STATEMENT OF DR. AGAM N. SINHA
BEFORE THE HOUSE COMMITTEE ON TRANSPORTATION
AND INFRASTRUCTURE, SUBCOMMITTEE ON AVIATION
HEARING ON AIRLINE DELAYS AND CONSUMER ISSUES

September 26, 2007

DR. AGAM N. SINHA
SENIOR VICE PRESIDENT AND GENERAL MANAGER
THE MITRE CORPORATION
CENTER FOR ADVANCED AVIATION SYSTEM DEVELOPMENT
7515 COLSHIRE DRIVE
MCLEAN, VA 22102-7539

(703) 983-6410

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Good morning Chairman Costello and Members of the Subcommittee. Thank you for inviting me to participate in today's hearing on airline delays and consumer issues. My name is Agam Sinha and I am a Senior Vice President at the MITRE Corporation. I am also the General Manager of MITRE's Center for Advanced Aviation System Development (CAASD), which is the FAA's Federally Funded Research and Development Center (FFRDC).

My testimony contains both a retrospective view of trends in the numbers of operations and delays our aviation system has experienced, as well as a prospective view of where future capacity issues are likely to arise. I will outline a number of successfully completed airport, airspace and procedural enhancements as well as decision-support tool deployments that have increased overall system capacity, efficiency and safety. Finally, I will address what I believe are the solutions necessary to support the future economic growth of our aviation industry.

Introduction

The initial downturn of the commercial airline sector beginning in late 2000 and the subsequent impact of the terrorist attacks of September 11, 2001 on the broader aviation industry are well understood. All but two of the biggest airlines were forced to restructure through bankruptcy. However, those restructurings appear to be over and the industry has just completed its first full year of profitability since 2001.

Airlines now operate much more productively than before, offering fewer flights at lower fares than in 2000 yet transporting more passengers in 2007 than at any time in history. Domestically, competition is flourishing with not just one but two new low-cost airlines being launched this year (Skybus and Virgin America). Internationally, the implementation of the EU-US aviation agreement in March 2008 is a watershed event that will bring similar lower fares, more flights, and more passengers between our respective countries.

Although too early to tell, other parts of aviation may also drive aviation growth. Very Light Jets, a new and less expensive type of small jet aircraft, are just now beginning to be delivered and the air taxi industry is beginning to experiment with their use. Whether they fuel substantial growth of a new industry segment, or are more suitable for personal ownership, their emergence is driving growth in the General Aviation sector. For example, Eclipse has announced that it has 2,700 orders in hand (as of May 2007), Cessna has successfully launched the Mustang and has 300 orders, Adam Aircraft has 70

orders and will deliver in 2008, while estimates for the Embraer Phenom 100 range from 250-600 (delivering in 2010).

The industry's economic recovery has relied on changes in airline business models such as reducing non-hub flying, eliminating many short-haul flights, and reducing flights at certain airports such as Pittsburgh, Cincinnati, and St. Louis while increasing emphasis on other locations such as Ft. Lauderdale, Denver, and Kennedy. We are now experiencing the culmination of these industry changes in the form of unprecedented system delays. What is not well understood is that since 2000, improvements in the National Airspace System (NAS) have also been made in new runways, new automation, new procedures and airspace redesign. Without these improvements the system would surely be in a greater crisis than we are now facing. However, the increase in system capacity has not kept up with system demand in key locations. This is ultimately the key to answering the question, "If operations are down across the NAS, why are delays up?" The answer to this question is location-specific. Operations are not down everywhere; nor are delays up everywhere.

NAS System Performance 2000-2007

While many airports and their surrounding airspace have adequate capacity to accommodate increased operations safely and efficiently, other airports and their associated congested airspace and flight corridors have reached their saturation point. The corridors connecting New York, Chicago, and Atlanta and then south to Florida and Texas have become the key bottlenecks in the system and comprise the majority of delays.

In the summer of 2000, of the 45 major airports reported on by DOT/FAA just seven, Atlanta, Chicago O'Hare, Philadelphia, Newark, LaGuardia, Houston, and Kennedy, accounted for 55% of all major airport delays recorded under the FAA's Operational Network (OPSNET) system of measuring delays. Today these seven airports account for 72% of the total delays, as shown in Figure 1. Since 2000, operations at those airports increased by nearly 10% while operations at the other 38 airports decreased by nearly 14%. While delays at these seven airports increased 39% overall, delays decreased a combined 27% at the other 38 airports as shown in Figure 2.

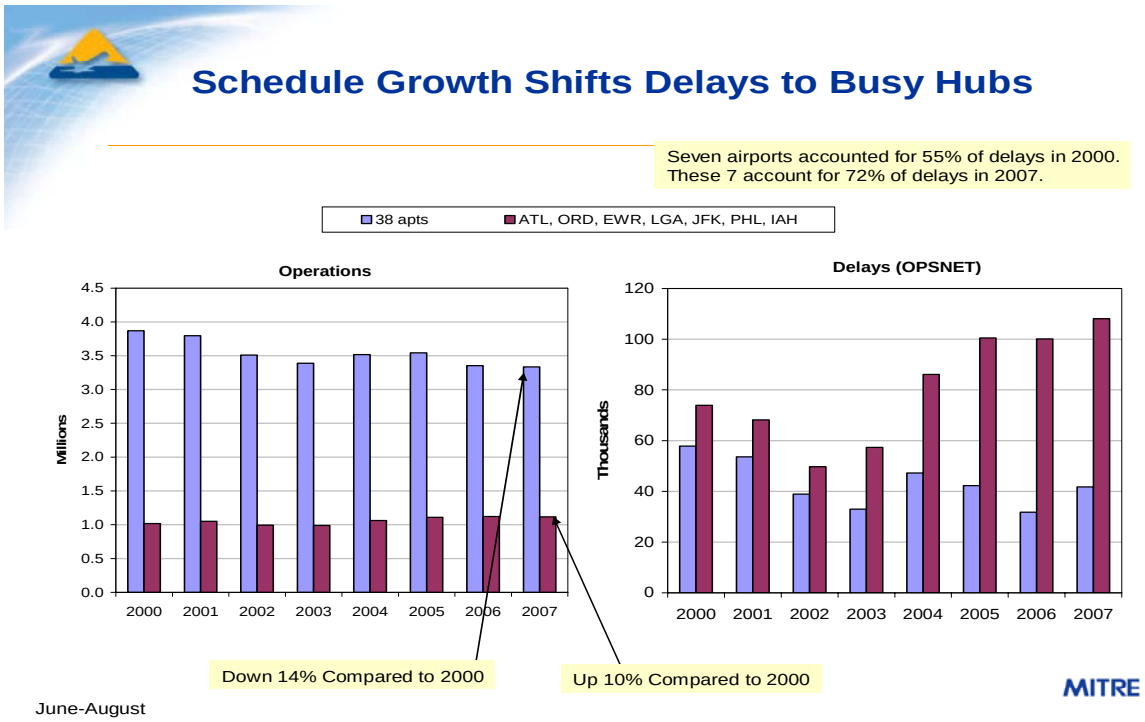
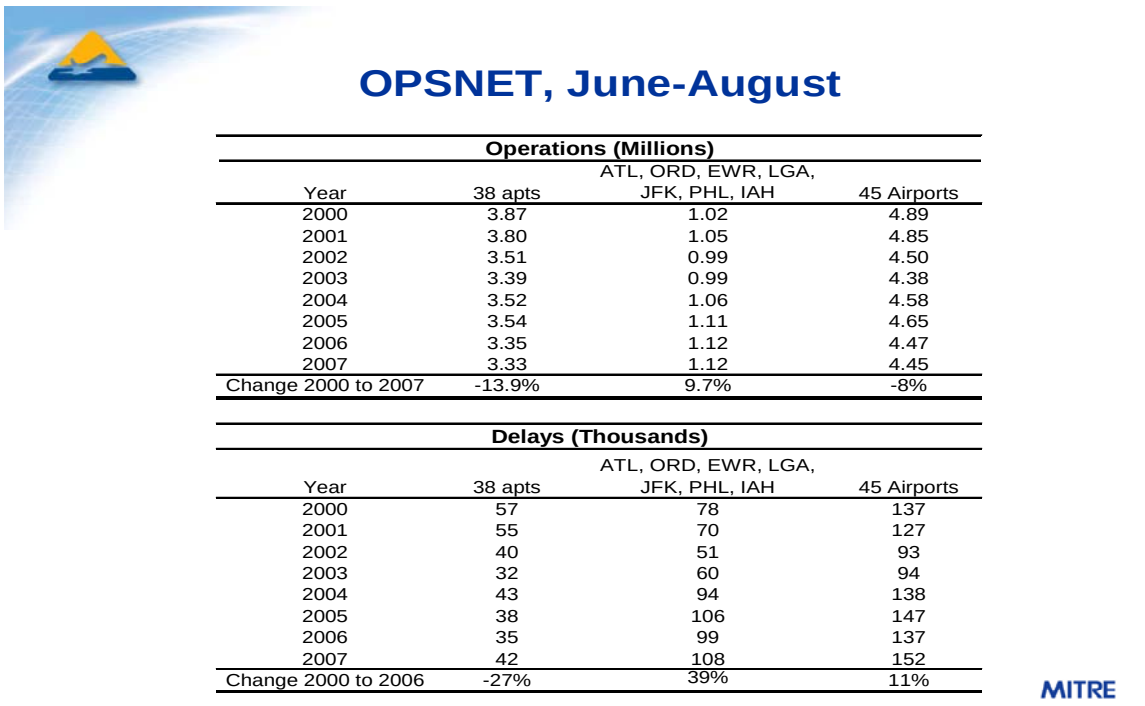


FIGURE 1



OPSNET, June-August

Operations (Millions)			
Year	38 apts	ATL, ORD, EWR, LGA, JFK, PHL, IAH	45 Airports
2000	3.87	1.02	4.89
2001	3.80	1.05	4.85
2002	3.51	0.99	4.50
2003	3.39	0.99	4.38
2004	3.52	1.06	4.58
2005	3.54	1.11	4.65
2006	3.35	1.12	4.47
2007	3.33	1.12	4.45
Change 2000 to 2007	-13.9%	9.7%	-8%

Delays (Thousands)			
Year	38 apts	ATL, ORD, EWR, LGA, JFK, PHL, IAH	45 Airports
2000	57	78	137
2001	55	70	127
2002	40	51	93
2003	32	60	94
2004	43	94	138
2005	38	106	147
2006	35	99	137
2007	42	108	152
Change 2000 to 2006	-27%	39%	11%

FIGURE 2

The biggest bottlenecks this summer have been at the three major New York/New Jersey airports as well as the surrounding airspace. Scheduled demand at Kennedy has increased rapidly since June 2006 as Jet Blue and Delta Airlines have developed their hub operations. Since 2004, Kennedy's scheduled operations have increased 44%. To accommodate this increased demand, more efficient procedures have been put in place to make better use of multiple runway operations, thereby increasing the overall throughput at the airport. If not for these procedural improvements, delays would have been much worse. Figure 3 shows both the increased scheduled traffic and increased actual traffic at Kennedy.

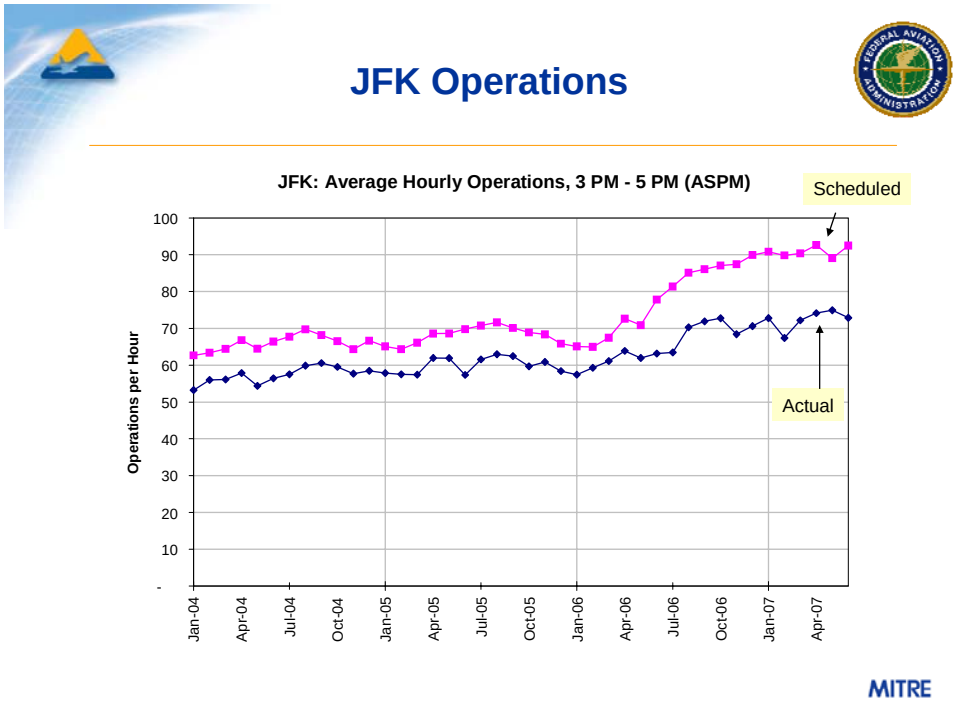


FIGURE 3

As shown in Figure 4, Newark and LaGuardia have experienced a decline in peak throughput. Because they were previously operating close to capacity, that decline has contributed to the significant increase in delays at those airports as shown in Figure 5. The FAA has been assessing all factors that have contributed to decreased throughput, including runway configuration usage, weather conditions, fleet mix changes, and separation requirements in order to address any efficiency improvements while maintaining safety.

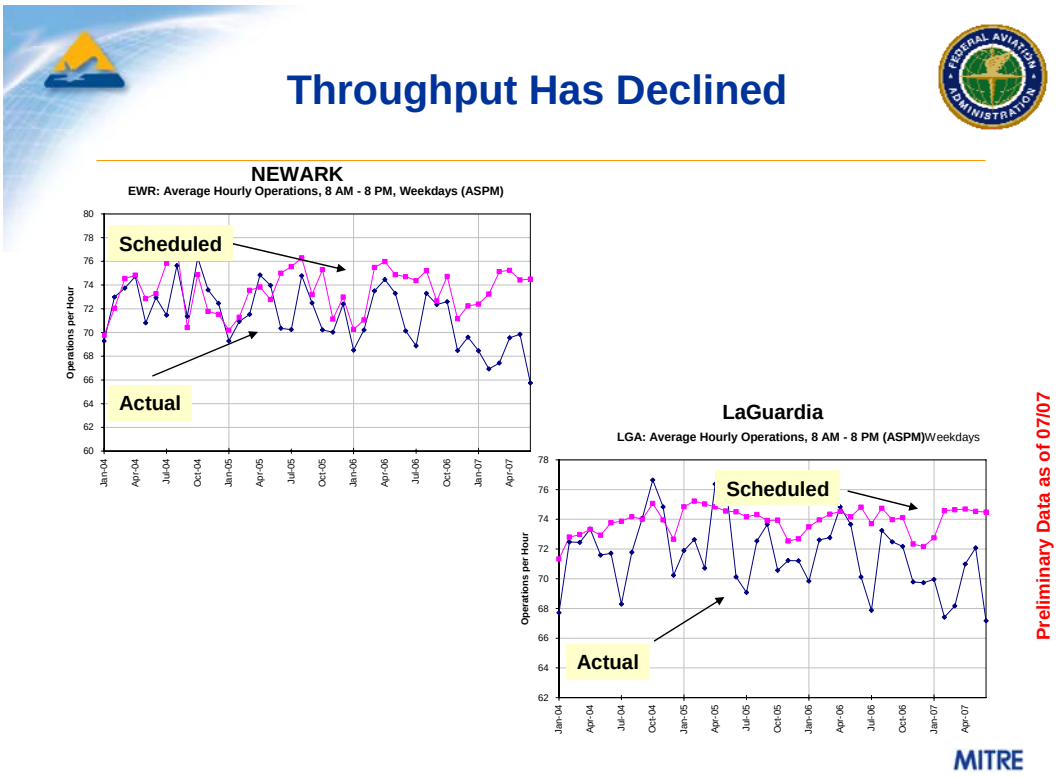


FIGURE 4

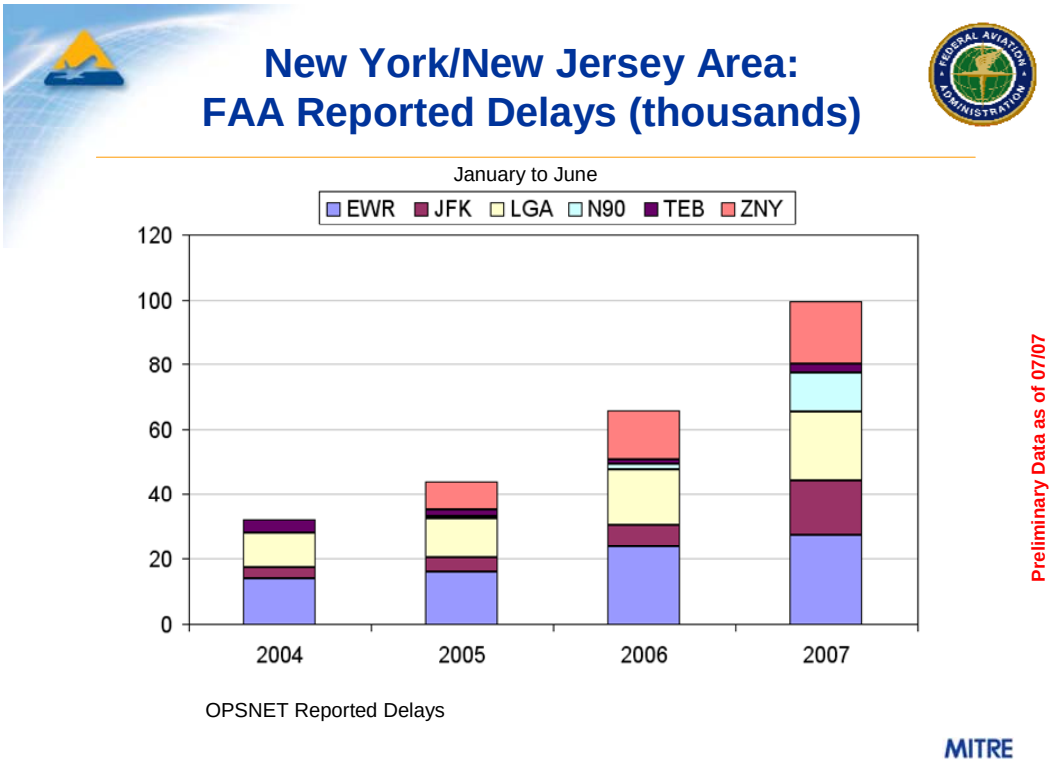


FIGURE 5

The magnitude of delays provides additional insight into the performance of the system. The FAA's OPSNET system records a delay whenever the progress of a flight has been delayed more than 15 minutes by any non-airline cause, such as miles-in-trail restrictions, runway congestion, airborne holding, ground stops, or ground delay programs (GDPs). Because delays greater than one hour are much more disruptive to airlines and passengers, this metric is also tracked. Recent trends for delays greater than one hour, shown in Figure 6, are significant. Hour-long delays at the 45 airports are at their highest level; even compared to 2000—a year in which aviation delays received much public attention.

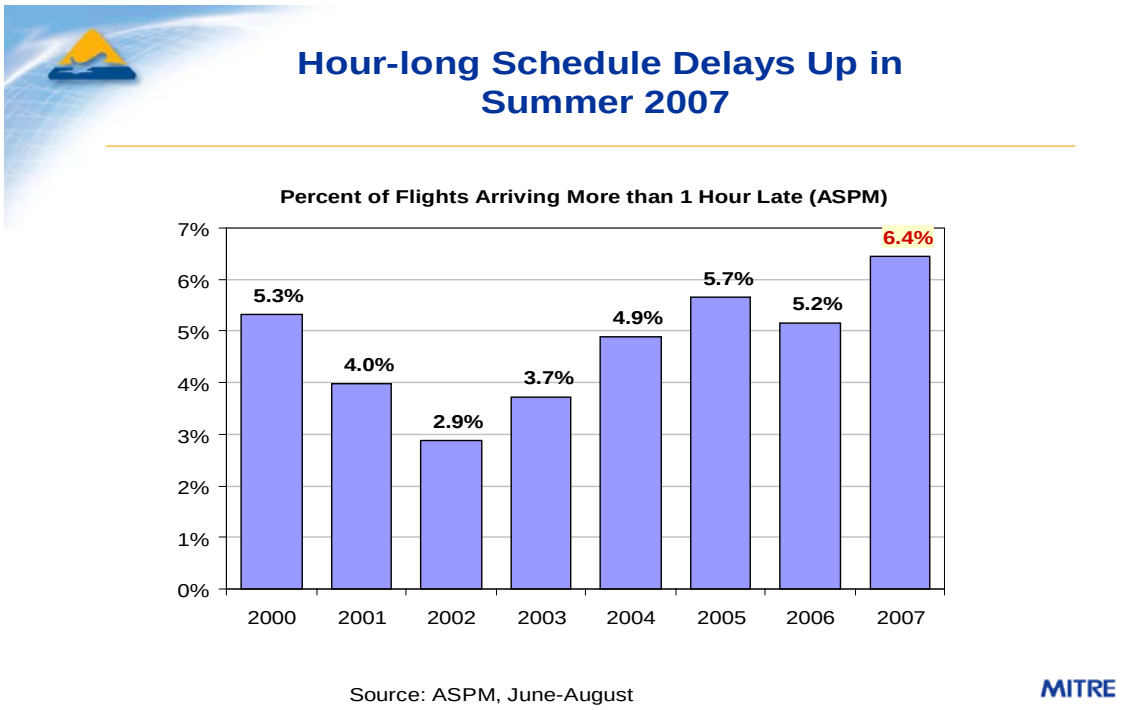


FIGURE 6

Improvements Have Been Made

As mentioned previously, system delays would be worse than they currently are if improvements had not been made at various locations across the NAS. Since 2006, five new runways have opened in Atlanta, Boston, Cincinnati, Minneapolis, St. Louis and new runway construction was begun at Dulles. Excluding Boston, where the new runway was designed to reduce delays rather than increase capacity, these new runways increase the benchmark capacity at the airport by 27-40 percent in good weather, and by 10-63 percent in poor weather. At some airports, the effect has been an increase from having just one landing runway in poor weather to two, or from two to three, greatly increasing the arrival capacity of the airport.

Recently, two large airspace redesign projects were completed. The Florida Airspace Optimization (FAO) implemented redesigned airspace and numerous new routes in a record 7 months in October 2005. This redesign is expected to reap $20M a year in benefits. Then in 2006 the Midwest Airspace Enhancement (MASE) was completed, encompassing nine Air Traffic Control Centers (ARTCCs) including Chicago, Cincinnati, Indianapolis and Pittsburgh areas, and extending to Philadelphia, New York and Boston on the east coast, then down south as far as Atlanta and Jacksonville. MASE is expected to provide $7M a year in benefits. Between 2002 and 2007, airspace redesign projects have produced almost $700M of customer benefits from reduced delays, more efficient routing, and reduced restrictions from better balanced workload.

In the traffic management arena, a number of initiatives have been implemented. The National Playbook is a pre-coordinated set of routings to be used in bad weather. Flow Control Areas (FCA) and Flow Evaluation Area (FEA) tools allow the FAA and users to collaborate on solving congestion problems. More recently, the Airspace Flow Program (AFP) was initiated to address flows into congested enroute airspace, typically during bad weather, similar to Ground Delays Programs. According to FAA, 36 airspace flow programs were implemented on 19 days from June through August of 2006 resulting in a 21 percent reduction in delays from what they would have been without the capability in place. The flexibility of the AFP was expanded this summer, and delay savings are expected to be higher than last year. Another program called adaptive compression identifies airport slots that are made available due to cancelled, delayed or rerouted flights. As a result of this program, the FAA estimates that between April and July 2007, delays were reduced by more than 863,000 minutes, adding up to a potential $35 million a year in fuel and other operational expense savings to the airlines.

Recently, FAA has developed a set of twelve short-term initiatives that are underway for the NY area to procedurally address current capacity issues. Examples include reducing excessive spacing on final approach, implementing independent parallel instrument approaches at Kennedy, simultaneous visual approaches at Newark, and additional use of jetways for departures out of New York. Finally, the Record of Decision for the New York, New Jersey, Philadelphia airspace redesign was signed in September 2007, paving the way for a more comprehensive solution to the largest airspace bottleneck in the country. The projected benefits of the redesign include a 20% reduction in delay in 2011 and $250M in user benefits.

The FAA has also deployed controller automation tools to increase safety, efficiency and productivity. The national deployment of the automated conflict probe called URET has been completed. This controller decision support tool provides strategic prediction of aircraft conflicts and helps to efficiently resolve them. Initial MITRE estimates of annual benefits to users in fuel savings is approximately $250M. Traffic Management Advisory (TMA) has now been implemented nationally at all centers, and is being used daily to provide time-based metering services to the following major airports: Los Angeles, Las Vegas, Houston, Dallas Ft. Worth, Miami/Ft. Lauderdale, Minneapolis, San Francisco, Seattle, Boston, Atlanta, and soon will be used for Chicago O'Hare. Besides providing a significantly smoother flow and improved throughput of traffic to these congested

airports to match their available capacity, studies by the FAA Free Flight Program Office showed that TMA can increase capacity at some of these airports by up to 3 to 5 percent during Instrument Meteorological Conditions (IMC). Other benefits such as reduced holding and shorter arrival flight distances in the TRACON for arrival aircraft have been documented.

Procedure changes to the system have also improved efficiency and flexibility in the system. Domestic Reduced Vertical Separation Minimums (DRVSM) was implemented in 2005, significantly increasing capacity in the en route airspace by doubling the number of usable altitudes between 29,000 and 41,000 feet. FAA estimated that DRVSM would save airlines approximately $5 billion through 2016. Since 2005, more than 300 RNAV and RNP procedures have been implemented. As an example of the magnitude of benefits expected from these procedures, when fully implemented in Atlanta and Dallas-Ft.Worth RNAV departure routes are estimated to provide a combined total savings of approximately $50 million annually.

Looking to the Future

In addition to the examples above, there are many other local, regional, and national plans that have been developed to increase system capacity. These plans were taken into account as part of the 2007 update to the FAA's Capacity Needs in the National Airspace System report. The report takes a systematic look at current and projected demand and capacity across our system of airports and also assesses needs by metropolitan areas. The results show that if all planned improvements are implemented by 2015, 6 airports and 4 metro areas will have insufficient capacity to meet projected demand. If the planned improvements are not made, this number increases to 18 airports and 7 metro areas. By 2025, the situation will worsen. With planned improvements, there are projected to be 14 airports and 8 metro areas that will be capacity constrained. Should the planned improvements not materialize, these numbers would increase to 27 airports and 15 metro areas. This is summarized in Figures 7, 8, 9 and 10.

2015

After Planned Improvements

6 airports that need additional capacity

- SNA
- LGA
- LGB
- OAK
- EWR
- PHL

4 metro areas that need additional capacity

- Los Angeles
- New York
- Philadelphia
- San Francisco

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FIGURE 7

2015

If Planned Improvements Do Not Occur

18 airports that need additional capacity

- CLT
- FLL
- IAH
- JFK
- SNA
- LGA
- LGB
- LAS
- OAK
- MDW
- EWR
- ORD
- PBI
- PHL
- PHX
- PVD
- TUS
- HOU

7 metro areas that need additional capacity

- Charlotte
- Chicago
- Las Vegas
- Los Angeles
- New York
- Philadelphia
- San Francisco

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FIGURE 8

2025

After Planned Improvements

14 airports that need additional capacity

- ATL
- EWR
- FLL
- JFK
- LAS
- LGA
- LGB
- MDW
- OAK
- PHL
- PHX
- SAN
- SFO
- SNA

8 metro areas that need additional capacity

- Atlanta
- Las Vegas
- Los Angeles
- New York
- Philadelphia
- Phoenix
- San Diego
- San Francisco

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FIGURE 9

2025

If Planned Improvements Do Not Occur

27 airports that need additional capacity

- ATL
- BOS
- CLT
- EWR
- FLL
- HOU
- IAD
- IAH
- JFK
- LAS
- LAX
- LGA
- LGB
- MDW
- MSP
- OAK
- ORD
- PBI
- PHL
- PHX
- PVD
- SAN
- SAT
- SEA
- SFO
- TUS
- SNA

15 metro areas that need additional capacity

- ATL
- CLT
- ORD
- HOU
- LAS
- LAX
- MSP
- NY
- PHL
- PHX
- SEA
- SAN
- SFO
- SFLA
- DC

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FIGURE 10

Potential Solutions

Now that capacity constraints have been identified out to 2025, what needs to happen to mitigate these shortfalls? Capabilities that are part of NextGen, such as 4-Dimensional Trajectories and Shared Situational Awareness, will help increase airport capacity in ways that we are only starting to analyze today. Further modeling of individual airports and the surrounding airspace is needed to better assess how much capacity will be gained in the future.

In general terms, NextGen will provide better navigation, surveillance, and information sharing and decision making than today. The aircraft will be where it is supposed to be, when it is supposed to be there, more accurately; the controller and ground automation systems will know where the aircraft is more precisely, as well as where the aircraft is going to be; and both the pilot and controller will know more quickly if an aircraft deviates from its plan. Together, these capabilities will allow a reduction in the buffers provided between aircraft while increasing levels of safety.

For example, we expect that the separations between aircraft can be reduced in NextGen, allowing more aircraft to land and depart per hour. Greater precision in planning will enable more efficient handling of aircraft of different sizes and performance. Allowing two aircraft on the runway at the same time could increase the arrival capacity and reduce delays at the majority (up to 90%) of the busiest 35 airports in the U.S., including Atlanta, Kennedy, and Newark.

Better surveillance and more automation in the cockpit can reduce the dependencies between operations on different runways. More precise navigation (using RNAV/RNP routes) will help to reduce the dependencies between operations at different airports in busy metropolitan areas. NextGen would thus allow more usage of existing runways at more than half of the top 35 airports, and might create new opportunities for construction of additional runways at existing airports.

More efficient use of the airspace would also facilitate greater use of secondary airports in major metropolitan areas. Aircraft noise will be reduced and aircraft will be routed over less noise-sensitive areas for minimal noise impact (which would benefit many airports, prime examples being Phoenix and Ft. Lauderdale).

Better weather data, together with cockpit display of traffic information, will reduce traffic disruptions due to poor weather conditions, leading to what are termed “Equivalent Visual Operations” in the NextGen concept. (For example, the capacity at San Francisco today in poor weather is only half the capacity in good weather.) Movement on the airport surface will be improved thanks to accurate surface information through ASDE-X and ADS-B and cockpit displays of traffic information (CDTI), for smoother flows of taxiing aircraft and fewer runway incursions (a problem recently at Los Angeles and other airports). In fact, around two-thirds of the top 35 airports are likely to benefit from improved surface traffic management, in terms of improved safety and reduced fuel

consumption while taxiing. Further analysis of the potential benefit of these and other NextGen capabilities at the nation's airports is underway.

As the FAA evolves the current Air Traffic Management System towards NextGen, we must all be focused on improving controller productivity to handle additional traffic as demand grows, and to provide better service to airspace users. The aviation community must move ahead with incremental implementation of a set of integrated capabilities and an operational concept that is firmly aligned with the NextGen vision and represents an affordable and realistic path. These integrated capabilities, that include improved surveillance, navigation, data communications, and automation for ground and airborne systems, will provide FAA and the aviation community with needed capacity and productivity benefits to handle increased demand. A number of technologies and procedures have been demonstrated to be technically and operationally feasible in both en route airspace and in busy terminal areas. These Performance Based ATM (PATM) capabilities are currently being incorporated into FAA's Operational Evolution Partnership. PATM validation through analyses and Human-in-the-Loop testing conducted over the past two years has shown that these en route and terminal concepts are feasible and provide significant benefits in service provider workload reduction. The amount of time spent on both routine and complex tasks was reduced. The amount of traffic safely and efficiently handled by the controllers was increased significantly (by up to 25%).

Summary

In summary, the answer to the question of why operations are down and delays are up appears to be that traffic levels have increased at the most popular hubs, which have little spare capacity, and have decreased at less popular hubs, which have more spare capacity. In addition, a significant number of activities to increase airport and airspace capacity have been underway, although they are not keeping pace with evolving aviation industry needs and the shifts in demand in specific locations. Local and regional solutions will continue to be needed to address capacity problems as they emerge, however, a system-wide approach to solving the nation's capacity needs is imperative. Finally, successful implementation of all the planned improvements at airports and in the airspace, as well as enhanced automation and procedures for both ground systems and avionics are critical to ensuring a safe and efficient aviation system both in the near-term and for the future. This will require full participation from FAA, customers, and manufacturers.

Mr. Chairman, this concludes my testimony. I would be happy to answer any questions the Committee may have.