STATEMENT OF DR. AGAM N. SINHA
BEFORE THE HOUSE COMMITTEE ON TRANSPORTATION
AND INFRASTRUCTURE, SUBCOMMITTEE ON AVIATION
HEARING ON THE FUTURE OF AIR TRAFFIC CONTROL MODERNIZATION

MAY 9, 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

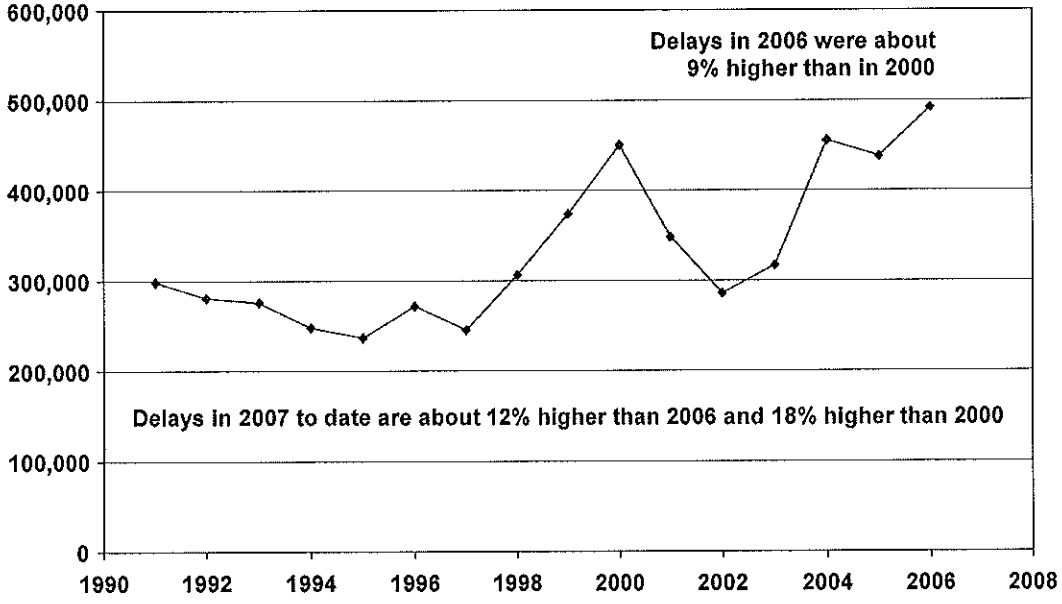
(703) 983-6410

STATEMENT OF DR. AGAM N. SINHA
BEFORE THE HOUSE COMMITTEE ON TRANSPORTATION
AND INFRASTRUCTURE, SUBCOMMITTEE ON AVIATION
HEARING ON THE FUTURE OF AIR TRAFFIC CONTROL MODERNIZATION
MAY 9, 2007

Good morning Chairman Costello and Members of the Subcommittee. Thank you for inviting me to participate in today's hearing on the Future of Air Traffic Control Modernization. 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).

We all remember the Summer of 2000, when delays in the system were at a very high level and were the subject of frequent stories in the popular press and on the evening news. Terms like "gridlock" and "crisis" were often used to describe the state of the system both by people inside and outside the aviation community.

The impact of September 11, 2001 events led to lower demand levels and during the next few years there was a significant reduction in delays. Demand has returned. It is at or above where it was in 2000 in many locations, and so are delays. Total delays in the National Airspace System (NAS) were 9 percent higher in 2006 than in 2000, and 2007 is worse. Through April, total



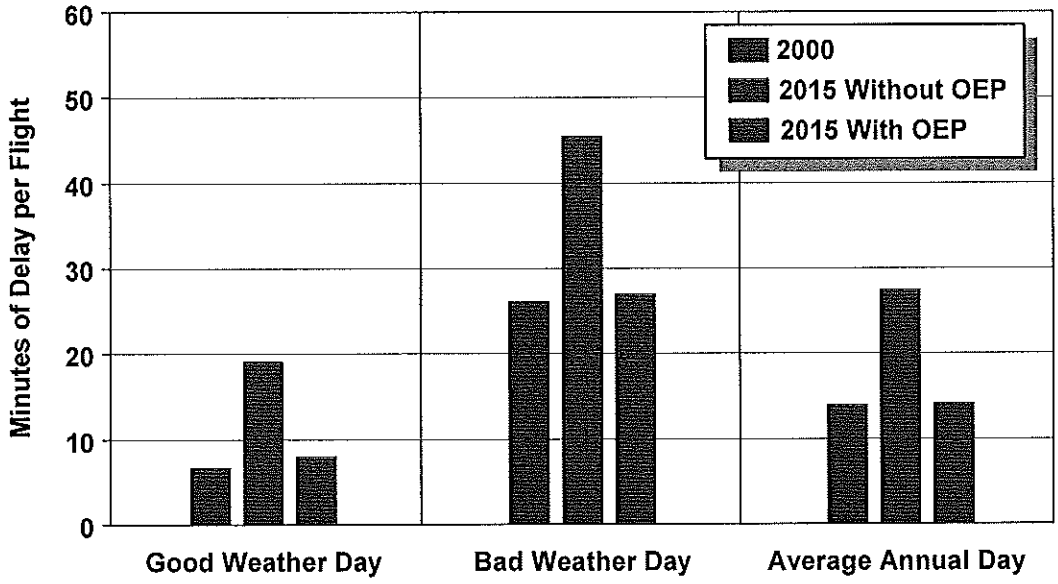
Source: OPSNET Delays, FAA, Aviation Policy, Planning & Environment

Total Systemwide Delays Annually

delays systemwide are 12 percent higher than in the corresponding period in 2006 and 18 percent higher than in 2000, and nearly 75 percent of all airport delays occur at just seven airports:

- Chicago – O'Hare International Airport
- Newark – Liberty International Airport
- Atlanta – William B. Hartsfield International Airport
- New York – LaGuardia Airport
- Philadelphia – Philadelphia International Airport
- New York – John F. Kennedy International
- Houston – George Bush Intercontinental Airport

There have been many significant improvements in the National Airspace System since 2000. Most significant with respect to increased system capacity is the addition of 13 new operational runways together with the necessary airspace changes. New procedures such as Area Navigation (RNAV) departures at Atlanta are saving users $30-40 million annually. These RNAV procedures are based on the ability of aircraft to navigate prescribed paths accurately and reliably. There are today over 100 such RNAV arrival and departure procedures authorized at over 30 airports, and more are being implemented in 2007. The next level in this process is called Required Navigation Performance (RNP) procedures, which is one of the key elements of the future system. RNP allows aircraft to fly even more precise paths with assurance. In Alaska, RNP procedures are used today to fly instrument approaches safely in some of the most challenging geographical terrains. These illustrate just some of the improvements in the system since 2000.



Source: MITRE/CAASD analysis for the Operational Evolution Plan (OEP), 2006

Average Delays at the 35 OEP Airports

The nation's aviation system and the air traffic management system that serves it are facing serious challenges in the years ahead. The demand for air transportation service will lead to an increase in the number of flights by passenger airlines, cargo carriers, and general aviation that will outstrip the ability of the existing NAS to accommodate them safely and efficiently. A MITRE study for the FAA analyzed capacity and delay impacts of the Operational Evolution Plan. It showed that the growth in air traffic demand is projected to lead to a doubling of delays at the nation's busiest airports and in the airspace that serves them in 2015 compared to 2000 if none of the planned improvements are made to the NAS. Currently planned improvements, however, are projected to maintain average delays nationwide at 2000 levels, assuming these improvements are implemented on schedule. Nevertheless, delays at many key congested locations across the NAS will continue to be a challenge (similar to the seven airports experiencing 75% of the delays today).

Looking ahead to 2015 and beyond to 2025, it is imperative for the growth of our national economy that the NAS be able to accommodate the projected growth in a safe an efficient manner. While the specifics of various forecasts may differ in their exact projections of traffic levels, they all agree that:

- Traffic in the future will be much more diverse than today with new aircraft such as A380, B787, very light jets, and unmanned aerial systems operating in the NAS.

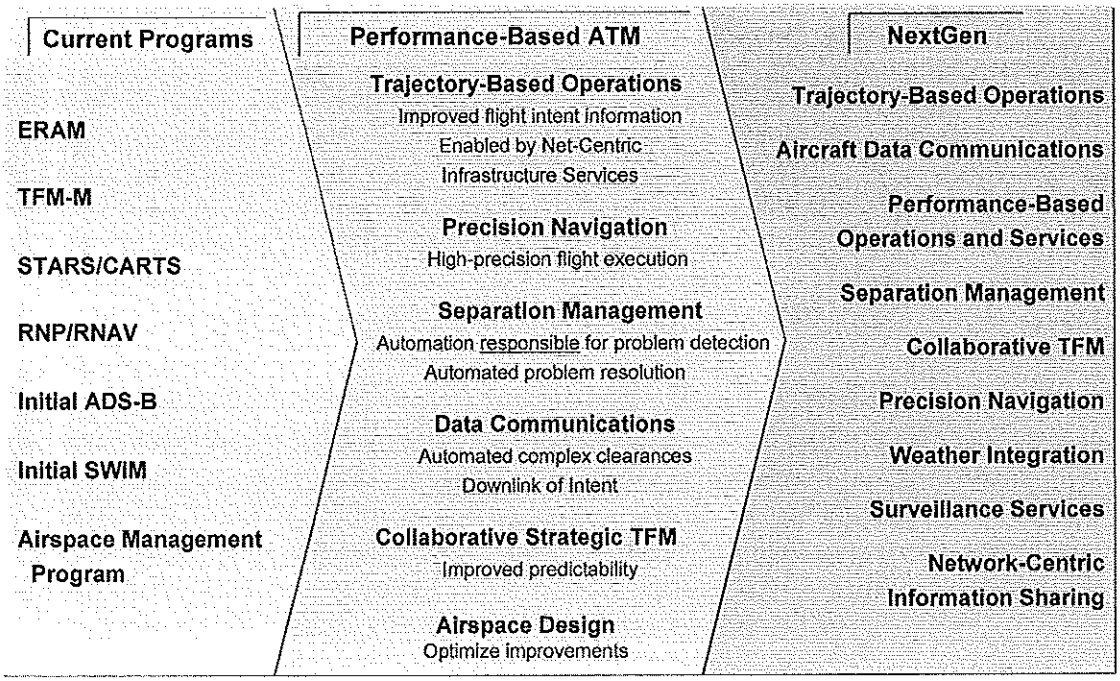
- Delays will not be distributed uniformly across the country. There will continue to be pockets of greater congestion reflected by people's desire to fly to certain destinations (e.g., the northeast corridor, New York/Philadelphia area, San Francisco and Los Angeles areas, to name a few).

The FAA and the Joint Planning and Development Office (JPDO) working in partnership with the aircraft operators, and industry, have developed an operational concept for the future air transportation system. The JPDO has identified the next generation system (NextGen) capabilities beyond those in current FAA plans and budgets, and the research required to develop them. Some of these NextGen improvements are changes to existing airspace and procedures that do not require major capital investments and can be implemented relatively quickly (e.g., RNAV/RNP routes to and from congested airports that capitalize on the capabilities of aircraft's existing flight management systems). Others are NAS improvements that do require capital investment but are well understood, mature, and ready for implementation soon (e.g., improved automation aids for pilots, air traffic controllers and traffic flow managers). While still others are less mature, but appear to be quite promising, and require further research to develop them and to assess whether, when, and how they might be implemented (e.g., advanced applications of cockpit displays that can permit aircraft to separate themselves from one another).

The FAA's Operational Evolution Partnership (OEP) will provide the mechanism that the FAA will use to manage the transition to NextGen. It builds on the experience and success of the Operational Evolution Plan. The new Operational Evolution Partnership has a much more expanded view and will provide the executive level view and oversight to ensure that the full range of activities come together at the right time to achieve the operational benefits that NextGen is to provide.

In the future, aircraft will be key nodes of the system and will have advanced capabilities in communication, navigation, and surveillance. Automation systems (on the ground and in the aircraft) will be playing an increased role in providing a number of routine functions, which will enable pilots and controllers to focus on the more critical activities in handling the higher traffic levels. NextGen is being designed to be human-centric but automation-intensive system with great emphasis on aircraft-centric operations. While some of the operational capabilities needed for NextGen require research, the good news is that the fundamental technologies and procedures (e.g., satellite navigation, Automatic Dependent Surveillance-Broadcast (ADS-B), air-to-ground digital data link, RNP procedures) are known and are available to build a scalable system that can help mitigate congestion in the mid-term (circa 2015) and be a stepping stone to achieve NextGen capabilities.

FAA and MITRE/CAASD have developed and conducted human-in-the-loop experiments of a portfolio of NAS improvements of particular note, targeted around the middle of the next decade and termed Performance-based Air Traffic Management (P-ATM). The idea behind this concept is to start changing the roles of flow managers, controllers, aircraft operators, flight planners, and dispatchers. It will require additional automation capabilities in the ground system, new avionics capabilities in the aircraft, air-ground data communications, and common situational awareness such as that provided by System Wide Information Management (SWIM).



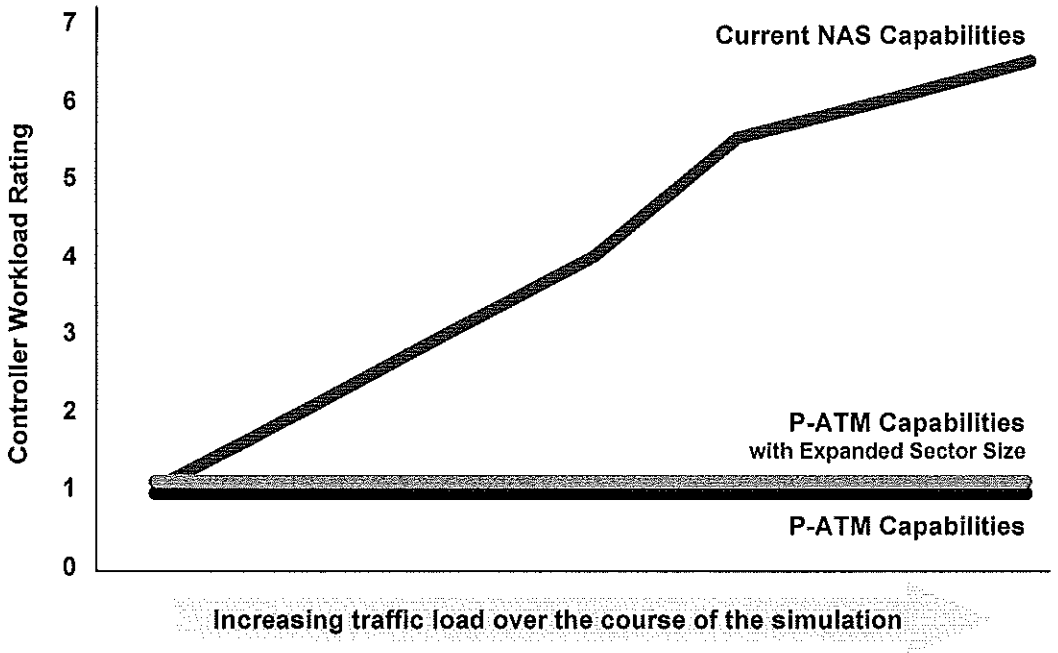
Relationship of P-ATM to NextGen

A key element of the challenges of implementing operational improvements on the road to NextGen is that the implementation must be done from a portfolio perspective (i.e., all the necessary components must be in place). For example, air-ground communications is a key element of using the automation capabilities of the aircraft and the ground system.

The improvements simulated in the P-ATM experiment are key elements of the OEP and provide an important step toward NextGen. These improvements are:

- Necessary: They will permit the NAS to accommodate demand growth and the diverse operational needs of airspace users.
- Desirable: They will reduce FAA and airspace user costs, leverage aircraft capabilities, integrate promising technologies, provide scalability to accommodate increasing demand in later years, and lay a foundation and path toward NextGen.
- Achievable: They rely on capabilities that have been researched and evaluated for many years, are well understood, and are within reach of current technology.

A key element of the P-ATM concept focuses on improving controller productivity to permit controllers to handle additional traffic as demand grows and to provide better service to airspace users both in en route airspace and in busy terminal areas. FAA and MITRE/CAASD have conducted simulations that have demonstrated significant workload reductions under the P-ATM concept compared with today's system. This improvement can translate to lower long-term costs for both the FAA and the airspace users it serves.



Workload Ratings from En Route Controller Simulations: P-ATM Capabilities and Current NAS Capabilities

The evolution of the NAS must not focus exclusively on FAA ground system capabilities. The future NAS needs to consider and capitalize on the role that the aircraft can play and the capabilities it can provide. Air/ground data communications capabilities can permit ground

automation systems to communicate with onboard flight management systems (e.g., to reroute flights around thunderstorms or congestion) and can reduce controller and pilot workload at the same time. Improved navigation and flight management systems can enable aircraft to fly with greater precision and can increase airport, terminal area and en route airspace capacity. Advanced cockpit displays and automation aids may permit aircraft to separate themselves from one another safely and efficiently, possibly at closer separations. Many air traffic service providers internationally are implementing integrated ground and airborne capabilities, and some are using creative approaches to acquire and finance their implementation to overcome some of the historical impediments associated with the evolution of avionics capabilities. The evolution of the system must be viewed in an *integrated* manner, and careful consideration must be given to the most appropriate role that aircraft and pilots can play in providing safe and efficient services and the possible approaches that can be taken to realize the system capacity that the nation needs and the quality of service airspace users want in a cost effective manner.

As the JPDO and FAA together with their government partners (DOD, NASA, DOC, DHS, DOT, and the White House OSTP) continue to develop the necessary details of the 2025 NextGen concept of operations and the integrated roadmap, it is important for the aviation community to move ahead with the implementation of the known fundamental technologies and procedures. This needs to be truly a community effort because it requires changes in aircraft and air traffic systems together with procedures and airspace changes. Only through moving ahead now can we meet the challenges of the mid-term and be well on our way to having the full capabilities of NextGen by 2025.

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