U.S. Department
of Transportation

**Federal Aviation
Administration**

Office of the Administrator

800 Independence Ave., S.W.
Washington, D.C. 20591

August 8, 2013

The Honorable John D. Rockefeller, IV
Chairman, Committee on Commerce, Science,
and Transportation
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

The enclosed report responds to a requirement in Section 214 of the FAA Modernization and Reform Act of 2012. Subsection (d) of Section 214 requires the Administrator to submit, no later than 180 days after the date of enactment of the Act, a report on Next Generation Air Transportation System (NextGen) performance metrics to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Transportation and Infrastructure of the House of Representatives. The report must describe 1) the metrics by which the Federal Aviation Administration (FAA) will "measure the Administration's progress in implementing NextGen capabilities and operational results;" 2) "any additional metrics developed," and 3) "a process for holding the Administration accountable for meeting or exceeding the metrics baselines" identified in compliance with subsection (b) of Section 214.

A further requirement in subsection (a) of Section 214 specifies that, "Not later than 180 days after the date of enactment of this Act, the Administrator of the Federal Aviation Administration shall establish and begin tracking national airspace system performance metrics..." The subsection identifies 12 metrics for us to track.

This report reflects the current activities and future plans of the FAA and its stakeholders in identifying NextGen performance metrics and reporting the metrics on the NextGen Web site.

We have sent identical letters to Chairmen Shuster, Senator Thune, and Congressman Rahall.

Sincerely,

Michael P. Huerta
Administrator

Enclosure

U.S. Department
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Office of the Administrator

800 Independence Ave., S.W.
Washington, D.C. 20591

August 8, 2013

The Honorable John Thune
Committee on Commerce, Science,
and Transportation
United State Senate
Washington, DC 20515

Dear Senator Thune:

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August 8, 2013

The Honorable Bill Shuster
Chairman, Committee on Transportation
and Infrastructure
House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

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800 Independence Ave., S.W.
Washington, D.C. 20591

August 8, 2013

The Honorable Nick J. Rahall, II
Committee on Transportation and Infrastructure
House of Representatives
Washington, DC 20515

Dear Congressman Rahall:

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Federal Aviation Administration

Report on NextGen Performance Metrics

Pursuant to FAA Modernization and Reform Act of 2012,
H.R. 658, Section 214

2013

Introduction

The Next Generation Air Transportation System, or NextGen, is a long-term improvement to the National Airspace System (NAS) using new technology and procedures. In order to measure overall NAS improvements with the intention of understanding the impact of NextGen on safety, capacity, efficiency and the environment, Congress has required the FAA to track and report on 12 specific metrics.[1]This document responds to the requirement in Section 214(d) of the FAA Modernization and Reform Act of 2012, H.R. 658, which requires the Administrator to submit, no later than 180 days after the date of enactment of the Act, a report on Next Generation Air Transportation System performance metrics to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Transportation and Infrastructure of the House of Representatives.

In this report we briefly explain the purpose of each metric and how we measure and report the metric. Examples of NextGen success stories are provided for several metrics.

Two key public FAA websites are used to report these 12 congressionally mandated metrics:

- FAA Metrics Web Page at: http://www.faa.gov/about/plans_reports/operational_metrics/; and
- NextGen Performance Snapshots (NPS) at: http://www.faa.gov/nextgen/snapshots

On the FAA Metrics Web page the FAA publishes NAS-wide operational, externally reported metrics that measure the performance of our NAS. These metrics were recently reviewed, or "harmonized" by the FAA in order to ensure the performance metrics we track are meaningful and aligned to the agency targets and goals. The FAA Metrics harmonization effort resulted in the creation of the FAA Metrics Web page, which creates consistency in metric definitions, terminology, data sources and computation.

On the NextGen Performance Snapshots page of the FAA NextGen site, the FAA publishes NextGen-specific metrics. These metrics are primarily at the local level in order to isolate and identify NextGen improvements at site-specific locations. The metrics reported on NPS were baselined in 2009, except environmental measures, which have more historical data.

A key limitation to measuring NextGen improvements is data availability. The FAA is working diligently on closing internal and external data gaps.

- While there is a range of data available on performance-based operations such as published RNAV procedures, the FAA is still working to collect information on the number of actual area navigation (RNAV) and required navigation performance (RNP) procedures that were cleared and flown;
- While there are data to measure commercial operations, less data is collected for other operations, e.g., visual flight rule (VFR) operations or Part 91 instrument operations.

[1] FAA Modernization and Reform Act of 2012, 214(a).

As a result, the impacts of NextGen on constituents other than commercial operators cannot be easily measured; and

- The Agency does not currently collect actual fuel-use data from the airlines. Due to the proprietary nature of this information, the airlines have been reluctant to provide it to FAA. The FAA has the ability to model fuel use, but actual data on fuel burn, by airline and aircraft type, is necessary to better understand the impact that NextGen procedures have on fuel burn. The FAA, with the help of the NextGen Advisory Committee (NAC), is currently working with several airlines to find a solution to this data gap.

In addition, the 12 metrics in this report cannot be assessed in isolation. Each metric needs to be analyzed in the context of the operation, together with the operational conditions, in order to accurately examine its impact. A given metric may not be able to isolate the impacts of NextGen from other factors affecting performance. For example, delay metrics are also affected by the incidence of severe weather and changes in demand patterns.

The following section provides specific detail on the status of each of the 12 congressionally mandated metrics and how these metrics are being reported.

Accountability

NextGen represents the dedicated work of many great minds and hands over the course of many years. Managing such a large-scale, long-range effort is accomplished through the interrelationship of coalitions, offices and executives. This enables the FAA to efficiently control costs, improve information technology and cyber security and achieve a high, consistent quality of acquisition program management and provide the focused strategic direction needed to accomplish NextGen.

The NextGen Management Board (NMB) oversees NextGen strategy and execution. Chaired by the FAA's Deputy Administrator, the NMB includes representatives from all key Agency lines of business and has authority to force timely resolution of emerging NextGen implementation issues. The NMB seeks to provide transparency among its members and to promote collaboration across the FAA at all levels of the organization. Individual members of the NMB share the accountability for delivering their parts of the whole.

The Deputy Administrator is the Federal official with overall Agency responsibility for making NextGen a reality and is responsible for ensuring NextGen implementation is consistent with decisions of the NMB.

Section 214(a) Metrics

Metric 1: Actual arrival and departure rates per hour measured against the currently published aircraft arrival rate and aircraft departure rate for the 35 Operational Evolution Partnership airports.

Understanding the metric:

This measures the use of capacity in the NAS and how it is managed to accommodate air travel demand. A key benefit of NextGen is reduced delay through better capacity management. The FAA tracks how an airport manages available capacity during the time of day when the vast majority of operations occur. Since 2011, FAA realigned its reporting to use Core Airports as a good representation of the NAS, for several of its key performance measures, including airport capacity and operations.

While this metric will help us understand the use of capacity at busy airports and during busy times, it can be misleading at less busy airports. For example, a low value may indicate that the airport capacity is not being effectively utilized. Alternatively, the demand may not reach the capacity in the first place.

How we measure and report the metric:

To meet this requirement, two currently tracked metrics are compared, the Average Daily Capacity (ADC) and the Average Daily Operations. The ADC is defined as the sum of the number of flights the FAA facilities plan as capability for landings and take-offs in a month(s), divided by the number of days in the month(s). The Average Daily Operations are defined as the sum of the number of flights the FAA facilities actually land and take-off in a month(s), divided by the number of days in the month(s). A comparison between these average daily operation rates and the ADC allows for an overall assessment of NAS capacity, in terms of actual versus published rates. The metric units are the number of arrival and departure operations.

These metrics are reported on FAA's Metrics Web page for Core Airports and times of day relevant to the operations.

Example of Success

At Hartsfield-Jackson Airport in Atlanta, a NextGen enhanced lateral spacing operation has allowed us to optimize airspace departures, thus air traffic controllers have been able to get between 8 and 12 additional aircraft off the ground every hour, clearing aircraft to take off from the same runway one minute apart compared to the previous two minutes between takeoffs. The FAA has enabled these additional departures with the use of technology and new procedures, optimizing the use of already available assets. The full story can be read on the NPS Performance Success Stories page.

Metric 2: Average gate-to-gate times.

Understanding the metric:

This metric measures the actual elapsed time between gate departure at the origin airport to gate arrival at the destination airport. This duration is very important to air travel passengers, as it is the time spent continuously onboard an aircraft. Since NextGen initiatives result in improved NAS efficiency, it is important to monitor average gate-to-gate times and assess how they relate

to potential savings in time, fuel, or operational cost. Ultimately, through efficiency gains, the air travel passenger experience will be improved.

How we measure and report the metric:

The Average Gate-to-Gate Times metric is computed as the duration between the gate out time at the departure airport and the gate in time at the arrival airport. A system value is obtained when averaging these durations over a period of time. The metric units are minutes.

This metric is reported on FAA's Metrics Web page for carrier reported flights to and from Core Airports.

In the future, the NPS will report this metric for site specific locations in order to isolate and identify NextGen improvements. The metric will be available at http://www.faa.gov/nextgen/snapshots.

Example of Success

A NextGen tool used for flights into Minneapolis-St. Paul International Airport has cut the number of go-around maneuvers by 23 percent due to more precise separation awareness. Automated Terminal Proximity Alert (ATPA) decreased the excess flight time due to a go-around by 19 percent and increased the average number of days between go-arounds from 12.3 to 21.3. ATPA is now deployed at sites around the country.

Metric 3: Fuel burned between key city pairs.

Understanding the metric:

Fuel burn is a significant component of operating costs and imposes a large impact on our environment. As a result, reducing fuel burn is a major goal of the aviation community and NextGen. This metric identifies the amount of fuel burned on flights between key city pairs. Many NextGen and FAA initiatives contribute to reducing fuel burn, such as performance based navigation (PBN), collaborative air traffic management, and surface improvements. These provide for more direct routes, optimized profile descents and less time in takeoff queues, and offer flexibility to operators to get around convective weather events. All these initiatives would greatly benefit from direct measurement of the actual fuel burned. It is important to have shared data that FAA and carriers can examine together, to jointly assess the contributions of these initiatives and to shape future efficiency improvement actions.

How we measure and report the metric:

The FAA does not currently measure fuel burn between city pairs[2]. Air carriers do not provide DOT/FAA with actual fuel burn data on a per flight basis. Fuel burn varies with aircraft type,

[2] Section 214, Performance Metrics from the FAA Modernization and Reform Act of 2012 (Public Law 112-95) calls for the FAA to begin tracking and reporting performance against a set

speed, weight, winds, weather and other factors. The FAA is not able to accurately account for all of these variables without actual fuel-use data. Once a consensus is reached and data are provided by airlines, FAA will be able to further develop this metric.

The FAA has been working hard to remedy this data gap. With actual fuel-use data, the FAA could better understand before/after comparisons and incremental NextGen improvements. In order to determine actual fuel-use, the FAA has asked the NAC to work with industry stakeholders to identify a way to secure actual airline fuel-use data. The NAC is currently involved in an extensive data sharing analysis activity to determine fuel data sharing options.

Example of Success

Under the Collaborative Trajectory Options Program (CTOP), operators submit alternative routes of their choice around or away from a traffic or weather constraint, thus providing additional options for air traffic controllers to expedite flights. A video about this new program can be viewed on the FAA TV page.

Metric 4: Operations using advanced navigation procedures, including Performance Based Navigation (PBN) procedures.

Understanding the metric:

This metric is important because PBN procedures can provide benefits in all phases of flight, including departure, en route, arrival, approach, and transitioning airspace.

This is an evolving area of measurement that has the highest interest of both the FAA and its users. The FAA is working with the airlines on establishing ways to determine the use of PBN procedures. We have not been able to accurately calculate this metric, to date. Today's environment is mixed, not all aircraft have PBN capability. Aircraft that have PBN may not always use it. This mixed environment does not allow for an accurate count of PBN operations. The FAA is implementing new Performance-Based Navigation (PBN) routes and procedures that leverage emerging technologies and aircraft navigation capabilities. The two main components of the PBN framework are Area Navigation (RNAV) and Required Navigation Performance (RNP). Once the required performance level is established, the aircraft's own capability determines whether it can safely achieve the specified performance and qualify for the operation. Crew qualifications are also a factor in achieving the specified performance.

How we measure and report the metric:

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of metrics, including three that are to be measured for "key city pairs." Using an analytical process supported by quantitative criteria and qualitative analysis by Subject Matter Experts, a list of 25 metroplex pairs was identified. These serve as the foundation of the key city pairs the FAA will use in measuring these three required metrics. Note: A metroplex is a grouping of airports located closely together, with interdependent airspace design.

This metric is defined as a count of flights that are using PBN procedures. At the Core Airports, the FAA has so far authorized over 280 RNAV procedures. The FAA is still working to collect the number of actual RNAV and RNP procedures cleared and flown.

Example of Success

"Greener Skies Over Seattle" is an example of a collaborative project between the FAA, airlines, the Port of Seattle and Boeing Corporation to implement PBN in Washington. First operational in summer 2012, it is already showing benefits. The project is estimated to cut fuel consumption by 2.1 million gallons annually and reduce carbon emissions by 22,000 metric tons, the equivalent of taking 4,100 cars off the road every year. In addition, it will reduce overflight noise exposure for an estimated 750,000 people living within the affected flight corridor. More on this project can be found on the NPS Performance Success Stories page.

Metric 5: The average distance flown between key city pairs.

Understanding the metric:

The FAA has data available to compute the distance flown between city pairs by flight.
The average distance flown between city pairs is not currently a direct part of any strategy for operational improvement. Sometimes, just flying a shorter distance doesn't mean the operations are improved. Moreover, adverse conditions may require longer flown distances as the only option. This computation is useful when linked to a higher level measure, such as the "Flown versus filed flight times" metric (metric number 9 in this document). It will be used as a supporting metric to help assess operational improvements achieved through NextGen initiatives.

How we measure and report the metric:

The Average Distance Flown metric is defined as the actual flown distance between wheels-off and wheels-on. The metric is reported as an aggregate for all key city pairs[2]. The average distance is measured in nautical miles.

This metric is reported on FAA's Metrics Web page for Core Airports and Key City Pairs.

In the future, the NPS will report this metric for site specific locations in order to isolate and identify NextGen improvements. The metric will be available at http://www.faa.gov/nextgen/snapshots.

Metric 6: The time between pushing back from the gate and taking off.

Understanding the metric:

The time between pushing back from the gate and taking off is referred to as "taxi-out time". As the name suggests, it is the time an aircraft spends on the airport surface and represents the total duration elapsed from gate departure to wheels off. Taxi-out time can vary based on a number of factors, including airport weather conditions and taxiway congestion. Measuring and monitoring

the average taxi-out time provides awareness of trends and helps identify potential time and cost savings achieved through FAA NextGen initiatives. Ultimately, it supports improvement of the overall air travel passenger experience.

How we measure and report the metric:

The Taxi-Out Time is computed as the duration between gate out time and take off (wheels off) time. A system value is obtained by averaging these durations over a period of time. It is measured in minutes.

This metric is reported on FAA's Metrics Web page for Core Airports.

In the future, the NPS will report this metric for site specific locations in order to isolate and identify NextGen improvements. The metric will be available at http://www.faa.gov/nextgen/snapshots.

Example of Success

A NextGen technology intended to improve this metric is a data sharing and scheduling tool called Collaborative Departure Queue Management (CDQM). FedEx realized significant benefits when its Memphis hub collaborated with the FAA in a CDQM trial. FedEx shared the location and readiness of aircraft scheduled for departure. When the demand for departure exceeded available capacity, CDQM recommended the number of aircraft that should enter the movement area (taxiways and runways) in 10-minute windows. Aircraft could wait at the gate with engines off until then. This allowed each aircraft to save fuel, which saves money and reduces emissions. The full story can be found on the NPS Performance Success Stories page.

Metric 7: Continuous climb or descent.

Understanding the metric:

This metric is a direct result of NextGen technologies implementation, specifically Optimized Profile Descents (OPD). Level flight distance is calculated from Top of Descent (TOD) to runway. New performance based navigation procedures will allow for more efficient lateral and vertical routes, resulting overall in fewer miles flown. This is a new metric, computed by the FAA as of Fiscal Year 2013.

How we measure and report the metric:

The Optimization of Airspace Procedures in the Metroplex (OAPM) program started in 2011 and targets the country's busiest airspace. Efforts are under way to review descent procedures and reduce the distance flown at level flight. This continuous descent effort is focused on Core Airports. The metric units are nautical miles.

This metric is reported on FAA's Metrics Web page for Core Airports.

In the future, the NPS will report this metric for site specific locations in order to isolate and identify NextGen improvements. The metric will be available at http://www.faa.gov/nextgen/snapshots.

Example of Success

Improvements in descent can be found at Phoenix Sky Harbor International Airport, where the FAA has converted the four primary arrival routes into OPDs, which means aircraft begin a smooth glide from high altitude airspace using minimal engine power. Sky Harbor is one of the 10 busiest U.S. airports for passenger traffic. US Airways, which uses Sky Harbor as one of its hubs, estimates it burns less fuel at Sky Harbor compared with its other hub airports, saving 500 pounds of fuel per OPD arrival. OPD fuel savings adds up to $14.7 million per year. By flying OPDs into Sky Harbor, US Airways reduces its carbon footprint by 51,000 tons per year. The full story can be found on the NPS Performance Success Stories page.

Metric 8: Average gate arrival delay for all arrivals.

Understanding the metric:

A major beneficiary of all NextGen improvements is the air travel passenger. Delay at any point in flight affects the passenger experience.

While some of these delays can be absorbed during the next phase of flight, gate arrival delay is defined to capture the end result, as experienced by passengers, by measuring minutes past the published arrival time. This metric is important to the FAA and to all carriers and flight operators, as it provides a common passenger perspective. All aviation stakeholders collaborate on understanding the root cause of gate arrival delay and in taking action to mitigate it.

While gate arrival delay relative to the published schedule is important, to fully understand this metric additional information is needed. Airlines may adjust their flight schedules in reaction to changing conditions in order to improve the efficiency of their operations. Improving or worsening system performance may be masked by these adjustments.

How we measure and report the metric:

The arrival delay is computed as the gap between scheduled arrival (gate in) time and actual arrival time, whenever the actual arrival is later than the scheduled arrival time. Arrival Delays are averaged over a period of time. The metric units are minutes.

This metric is reported on FAA's Metrics Web page for Core Airports.

In the future, the NPS will report this metric for site specific locations in order to isolate and identify NextGen improvements. The metric will be available at http://www.faa.gov/nextgen/snapshots.

Metric 9: Flown versus filed flight times for key city pairs.

Understanding the metric:

This metric is relevant to performance on the day of operation. While flight operations planning activities take place months in advance, many important decisions are made on the day of operation. Hours prior to a flight departure, the carrier or flight operator typically submits a desired flight plan to the FAA. Before accepting a flight plan, the FAA has the responsibility to assess any constraints in place at departure time, such as restricted airspace. A finalized plan is called a "filed flight plan" to which there can be subsequent revisions requiring re-filing.

This metric measures the time gap between the airborne duration planned for a flight and the actual airborne duration. It helps the FAA assess how well the plan was followed and to identify actions to improve either the filed flight plans or the actual operations. NextGen technologies help improve air traffic control procedures, thus directly impacting this metric. For example, PBN procedures can provide benefits in all phases of flight, including airborne operations.

How we measure and report the metric:

Prior to departure, operators submit their flight plans to the FAA, and then a collaborative flight plan is filed and cleared for take-off. To compute this metric, we compare the latest flight plan time, as filed prior to departure, with the actual flown airborne time (wheels off to wheels on). A system value is obtained by averaging over a period of time, for all key city pairs. The metric units are minutes.

This metric is reported on FAA's Metrics Web page, for Core Airports and Key City Pairs.

In the future, the NPS will report this metric for site specific locations in order to isolate and identify NextGen improvements. The metric will be available at http://www.faa.gov/nextgen/snapshots.

Metric 10: Implementation of NGIP or any successor document, capabilities designed to reduce emissions and fuel consumption.

Understanding the metric:

This metric is unique on the list because it does not use data from aircraft movement. Instead, it measures whether the FAA is successfully implementing NextGen technologies and procedures that focus on emissions and fuel consumption.

How we measure and report the metric:

The publicly available NextGen Implementation Plan (NGIP) contains information on NextGen schedules and timelines for implementation. Appendix A of the NGIP provides implementation information on fuels, airframe and engine technologies. Appendix B of the NGIP provides schedule information on all of the operational improvements that make up the NextGen program. The NGIP is updated annually. All schedule adjustments, both forward and backward, are clearly noted in the Plan, allowing for tracking of milestones from year to year.

Metric 11: The Administration's unit cost of providing air traffic control services.

Understanding the metric:

The FAA is often asked to report on the cost of air traffic control services. In the context of Section 214 which contains performance metrics, the reported metric is the unit cost of air traffic control services per operation. This metric is used to inform cost management decisions that ensure quality of service. It is also used by the FAA to achieve a highly cost-effective service delivery strategy. The FAA's cost per operation is also included in reviews and periodic benchmarking initiatives with the global air navigation service community.

How we measure and report the metric:

FAA is currently computing and reporting its unit cost for providing air traffic control services per operation. One flight can encompass several operations as it transits different FAA facilities. Operation counts include both instrument and visual flightrules, for Federal and Contract facilities. The metric units are U.S. dollars per air traffic operation.

This metric is reported on FAA's Metrics Web page, for NAS operations.

Metric 12: Runway safety, including runway incursions, operational errors, and loss of standard separation events.

Understanding the metric:

Since the inception of the dedicated Runway Safety program, the program has utilized agency and industry resources to analyze and identify causal and contributory factors surrounding runway incursions categorized as A or B. Hazards, and the proposed actions to address those hazards, are tracked inside the Runway Safety Tracking System (RSTS). Runway Incursions causal and contributory factors, rate and severity were assigned by the Runway Incursion Assessment Team (RIAT) and compiled within annual Runway Safety reports. In 2008, the FAA established the Runway Safety Council (RSC) and the Root Cause Analysis Team (RCAT) to utilize a Government/Industry approach to reduce the number and severity of runway incursions. The RCAT provides additional depth of understanding for 'why' events occur and recommends mitigating actions. Our National Airspace System is the safest in the world and these metrics reflect that success.

How we measure and report the metric:

There are two metrics that address this requirement, which allow us to assess both runway safety and airborne safety of all operations. The Runway Incursions Rate metric is defined as the rate of category A and B runway incursions per million operations. The System Risk Event Rate metric, is defined as the rate of high risk loss of standard separation events, per thousand events of loss of standard separation. The rate is computed over a rolling 12 month period.

These two metrics are reported on FAA's Metrics Web page for NAS-wide operations.

Example of Success

The risk analysis processes in these metrics have enabled the Agency to identify the top five hazards that contribute to high risk events on a yearly basis. These hazards then become the focus for the agency to reduce or eliminate the causes of such events. This process has been in place since 2012 and along with voluntary safety reporting programs have driven corrective action to over 100 identified hazards.

Additionally, NextGen technology improved runway safety at airports. For example, for Automatic Dependent Surveillance-Broadcast, transponders were installed on ground vehicles

at Boston Logan airport so they could be seen on the Airport Surface Detection Equipment, Model X display to provide air traffic controllers better situational awareness. Early results show decreased runway incursion events.

Conclusion

The FAA, its aviation community stakeholders, and the congressional committees are very much in step regarding the need to measure the performance of NextGen initiatives, and the type of metrics that are most important in doing so.

Core airports, key city pairs, distance/time/fuel reduction, runway safety, the implementation and use of NextGen technology and procedures will continue to be important to understanding the value and benefits of modernization.

Taken together, these metrics reveal the Nationwide impact of NextGen development that has already been shown to be positive in the areas of safety, capacity, efficiency and the environment. During the past two years, the FAA has made progress with better NextGen metrics reporting and is actively working to capture more data. The Agency's goal is to further refine the ability to measure NextGen's impact with metrics that better isolate its effect from other sources and also at specific localities.