STATEMENT OF
CAPTAIN LEE MOAK
PRESIDENT
AIR LINE PILOTS ASSOCIATION, INTERNATIONAL
BEFORE THE
SUBCOMMITTEE ON AVIATION
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE
UNITED STATES HOUSE OF REPRESENTATIVES
ON
A COMPREHENSIVE REVIEW OF THE FAA'S NEXTGEN PROGRAM: COSTS, BENEFITS, PROGRESS, AND MANAGEMENT
OCTOBER 5, 2011

Good morning, Mr. Chairman and members of the Subcommittee. I am Captain Lee Moak, president of the Air Line Pilots Association, International (ALPA). ALPA represents over 53,000 pilots who fly for 39 passenger and all-cargo airlines in the United States and Canada. On behalf of our members, I want to thank you for the opportunity to provide our perspectives on the issues that are of great importance as the FAA, as the Air Traffic Service provider, and the pilots and operators who use the system, work collaboratively to modernize the National Airspace System (NAS) into the Next Generation Air Transportation System (NextGen).

The Economic Benefits of NextGen

As the budget debate rages in Washington, everyone, from our President to the most liberal and conservative members of Congress, should agree that we need to cut programs that are not providing an acceptable return on our investment and support the ones that bring back more than we put in—those that grow the economy and create jobs. These are decisions that businessmen and women make in companies large and small every day. It's fundamental to long-term success.

This basic measure of smart business spending—return on investment—should be the same in government and industry. The challenge often lies in determining where the waste is and what will bring a good return.

There is no serious disagreement on the smart investment in NextGen—it's plain that funding NextGen will bring enormous returns to the U.S. economy for years to come and equally clear that funding should commence immediately.

We need to get our economy moving again. The civil aviation industry has a critical role to play. Civil aviation, directly and indirectly, contributes more than $1.3 trillion to the

U.S. economy each year—or 5.2 percent of gross domestic product. The value of air travel—leisure and business—is a critical pillar of the economy. Hotels and resorts, conference centers, rental car companies, tourist attractions, and just-in-time deliveries are not viable without reliable, efficient, affordable air travel. In today's economy—and even more so in tomorrow's—millions of jobs depend on keeping the air travel system healthy. NextGen will increase capacity and efficiency while generating growth in our nation's airlines, aviation companies, and suppliers. This will lead to job growth at a time when our nation needs it the most.

The Safety Benefits of NextGen

Aviation safety is vital to our country and air traffic control (ATC) system modernization and NextGen is vital to the future of aviation safety.

Today's U.S. air transportation system is the safest in the world. You are about 40 times safer in an airliner than on the safest highway system in the world. But we are at a crossroads. Our ATC system is getting older and there are many systems on our aircraft that are not used to their fullest capabilities. Infrastructure is woefully outdated, the equipment's capabilities are limited, facilities are crumbling, efficiency is decreasing, and capacity is limited. These shortcomings, left unchecked, eventually have the potential to decrease efficiency and even erode safety margins, because our air traffic system and infrastructure have not been kept up to date.

Despite all that, it is a tribute to the dedication and professionalism of our pilots, controllers, and air traffic services employees that the system continues to operate safely, albeit at a slower tempo during periods of radar outages, poor weather, and mass congestion. The system we are given to work with, however, cannot keep going indefinitely.

In 1931, ALPA's founders chose the motto "Schedule with Safety." That era saw accident rates many times higher than those of today. In fact, over half the founding members of ALPA died in aircraft accidents. ALPA is keenly aware of the continuing need to improve the safety of the air transportation system. Over the past 80 years, NAS has changed greatly. Communications evolved from light signals and burning oil cans to lightweight and reliable radios to where we are now, using a data link technology akin to texting to track aircraft.

The ATC system in the contiguous United States has moved from separating flights using radio position reports to positive control using radar that extends from coast to coast.

With the introduction of the Global Positioning System (GPS), a system originally designed by the Department of Defense as a precision method to attack targets and adapted by the aviation industry, aircraft navigation is moving from a ground-based navigation system to a satellite-based navigation system and at the same time achieving unprecedented levels of positioning accuracy. GPS technology allows all types of aircraft, both large and small, to fly approaches around the world in all types of weather using purely satellite-based navigation systems.

All of these changes have two things in common. They have made air travel safer, and they were successfully accomplished when there was a collaborative relationship between the government and the private sector.

In each example, the private sector and government worked together to develop system and equipment specifications, new controller and pilot procedures, training requirements, and the development and implementation of ground and airborne infrastructure. ALPA is working actively with industry, the FAA, and the JPDO to ensure that NextGen is yet another example of a successful collaboration leading to fundamental change to the NAS.

We have a lot of work to do. It is almost unbelievable, but despite improvements in technology, a large percentage of the approximately 50,000 flights a day in the United States are controlled much the same as they were in 1960—by World War II–era ground radar stations. NextGen will completely replace our World War II–era analog, ground radar-based air traffic control infrastructure with a 21st-century, all digital, satellite-based system.

NextGen provides precision surveillance and navigation capability that will give pilots and controllers more accurate and detailed real-time information about aircraft location than is currently possible, increasing situational awareness and making the system safer. NextGen will bring precision-approach capability to locations and runways where precision approaches do not currently exist. A full list of these runways is attached at the end of this statement, but what this means is that in locations and runways like Reagan National 19, Chicago Midway 4L–22L–31C, Boston 4R–9–22R–32, and Minneapolis 4–17–22 to name a few, pilots will be given precise aircraft location and altitude information relative to the landing runway, improving safety and capacity when operating in adverse weather conditions.

Without the improved navigation accuracy possible through NextGen, we are seeing the implementation of nonstandard procedures in some locations in an attempt to gain capacity and efficiency improvements. While we have worked hard to ensure an

adequate level of safety, moving forward on NextGen implementation would mitigate the need for these nonstandard, location-specific applications. Our current system is capacity limited. Without the improved navigation accuracy possible through NextGen, we risk reducing the current safety margin for that system capacity.

The 793 ground transceivers that comprise the NextGen surveillance system will be in place by 2013, but NextGen cannot work unless the commercial airlines and private aircraft install avionics systems designed to send and receive NextGen data. This equipment, however, isn't required until 2020, a seven-year gap that could cost our economy $35 billion in reduced benefits.

Funding NextGen

The cost for NextGen, among the most significant efforts ever undertaken to upgrade the air traffic management infrastructure, has been estimated at over $40 billion initially and as high as $160 billion in some scenarios. There is little debate over the need to modernize. Industry agrees that with a price tag this high, we must get this right the first time. This is a global issue and demands a high priority.

ALPA was pleased to see the President's inclusion of $3 billion for aviation-related projects in the American Jobs Act that was presented to Congress. The bill provides $2 billion for airport-development grants plus an additional $1 billion specifically for NextGen projects. In addition, the American Infrastructure Financing Authority (AIFA), or infrastructure bank, which is established in the bill, would allow a portion of the $10 billion allocated to the AIFA to be used to support loans and loan guarantees for private financing of airports and ATC systems.

It is our hope that, if it becomes law, the $1 billion NextGen investment will serve as the tipping point for others in industry and government to move forward on this critical initiative in a serious way. But, against the total cost of NextGen what will $1 billion get you? It is like putting a quarter into a parking meter on Capitol Hill and expecting to get two hours of parking. It is not going to happen, a quarter only gets you 7.5 minutes. You are going to get a ticket or be towed—a penalty for lack of investment—and industry and consumers are penalized for not investing in NextGen with higher costs and sacrificed safety.

Another analogy, look at the home mortgage crisis in this country which is as a result, in part, of homes that were purchased with an insufficient down payment by people who ultimately could not afford their mortgage, but banks were willing to lend them money with no money down. NextGen is going to collapse, and the United States is going to be bypassed by our aviation competitors around the globe if we continue with

an insufficient down payment—the system cannot sustain itself without a committed buy-in from the government and a promise of return on investment for industry.

One billion dollars is simply not enough against the estimated price tag for NextGen. The government must step forward with a greater financial commitment and show of support for aviation here in the United States.

In 1997, while a member of Congress, former Secretary of Transportation Norm Mineta chaired the National Civil Aviation Review Committee (NCARC). The NCARC recommended that the FAA's funding and financing system receive a federal budget treatment that ensured revenues from aviation users and spending on aviation services were directly linked and shielded from discretionary budget caps. This would ensure that FAA expenditures would be driven by aviation demand. While some movement has been made on this issue, this recommendation has not been fully implemented.

With the movement toward NextGen, the issue of a sustained funding stream is even more urgent. This is best illustrated by the fact that the FAA is currently operating under the 22nd continuing resolution.

The safety of our air transportation system and the companies and workers who rely on it for their livelihood demand that Congress put a stop to the repeated short-term patchwork fixes and get an adequately funded bill passed. Operating from continuing resolution to continuing resolution does not provide the FAA with the ability to allocate money for needed ATC system improvements in a timely manner.

We urge Congress to pass a fully financed, multiyear FAA reauthorization bill, which would allow the FAA to move forward with implementing NextGen on a faster timetable. Twenty-two continuing resolutions over the past four years is simply unacceptable. The fact that partisan politics led to the FAA curtailing projects, furloughing employees, and the loss of hundreds of millions of dollars in tax revenue is unacceptable and must not be repeated.

Sustained long-term funding of the nation's airspace and air traffic control infrastructure is essential. ALPA feels that funding must be composed of a combination of federal funds and fees that require all airspace users to pay "their fair share" because all users will benefit from modernization. NextGen is simply a project that cannot be killed in midstream.

Right now our commercial airlines, through aviation taxes, pay the majority of the cost to operate and maintain this country's ATC system and infrastructure. Our airlines

cannot afford to pay the cost of operating and maintaining our current system and for the additional expense to purchase avionics equipment that may not realize its full benefit for many years. The congressional plan must pay for both operating the existing ATC system and modernizing the NAS without driving our airlines out of business. As such, ALPA opposes any new commercial aviation user taxes, disguised as fees, and calls on Congress to level the playing field for airline taxes.

And beyond funding, we need a comprehensive NextGen strategy, driven by the government. Funding from industry will not come without a clear path forward.

For example, aircraft manufacturers are currently delivering aircraft off the production line that possess capabilities that cannot be utilized either because the current infrastructure is not prepared to use the technology or the necessary operational procedures have not been approved. In addition, the government has required the installation of NextGen equipment that does not meet the end-state standard necessary to achieve the desired goal. This is irresponsible.

With a project of this magnitude and complexity, a well-coordinated, fully integrated plan, known to and agreed upon by all stakeholders, along with supporting equipment standards, is critical. Safety initiatives, as well as hardware and software projects by a wide variety of aerospace companies and the FAA are the component parts of NextGen. They must be developed in a tightly coordinated manner on specific time lines to support critical interrelationships with a variety of U.S. and international efforts.

Pilots sit literally at the intersection of new technology, operational measures, air traffic control procedures, and varying aircraft capabilities. This gives us a unique vantage point to see and experience firsthand what can happen if well-intended, but unrealistic operational procedures are instituted. Without thorough study and stakeholder involvement, complexity can increase, efficiency can decrease, and, in some cases, safety margins are eroded.

NextGen requires a new way of thinking about the NAS. No longer can we tolerate a NAS composed of a number of independent ATC systems and tools. NextGen must be an integrated blend of future technologies, procedures, and public policy reform designed to enhance system safety, increase throughput, and decrease emissions through the use of collaborative decision making and more precise and efficient flight routings and separation standards.

For the past 10 years, ALPA, during congressional testimony, speeches, press conferences, and releases has pressed for the long-term funding of the NAS and ATC

infrastructure. Every day we delay we fall further behind other regions of the world that have moved ahead without us and our airlines and their employees suffer in the global marketplace.

Transforming the NAS has been likened to changing the tire on a truck while it is underway at 70 MPH. It can be done, but it must be well thought out and it will take new technologies to make it happen. ALPA is working with the FAA and industry stakeholders to ensure that the airline pilot voice, the major operator, is a part of all discussions regarding the transition from the current ATC system to NextGen. This transition must be made without affecting the excellent NAS safety record.

Airport Surface

Since 2000, government and industry have been working together to implement a series of programs to reduce delays. These programs have had some effect in reducing delays, but more work is needed. Air traffic congestion in flight and on the ground remains a major issue, indeed the crux of the problem. There are physical limits in time and space of capacity, and a major impediment is the ground infrastructure, e.g., concrete runways, taxiways, aprons, and buildings. Each new runway takes over 10 years on average to design and build and costs billions of dollars. The impacts of noise and pollution regulations are forcing the cost even higher.

Airlines have been forced to increase the scheduled time between departing the gate and arriving at the destination gate. The flight of a propeller-driven Douglas DC-7 in the 1950s between Dallas and Atlanta had a shorter *scheduled* time than does a flight today in a Boeing 757. The extra time is necessary to navigate on the ground to and from the runway.

At some airports, airlines routinely allocate over 70 minutes just to get from the departure gate to the runway. Increased airport surface congestion increases the chances of runway incursions and possible collisions. Ground delays cost more than just the extra time. Time delays due to congestion adds costs for fuel, wear and tear on aircraft, follow-on schedule disruptions for crews and aircraft, and so forth that collectively amount to billions of nonproductive dollars lost annually due to sitting in traffic.

A 2010 research report by five universities, which was funded by the FAA, found that flight delays cost the United States $32.9 billion a year. The research also found that delays in the aviation system also create a significant drag on the economy. Delays reduced the gross domestic product by $4 billion in 2007. They also cost the airlines $8.3 billion.

Industry and government must collaborate on a series of efforts to reduce the challenges of airport surface management, including the use of ADS-B for increased surface situational awareness for both pilots and controllers. The collaborative use of flight data such as departure time of a flight from the gate and the estimated time before a flight will touchdown can be used by the airport, air traffic control, and airline managers to more effectively and dynamically manage the surface traffic of aircraft and ground vehicles.

The potential benefits of more effective surface management are tremendous. With the rising cost of fuel, less fuel will be consumed while taxiing, resulting in immediate savings. Reduced taxi time also translates into less noise and emissions. Better knowledge of exactly where the aircraft is on the surface translates into more efficient gate management and will allow the air traffic controller to arrange departures into a more efficient departure stream.

The RTCA's NextGen Mid-Term Implementation Task Force recommended that the FAA take steps to improve aircraft surface traffic management at airports. The intent would be to reduce tarmac delays and enhance safety, efficiency, and situational awareness by defining and standardizing requirements, and implementing the capture and dissemination of surface operations data to controllers, ramp towers, and user operations centers.

The FAA is in the process of addressing aircraft surface management as the Task Force recommends. They recently accelerated the ASDE-X schedule. ASDE-X enables air traffic controllers to detect potential runway conflicts by providing detailed coverage of movement on runways and taxiways. By collecting data from a variety of sources, ASDE-X is able to track aircraft ground support equipment, maintenance vehicles, and aircraft in the airport movement area and obtain identification information from aircraft transponders.

Metroplex Optimization

The Task Force also recommended that the FAA focus on relieving congestion and tarmac delays at major metropolitan area airports by reducing inefficiencies at satellite airports and surrounding airspace. This would be accomplished by instituting joint government and industry teams that focus on quality of implementation at each location and eliminating airspace conflicts with adjacent airports.

The Task Force recommended using core capabilities of RNAV, with RNP where needed; optimized vertical profiles using vertical navigation; and use of three nautical mile and terminal separation rules in more airspace.

The FAA has been working with industry towards addressing the complexities of the airspace of these metroplexes. Tiger Teams have been established to develop redesign and optimize the airspace at the Metroplexes. Over the past year, Tiger Teams completed the initial evaluations at the Potomac–Washington, D.C.; North Texas–Dallas/Ft. Worth; Northern California; Charlotte; and Houston metroplexes. They are currently conducting studies of the Southern California and Atlanta metroplexes.

These teams, composed of government and industry members, work with local air traffic control and airports to optimize use of performance-based procedures and associated separation rules that will improve throughput while also potentially reducing fuel burn, emissions, and noise.

Access to the NAS

The Task Force recommended improving access to, and services provided at, non-OEP airports and to low-altitude, nonradar airspace. They recommend doing this by implementing more precision-based approaches and departures, along with the expansion of surveillance services to areas not currently under radar surveillance. This can be accomplished through RNAV and RNP approach procedures, arrivals, and departures.

RNAV/RNP

Taking advantage of area navigation (RNAV and RNP) offers flexibility in procedure design and improved navigational accuracy available right now in many modern aircraft and can improve efficiency and reduce delays without compromising safety. However, efforts to use this technology to its fullest extent are lagging and must be accelerated.

In April 2002, FAA Administrator Jane Garvey announced the migration away from a ground-based navigation system to a "required navigation performance" (RNP) system. Airlines have long complained of sending aircraft to the bone yard with equipment capable of operating independent of ground-based navigation systems that has never been fully used. This avionics equipment was developed, bought, and installed with the hope that the capabilities could be used. However, this was an example of how the private sector and government did ***not*** work in a collaborative manner.

NextGen must take better advantage of these aircraft capabilities. Area navigation (RNAV) uses onboard avionics that allow an aircraft to fly more direct and precise flight paths, improving efficiency. This enhanced navigation capability allows greater ATC flexibility in assigning routes compared to traditional ground-based procedures. RNAV also allows ATC to put more aircraft in the same airspace safely. Using these improved procedures on departures has led to reduced departure delays, decreased taxi times, and reduced fuel burn and associated emissions. For example, RNAV operations have saved operators $8.5 million annually at Dallas/Ft. Worth International Airport and a total estimated $34 million at Hartsfield-Jackson Atlanta International Airport. Required Navigation Performance (RNP) builds upon RNAV and allows flights to land with lower minima.

Using RNP, in 2006 Alaska Airlines was able to continue 980 approaches that otherwise would have been diverted, largely due to adverse weather conditions. NextGen plans call for continued deployment of RNAV and RNP procedures, and we will begin to couple them with other decision-support tools to maximize their capabilities.

RNAV allows aircraft to fly more fuel efficient arrivals into airports. This has been demonstrated at San Francisco, Atlanta, and other airports. Aircrews receive the arrival path guidance matched to a specific flight by taking into consideration factors including aircraft performance, air traffic, airspace, and weather. In 2009, Boeing reported that the tests carried out at San Francisco International Airport showed the optimized arrivals helped the airlines cut fuel consumption by 1.1 million pounds and cut carbon dioxide emissions by 3.6 million pounds over one year.

One of the advantages of a satellite-based navigation system is the ability to expand capacity of the existing airports through greater-precision instrument approaches to all runways, not just those served by the ground-based workhorse of precision-landing approach guidance, the Instrument Landing System (ILS).

Meeting this goal will require a rethinking of the FAA's instrument procedure production and maintenance capability. Currently the FAA develops and maintains over 18,000 instrument procedures. Approximately 60 percent of these approaches are published as satellite-based procedures, and the number continues to increase. However, a large number of these are in fact, RNAV versions of existing ground-based procedures.

While we applaud this step toward reduction in the need for ground-based infrastructure, these so-called "overlay" procedures do not use the technology to

improve efficiency. The FAA must accelerate the development, testing, and implementation of true RNAV procedures in order to safely improve efficiency. In addition, the FAA is still maintaining over 900 procedures based on nondirectional beacons (NDBs), the oldest navigation technology in the NAS, and as a result, using resources to maintain ground equipment based on navigation methods that are now approaching 100 years old.

Instead of spending resources on older technologies, the resources should be spent on advancing the capabilities of the NAS. No longer can we afford to base the NAS on the lowest common denominator. Users equipped with the newest technologies should benefit instead of being penalized.

ADS-B

Fifty years ago, two airliners collided over the Grand Canyon killing all onboard both aircraft. As a result of this horrific accident, Congress demanded the establishment of an air traffic control radar system requiring commercial aircraft to be under positive radar control, that is, ground surveillance. Once again, government and industry collaborated to quickly establish a radar system across the NAS and at major airports that has evolved into the present system in use today.

In March, 2007, Administrator Blakey announced the surveillance system of the future—Automatic Dependent Surveillance-Broadcast (ADS-B). ADS-B, unlike radar, does not rely on a ground-based surveillance system of emitters and receivers. With ADS-B, each aircraft broadcasts its position along with additional information.

In May, 2010, the FAA issued a regulation requiring ADS-B "Out" equipment on all aircraft operating in certain classes of airspace within the NAS by 2020. ADS-B "Out" refers to the broadcast of the position signal by the aircraft to ground stations. The FAA has not issued a regulation proposing a time frame for the adoption of ADS-B "In," which would allow not only ground facilities, but also other suitably equipped aircraft, to receive the inbound signal.

While a radar uses ground-based signals to calculate the location of the aircraft in their airspace, by receiving better data directly from the source, that is, the aircraft, pilots are freed of many technical constraints and limitations and can make both strategic and tactical decisions on how best to guide the airplane. The new system tracks aircraft with greater accuracy, integrity, and reliability than the current radar-based system. ADS-B targets on controller screens update more frequently than radar and show information including aircraft type, call sign, heading, altitude, and speed. Controllers, and flight

crews with access to the appropriate equipment, will know the real-time position of aircraft on the ground or in the air.

Just like radar increased the air traffic controllers' situational awareness, ADS-B will increase situational awareness for everyone in the system. However, to realize the full benefit of the technology, a plan to facilitate widespread equipage of airline aircraft is essential.

Equipage for NextGen

At the Air Traffic Control Association's 55th Annual Conference, a paper with a provocative proposal to resolve what many have termed the "NextGen equipage paradox" was presented. The "NextGen equipage paradox" refers to the big problem of coordinating the FAA Air Traffic Organization's investments in ATC infrastructure with investments by aircraft operators (airlines, air taxis, fractional providers, business aircraft, etc.) needed to take advantage of the new infrastructure. Most of the benefits promised by NextGen will not be realized until a large fraction of the aircraft fleet is equipped.

Yet, based on previous unsuccessful programs, airspace users lack confidence that the FAA will make its infrastructure investments in a timely manner, making them reluctant to lay out the cash to equip their planes.

This concern is reflected in a 2010 DOT Inspector General report, "FAA Faces Significant Risks in Implementing the ADS-B Program and Realizing Benefits." (AV-2011-002, Oct. 12, 2010). The report points out that, "The greatest risks to successfully implementing ADS-B are airspace users' reluctance to purchase and install new avionics and FAA's ability to define requirements for the more advanced capabilities."

A significant challenge is the development of methodology to incentivize airlines to equip early in the process. This is the paradox. Discussions are ongoing right now on identifying the best way to incentivize early equipage. Without such plans, airlines are unable to close a business case that will allow them to responsibly equip with avionics that are crucial to the realization of systemic benefits of NextGen.

NextGen is the plan—but an architect's plans tend to work out best when the people building the house are actively engaged with the planners. That is the approach that will sustain the forward momentum if we're to achieve success.

A critical decision in all this will revolve around the aircraft capabilities needed for NextGen success. When it comes to looking at equipage, we've got to start with the

airplane. Aircraft capabilities are essential to NextGen. As we've learned from too many of the start-and-stop modernization plans of the past, decisions to implement new avionics-enabled capabilities must be made by industry and government together, and both sides need to be clear on what they're buying into and what return on investment they can achieve. Clarity on proposed aircraft capabilities is especially important and especially challenging. These must be vetted, refined, and matured by the aviation community.

Given the national significance of these challenges, partnership has to be the order of the day and everyone must weigh in. Potential capabilities only turn into system performance when both sides make the required investment. Certainly aircraft operators will play a decisive role in the resolution of these challenges.

The operators must make focused investments in the key aircraft equipment enablers required to deliver operational capabilities that are going to enable NextGen—including the avionics and other aircraft performance requirements. And operators must have some real assurance, not just wishful thinking that the investments they make in new aircraft and avionics will pay off.

We need to define exactly how the NAS could operate in 2018. We need to be able to explain how data link, ADS-B, RNP, and other existing systems will work together to make things better than they are right now. And, most importantly, we need to understand from operators how these systems can translate into business performance. After all, an industry that makes money can invest and upgrade faster than one simply seeking to survive.

An example of this is the new En Route Automation Modernization (ERAM). ERAM is the replacement for the existing host computer for en route centers. ERAM was designed with NextGen in mind. It will support satellite-based systems, such as ADS-B, and data communication technologies. This, in turn, will clear the way for future gains in efficiency and safety. ERAM has begun installations in the 20 air route traffic control centers (ARTCCs).

ERAM includes a fully functional backup system and precludes the need to restrict operations in the event of a primary system failure. The backup system also provides safety alerts and weather information not available on today's backup system. ERAM has increased flexibility in routing around congestion, weather, and other airspace restrictions. Automatic flight coordination increases efficiency and capacity.

A fully developed NextGen could eliminate as much as 15 percent of today's delays, increase safety and capacity, and concurrently reduce emissions. Funding of important research activities, like wake vortex studies, are critical to the full development of NextGen. More information about and understanding of wake vortex patterns around runways will allow spacing of traffic on the runway based on real hazards—a more accurate standard than the currently used mileage separation.

It is critical to continue funding for important infrastructure improvements including runway and taxiway additions and improvements. Poor airport design, including those with intersecting runways, increases taxi time and increases fuel use. Adding high-speed taxiway exits from runways can reduce runway occupancy time, thus increasing airport capacity. Additional runways, like those recently commissioned at Seattle-Tacoma, Chicago O'Hare, and Washington Dulles airports, reduce fuel wasted in holding patterns and long lines of aircraft waiting for takeoff.

Unmanned Aircraft Systems (UAS)

The need to modernize extends beyond simply upgrading today's ground and airborne equipment. New concepts and new technology must be integrated. Among the most dramatic changes in technology is the Unmanned Aircraft Systems (UAS).

The introduction of UAS to the NAS is a challenging enterprise for the FAA and the aviation community. UAS proponents have a growing interest in expediting access to the NAS. There is an increase in the number and scope of UAS flights in an already busy NAS. The design of many UAS makes them difficult to see, and adequate "detect, sense, and avoid" technology is years away.

Decisions being made about UAS airworthiness, pilot qualification and training, and other operational requirements must fully address safety implications of UAS flying in, around, or over the same airspace as manned aircraft, and perhaps more importantly, aircraft with passengers who have come to expect a single level of safety that is the highest in the world.

UAS are aircraft that range in size from as small as a bird to as large as a Boeing 737. They are flown remotely from an operational center or control stations that can be located at the launch and recovery site or thousands of miles away. Some are capable of "autonomous operation," meaning they follow preprogrammed instructions without direct operator control. Their pilots/operators are not currently required to be FAA-licensed pilots or even have a common level of proficiency.

Most of the current designs were developed for the Department of Defense (DOD) for use in combat areas and so are not necessarily designed, built, maintained, or operated in the same manner as other aircraft in the NAS. As a result, today they are typically flown in segregated airspace, i.e., military restricted airspace or equivalent, but have the clear potential to stray into our airspace in the event of a malfunction.

The UAS industry is currently focused on the rapidly growing DOD UAS application but is moving toward adapting current UAS to civil use. There is growing pressure by the UAS industry to gain access to the NAS as for commercial applications. In order to guarantee an "equivalent level of safety" for UAS in the NAS, extensive study of all potential hazards and ways to mitigate those hazards must be undertaken. The pressure for rapid integration into the NAS must not result in incomplete safety analyses prior to any authorization to operate.

The much-publicized success of UAS in combat operations has created a large potential market for the use of these aircraft by commercial enterprises. Many are also in use domestically by government agencies (law enforcement, customs, agriculture, etc.). However, there is currently a lack of transparency in understanding the full operational experience of UAS operated by government agencies. The civil aviation world needs to understand the difficulties, failures, and challenges already experienced in UAS operations in order to develop accurate risk analyses for UAS in the NAS.

As the number of these aircraft increase, and the potential for business use increases, so does pressure to allow their unrestricted operation in the NAS. Currently, they are operated in exclusionary airspace and not in the common areas. Before UAS can be authorized to occupy the same airspace as airlines, or operate in areas where UAS might inadvertently stray into airspace used by commercial flights, there needs to be in place a standard or combination of standards that will ensure the same high level of safety as is currently present in the NAS. We cannot afford to misjudge this issue in the name of profits.

ALPA believes that in all types of aviation, a well-trained and experienced pilot is the most important safety component of the commercial aviation system. The role of the pilot is a major area of concern within the UAS and piloted aircraft communities. These pilots should be trained, qualified, and monitored to the same standards as pilots who operate aircraft from within the aircraft. ALPA will continue to work to protect the safety and integrity of the NAS and ensure the introduction of UAS operations will not compromise the safety of our members, passengers, cargo, or the public at large.

ALPA fully supported the comments of the former FAA Associate Administrator for Aviation Safety, Mr. Nick Sabatini, when he said "that UAS should do no harm," when referring to their potential integration into the NAS. The standards for design, construction, maintenance, and operation of UAS must be developed to the point where they operate with the same high level of safety we all expect of commercial aviation before they are allowed unrestricted access to the NAS.

Summary

NextGen has the potential to revolutionize the NAS and our air transportation system, but only if private industry and government work together. By collaborating, we have made major strides in the almost 108 years since the Wright brothers first flew. However, the next 20 years could see of the most dramatic changes in the history of aviation.

Forecasted increases in air traffic of two to three times today's traffic cannot be met in today's NAS. The changes will be not be cheap or easy and will require much work and effort. Neither industry nor government can afford to attempt, or are capable of completing, this enormous undertaking alone. ALPA looks forward to collaborating with industry, academia, and government to meet these challenges.

Any measures to address NextGen's achievable goals must include the following general areas:

- **Air traffic control (ATC) modernization:** The administration and Congress should work to accelerate the FAA's NextGen plan to modernize our antiquated ATC, communications, navigation, surveillance, and management infrastructure; this is vital to safety and efficiency and can bring significant reductions in greenhouse gas (GHG) emissions.

- **Technology and research:** Industry is driven by customer demand and market forces to develop and deploy improvements to the NAS, aircraft, and engines.

- **Operational measures:** Aviation has vastly increased the efficiency of its operations to minimize GHG emissions; widespread use of GHG-saving navigation procedures such as continuous descent arrivals (CDA) or as they are also known, Optimized Profile Descents (OPD), awaits ATC modernization.

- **Ground infrastructure investment:** More infrastructure investment is required to address shortcomings at our busiest airports and improve operational efficiency.

- **Economic measures:** Positive incentives can add to the industry's efforts, but fees, charges, or taxes, whether direct or indirect, are counterproductive. Should any climate-change measures raise revenues, such revenues must be reinvested into initiatives that reduce aviation's GHG emissions.

  We must have a fully funded plan that offers a systematic approach that builds on better science and improved decision support tools, advanced air traffic procedures, enhanced aircraft technology, sustainable alternative fuels, and policies to address environmental challenges. Advances in aircraft technology and renewable fuels are essential if we are to provide solutions for the energy and climate challenges for the U.S. aviation system. The close partner to this sustainable development is livability, the fourth area of this administration's priorities. In aviation, this entails a commitment to the flying public to continue to focus on the safety, convenience, and confidence of the traveling public, with minimal environmental impacts on our communities.

  Thank you for the opportunity to present our views.

OEP Airport Runway Ends Without Precision Approach Capability

Airport	**ID**	**Runways Without Precision Approach**
Reagan National	DCA	19
Kennedy	JFK	13R
O'Hare	ORD	4L
Midway	MDW	4L/22L/31C
Tampa	TPA	10/28
Ft. Lauderdale	FLL	9R/27C/31
San Francisco	SFO	19R
Dallas/Ft. Worth	DFW	13L/31L
Detroit	DTW	9L/9R
Boston	BOS	4R/9/22R/32
Philadelphia	PHL	35
LaGuardia	LGA	31
Dulles	IAD	30
Minneapolis	MSP	4/17/22
Houston Continental	HOU	15L/33L
Las Vegas	LAS	1R/7L/7R/19L/19R
Phoenix	PHX	25R
San Diego	SAN	27
Orlando	MCO	18L/36L
Baltimore	BWI	4/15L
Dallas-Love	DAL	8/36
Cleveland	CLE	10
Newark	EWR	29