
	Expanded Radar-like Services/Secondary Airports	4	5	3
	OPDs Using RNAV and RNP STARs	5	5	5
	GBAS Category I Non-Federal System Approval	2	3	2
	LPV Approaches	3	5	3
	Low Visibility Surface Operations	3	1	2
	Provide Surface Situation Info for Near-Zero-Visibility Surface Operations	3	1	2

ICWG Metroplex Mapping Results

Integrated Capability		Tampa		
		Needs/ Benefits	Feasibility	Overall
Performance Based Navigation	Optimization of PBN Procedures	0	5	3
	Transition/PBN Routing for Cruise Operations	2	5	1
	Delegated Responsibility for Horizontal Separation and FIM-S	3	2	2
	Delegated Responsibility for Horizontal Separation (Lateral & Horizontal)	3	2	2
	Reduced Horizontal Separation Standards, En Route-3 Miles	2	2	2
	Relative Position Indicator (RPI)	2	3	2
	Large-Scale Redesign of Terminal and Transition Airspace Leveraging PBN	2	3	2
	NextGen En Route DME Infrastructure	1	3	1
	FMC Route Offset	2	1	1
	Deconflict Operations Among Adjacent Airports	2	3	1
	Mid-Term Efficient Metroplex Merging and Spacing	3	2	3
On-Demand NAS Information	Provide NAS Status via Digital NOTAMs	1	3	1
	Broadcast Flight and Status Data/Pilots/AOCs	1	3	1
	Provide Improved Flight Planning and In-Flight Advisories for FOCs/AOCs	1	3	1
	ANSP Real-Time Status for SUAs	5	5	3
	SAA Forecast of Capacity Constraints	5	3	3
Sep Mgt	Aircraft-to-Aircraft Alerts for 3nm Separation Areas	1	3	1
Com Serv	Initial Improved Weather Information from Non-Ground Based Sensors	1	2	1
	Full Improved Weather Information and Dissemination	1	2	1

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Appendix B
Integrated Capabilities
Working Group Members

Members of the ICWG

Sarah	**Dalton**	**Alaska Airlines (Co-chair)**
Chris	**Oswald**	**Airports Council International - North America (Co-chair)**
Dan	Allen	Federal Express Corporation
Philip	Basso	DoD Policy Board on Federal Aviation
Joe	Bertapelle	JetBlue Airlines
Tom	Bock	Port Authority of New York & New Jersey
Cyndy	Brown	RTCA, Inc.
Lee	Brown	The MITRE Corporation
Steve	Brown	National Business Aviation Association
Lorne	Cass	Federal Aviation Administration
Perry	Clausen	Southwest Airlines
Brad	Culbertson	Lockheed Martin Corporation
Bruce	DeCleene	Federal Aviation Administration
Kent	Duffy	Federal Aviation Administration
Scott	Foose	Regional Airline Association
Rob	Goldman	Delta Air Lines, Inc.
Aslaug	Haraldsdottir	The Boeing Company
Richard	Heinrich	Rockwell Collins, Inc.
Tom	Hendricks	Air Transport Association of America
Jens	Hennig	General Aviation Manufacturers Association
Carol	Huegel	Metron Aviation, Inc.
Jennifer	Iversen	RTCA, Inc.
Margaret	Jenny	RTCA, Inc.
Pascal	Joly	Airbus Americas, Inc.
Christian	Kast	United Parcel Service
George	Ligler	Project Management Enterprises Inc.
Glenn	Morse	United Airlines
Paul	Meyer	Hartsfield-Jackson Atlanta International Airport
Joe	Miceli	Airline Dispatchers Federation
David	Rinehart	Sensis Corporation
Rico	Short	Beacon Management Group
Chris	Stephenson	National Air Traffic Controllers Association
Edward	Stevens	Raytheon Systems Company
David	Strand	Strand Aviation Solutions
Chris	Sutherland	Harris Corporation
Ron	Thomas	US Airways
Steve	Vail	Mosaic ATM
Louis	Volchansky	Federal Aviation Administration
Heidi	Williams	Aircraft Owners and Pilots Association