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NEW AIRCRAFT IN THE NATIONAL AIRSPACE SYSTEM

HEARING

BEFORE THE

SUBCOMMITTEE ON AVIATION

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION UNITED STATES SENATE

ONE HUNDRED NINTH CONGRESS

SECOND SESSION

SEPTEMBER 28, 2006

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ONE HUNDRED NINTH CONGRESS

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NEW AIRCRAFT IN THE NATIONAL AIRSPACE SYSTEM

THURSDAY, SEPTEMBER 28, 2006

U.S. SENATE,
SUBCOMMITTEE ON AVIATION,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
Washington, DC.

The Subcommittee met, pursuant to notice, at 10:07 a.m. in room SR–253, Russell Senate Office Building, Hon. Ted Stevens, Chairman of the full Committee, presiding.

OPENING STATEMENT OF HON. TED STEVENS, U.S. SENATOR FROM ALASKA

The CHAIRMAN. Good morning. My apologies for being late. In the last days of any Congress, there are an enormous number of things that have to be handled, and conferences. I do apologize. And I apologize to you, Senator Rockefeller, for being late.

The Chairman of this Subcommittee will be here shortly to take over this hearing. He is at the Armed Services Committee meeting, which is an important meeting, and as soon as he can get away, he will come.

The issues we are here to discuss are critical to the future of our national aviation and aerospace system. The very light jets, or, I have called, the "mosquito fleet," without trying to be derogatory at all, will be—soon be a part of our daily air travel in our Nation. Just as regional jets vastly increased the number of planes in our national airspace, this new fleet has the potential to do even greater—to add even greater numbers to it.

The first wave of this fleet is expected to hit the market next year, and that increase could revolutionize air traffic—the air traffic business. At around $2 million each, on an estimated basis, these new minijets will be within reach of thousands of individuals and companies, and have the potential to create a booming air taxi industry.

Unmanned aircraft are also poised to enter our national airspace. They have been used by the military since World War II. In those days, as I reminded the Committee recently, pilots took those aircraft off, and then they parachuted out, and the planes were flown remotely to targets. That is not the situation now, of course. Unmanned aircraft play an integral part in fighting the wars in which we're involved now, particularly the war against the terrorists. And UAVs have the potential of being a key line of defense for our first responders. We have asked, actually, that they be tested in Alaska

to determine whether or not they can play a significant role in maritime boundary enforcement and protecting our fisheries.

We look forward to hearing from our witnesses today. And we urgently hope we can work together to ensure that our National Airspace System can, and will, accommodate all manner of new aviation transport, as well as face a period of upgrading of the whole system itself.

Senator Rockefeller?

STATEMENT OF HON. JOHN D. ROCKEFELLER IV, U.S. SENATOR FROM WEST VIRGINIA

Senator ROCKEFELLER. Thank you, Mr. Chairman.

I think the UAVs can patrol very well, fishing boundaries. It's a good use for them.

The CHAIRMAN. It's a question of icing, Senator. We—they generally do not have icing—deicing equipment, and some of those spaces which have to be patrolled have an enormous icing potential, so——

Senator ROCKEFELLER. They must have been talking about South Carolina.

[Laughter.]

The CHAIRMAN. The southern coast could easily be done. We're talking about the maritime boundary between the United States and Russia.

Senator ROCKEFELLER. I gotcha.

Next year, this Committee's going to have to reauthorize the Federal Aviation Administration. I'm certainly in hopes that we will do that. One of the most important challenges we have to address is how to make sure our aviation system can absorb all growth in traffic, any growth in traffic.

Now, the FAA predicts that commercial air travel is scheduled to increase by nearly 50 percent over the next 10 years. Compounding the uncertainties surrounding the ability of our aviation system to meet future needs is the potential impact of new types of aircraft on the aviation system.

I've been working on a different—not mosquito jet, but it's a different kind of jet—for 15 years, with Taiwan, something called Sino Swearingen, and it's completely a new innovative, small business jet, but it's not what we're talking about here. And I'm pleased to say that it's certified. I know that in addition to new business jets coming onto the market, a number of innovative kinds of small aircraft, called very light jets, or microjets, are in the process of certification or already in production.

I confess to you that I'm mystified about this phenomenon, and that's why these two gentlemen are sitting before us, so that—to demystify all of this.

These new planes, whether they're small business jets or very light jets, have the potential to be—not necessarily, but the potential to be very disruptive to the aviation system. I do not use that term "disruptive" in a pejorative sense. I'm a strong supporter of general aviation. I would not have spent all those years working on that project with Taiwan if I was not that way. But I am concerned that our aviation system is not prepared to handle the impact of all categories of new jets, and particularly these microjets.

Now, granted, they fly at 41,000 feet, or they say they do. On any given day, as many as two-thirds of all airplanes in the sky are, in fact, general aviation planes. Most people don't know that. And it becomes very important in all matters, including airport security.

And general aviation represents about 15 percent of the aircraft interacting with our air traffic control resources. However, the introduction of these new aircraft could alter how general aviation impacts the aviation system. We're all—we all recognize that the very light jets will have to use air traffic control system. They're taxis that are going to be under FAA. Whether the introduction of these planes into the system is gradual or explosive, the fact is that the composition of the planes in the sky is changing, the nature of air travel is changing. We must make sure, in our reauthorization, that the FAA has the tools and the resources to adapt to this changing environment.

And I'm worried about resources. I'll get to that in my question period.

The other issue I want to raise today is that we must consider security issues associated with an increase in general aviation traffic. I know the general aviation community does not see itself as a risk. I differ from them in that respect. We must make sure that the influx of small jet aircraft flying from hundreds of small airports into national airspace does not open up a new hole in our system of the—aviation security.

So, we have a lot of challenges, and we're going to have an interesting discussion this morning.

Thank you, Mr. Chairman.

The CHAIRMAN. Well, thank you.

Senator Lautenberg, do have an opening statement?

Senator LAUTENBERG. A short one, Mr. Chairman, thank you.

STATEMENT OF HON. FRANK R. LAUTENBERG,
U.S. SENATOR FROM NEW JERSEY

Senator LAUTENBERG. We really need to hold this hearing on the impact of very light jets on our aviation system. One hundred microjets could take flight by year's end. That's according to the FAA. Four hundred to five hundred could take to the skies over the next decade, for a total of almost 5,000 by 2017. These planes hold great potential to fly people into American cities and towns that they had trouble reaching before. But before we fly into the future, we've got to resolve some problems concerning the present and the past.

Before we put a new plane in the sky, we ought to look at a record that we have about some airplanes that we sent up before, more than 40 years ago, the MU–2 Mitsubishi twin turboprop plane. Twenty-five percent of those planes have since been involved in a serious series of fatal crashes—with these three crashes alone, this—where—three crashes this summer. But if you ask FAA about the MU–2, they'll say that all systems are go, and that the problem is pilot error. Before we consider a new airplane, we've got to have the courage to look into what's taken place with the MU–2.

And, second, before we put a new plane in the sky, we've got to see the effects of that on the aviation system. The equipment in our towers is outdated. The number of controllers in those towers is too

low. We've already had 1,081 fewer controllers in our towers than we did 3 years ago. And 70 percent of those controllers are eligible for retirement by 2011. So, as the workload increases, so do the number of people who plan to retire.

And I think it's fair to say that the judgment is that it takes 4 years to train a controller fully, and yet the FAA has still not developed a plan to hire new staff for our control towers.

At the same time 760 million people fly within the United States every year. By 2015, we're going to hit 1 billion passengers. So, before we consider new aircraft, we need full controller staff to handle the planes that are currently in the sky. We saw the tragic results of controller shortages recently in Kentucky. In August, Conair Flight 5191 crashed, 49 people lost their lives. Only one air traffic controller was on duty, and that's contrary to Federal Aviation Administration policy.

So, while the NTSB continues its investigation, we owe it to the public to find out why the FAA is not meeting its own standards. Now, I've asked the Subcommittee, Mr. Chairman, for a hearing specifically on the Kentucky crash and whether the FAA is properly staffing air traffic control facilities for our future. So, we have not yet been able to have that hearing, but I hope, at the earliest opportunity, that we'll do that. And so, before we consider a new plane, I urge the Subcommittee to act.

Thank you very much, Mr. Chairman.

The CHAIRMAN. Well, Senator, I think that's a very unfair statement.

Senator LAUTENBERG. Perhaps——

The CHAIRMAN. I think this system is working. We've had enormous new entries. We don't put one plane in the sky. They're put in the sky by private people, by companies who try to enter the system. The government doesn't put anybody in the air. We can't determine—we've got to prepare the system so it can take on this new, coming addition to the system. It's not something that we—where we can say, "You can't do it." It's going to happen. So, I really think the political statement, at this time, at—when we're trying to find out what the facts are concerning how to deal with this new system——

Senator LAUTENBERG. Mr. Chairman——

The CHAIRMAN.—is absolutely wrong.

Senator LAUTENBERG. Mr. Chairman, if we're going enter into a debate, I'm going to ask for a chance to respond.

The CHAIRMAN. You can have——

Senator LAUTENBERG. I didn't——

The CHAIRMAN.—all the time you——

Senator LAUTENBERG. I didn't——

The CHAIRMAN.—want to respond, but——

Senator LAUTENBERG. I didn't——

The CHAIRMAN.—that's an unfair statement.

Senator LAUTENBERG. I didn't say——

STATEMENT OF HON. CONRAD BURNS,
U.S. SENATOR FROM MONTANA

Senator BURNS [presiding]. Order.

Senator LAUTENBERG. Mr. Chairman, now, you weren't in the room, so I want to have an opportunity to respond to an accusation that was made that I suggest that the system isn't working. Not at all. It works. I spend a lot of time in the sky, and I know you're a pilot, but I would tell you this, that there are shortages. I go to Newark Airport. That's one of the busiest in the country. We're short 10 percent. We're short almost a hundred FAA controllers in that facility alone. That's a lot of——

The CHAIRMAN. Let's go to the floor and debate——

Senator LAUTENBERG.—a lot of people.

The CHAIRMAN.—this. We don't want—you said we can't put another plane in the sky.

Senator LAUTENBERG. Well——

The CHAIRMAN. Those were your words, Senator.

Senator LAUTENBERG. All right, I'm sorry, an error. We're talking about TSA, at the—five controllers short.

Senator BURNS. If I could—if I could assume a little control here——

[Laughter.]

Senator BURNS.—get my hand on the stick and the "go" knob.

Thank you all for your opinions. And I'll just make my statement. How's that? Is that all right with the rest of the——

Senator LAUTENBERG. You're in charge.

Senator BURNS.—Committee? Thank you very much.

I want to thank the folks who will be showing up today. We're going to focus on a different situation, as we are coming up a year away from reauthorizing the FAA. And I think we're going to talk about some things that are very, very—will be very, very important in that reauthorization in how we handle our air traffic.

We're going to be talking about very light jets today, and UAVs, and we'll review the information of developing, certifying, selling, and flying these new aircraft types, along with the challenges of integrating them with the current aviation system in a safe manner. And I would tell the—I want to emphasize the safe manner, because that's what we do, we err on the side of safety.

The introduction of potentially large numbers of very light jets into the National Airspace System and the request from industry and government agency for speedy certification of certain UAVs to operate in U.S. airspace raises numerous short- and long-time—or long-term policy and safety issues for the Federal Aviation Administration, and, of course, this Committee.

In addition, earlier this year we held a hearing on the Joint Program and Development Office, who is assigned the task of developing the Next-Generation Air Transportation System. It is important we start to understand the impact of the very light jets and the UAVs, what they will have on our aviation traffic. How will these new aircraft interact with the current system? Will some of the new aircraft types simply replace the current operations? Well, I will tell you, those are big, big questions.

To date, there has been a lot of speculation and back-and-forth about the actual impact in the number of aircraft that we should anticipate. On one hand, commercial aviation interests have argued that, based on the very optimistic, very light jet forecast, those jets will clog our air traffic control system increase congestion, and in-

crease costs, and not pay their fair share of the costs. And, on the other hand, general aviation interests have generally maintained a more conservative forecast of these light jets, and argue that the modest additional aircraft can easily be accommodated into the National Airspace System, as they are today. We hope to clarify some of those differences today. Not all of them, because the questions are too big. Ultimately, the free market will probably have the final say.

In addition, like many of my colleagues, I'm interested in the—effectively utilizing sophisticated UAVs to improve our border defense, wildfire-fighting and capabilities, among other uses. The bottom line is, where do we need to do it? And can we do it safely and create a smooth and noncumbersome integration of the UAVs into the general aviation and commercial aviation communities? And I couldn't ask for a better Ranking Member on this Subcommittee than Senator Rockefeller, and we're going to pursue this with a great deal of energy and vigor, and we'll—and we hope that we'll come up with some answers.

Today, we're happy to have Mr. Michael Cirillo, who is Vice President of System Operations Services of Air Traffic Organization for the FAA, and Mr. Nicholas Sabatini. I was wondering if—that's all they're hiring over there nowadays, I suppose, huh?

[Laughter.]

Senator BURNS. I've had the pleasure of meeting both of these gentlemen, and they are looking at monumental questions, and trying to answer them. And we appreciate both of you coming today.

Mr. Cirillo, we will hear your testimony first.

Oh, Mr. Sabatini is going to start, OK. All right. Thank you.

Mr. Sabatini?

And I assume you've made your statement and everything.

Senator ROCKEFELLER. I did. But I can make it again.

[Laughter.]

Senator BURNS. No, they didn't want to hear mine the first time.

Mr. Sabatini, please.

STATEMENT OF NICHOLAS A. SABATINI, ASSOCIATE ADMINISTRATOR FOR AVIATION SAFETY, FEDERAL AVIATION ADMINISTRATION

Mr. SABATINI. Good morning, Chairman Burns, Senator Rockefeller, and Members of the Subcommittee.

I am pleased to be here this morning to dispel any concerns you may have with certification and regulations regarding the introduction of new aircraft into our Nation's airspace. Together with my colleague Mike Cirillo, we represent every step in the process of the successful integration of new aircraft into the National Airspace System, from certification of the airframe to certification of the pilots to the introduction of the high-tech tools that have enhanced the safety of operations and made our air traffic control infrastructure as robust and flexible as it has ever been.

The system is in place today to accommodate the entry of new aircraft into the National Airspace System. This is nothing new for the FAA. It is our day-to-day business. We have established systems in place to assure a safe introduction of aircraft, no matter the size, speed, performance capability, manned or unmanned.

From when FAA's predecessor agency certified the first Buhl Airster in 1927 to the introduction of the Boeing 707 in the late 1950s and the dawning of the Jet Age in the 1960s, FAA's business has been to successfully assimilate new aircraft into the NAS.

When the Boeing 707 began its transcontinental flights in the 1950s, the average airspeed of a passenger aircraft more than doubled overnight, from about 220 knots to more than 500 knots. FAA was able to successfully mix the Boeing 707 into a system largely populated with piston-powered, propeller-driven aircraft. And this transition into the Jet Age took place with an infrastructure that was, at that time, 50 years old. The system is much more robust today, with better technology, more precision, and greater flexibility than any time in our history.

FAA has tried-and-true mechanisms and controls in place to assure the safe introduction of new aircraft, and nothing indicates to us that the introduction of VLJs or unmanned aircraft will be as operationally transformational as the introduction of jets.

The FAA has long-established operating procedures that ensure different types and vintages of aircraft are operated at compatible airspeeds in congested airspace or while en route to and from the high-altitude structure. We have done it time and again over the course of FAA's history, and the introductions have proven uneventful. We know how to do this.

In addition, by the time a new aircraft is ready for its entry into service and the domestic airspace, FAA engineers, pilots, and inspectors have been over every inch of the design, production, operating procedures, flight envelope, training requirements, and how to maintain the aircraft's continued airworthiness. FAA also certifies the pilots. We have established mechanisms to assure that pilots meet proficiency and medical standards for the safe operation of aircraft. Furthermore, with new, sophisticated aircraft, we have increased emphasis on pilot training to help pilots develop the skills and in-depth systems knowledge to assure safe operating procedures for these aircraft.

In addition, we certify air traffic procedures, in conjunction with the Air Traffic Organization, based on the new aircraft size, speed, and capabilities to assure safe operating environment.

Today's aircraft enter a more sophisticated, technologically advanced, and precise system than ever before. Aircraft avionics are more advanced, as well, with more precise autopilot and altimetry, and improved navigational systems, which allow for procedures like RVSM. From beginning to end, nothing is left to chance.

A large part of the unprecedented safety record that the U.S. is now enjoying is due to the synergistic partnering of industry, academia, and government, recognizing that we all share the same goal: aviation safety. This cooperation is a large reason why the United States aviation system is the envy of the world. It is why our citizens can fly with such assurance of safety.

Thank you for the opportunity to speak to you today, and I now would like to turn the mike over to my colleague Mike Cirillo, who will talk about the ATO and their plans to integrate these new aircraft into the air traffic control system.

Senator BURNS. Mr. Cirillo, thank you very much for coming today. We appreciate it and we look forward to your testimony.

Now, if you go over 5 minutes, why, if you can consolidate your statement, that would be fine, but your full statement will be made part of the record. And thank you for coming today.

STATEMENT OF MICHAEL A. CIRILLO, VICE PRESIDENT, SYSTEM OPERATIONS SERVICES, AIR TRAFFIC ORGANIZATION, FEDERAL AVIATION ADMINISTRATION

Mr. CIRILLO. Well, thank you, and good morning, Chairman Burns, Senator Rockefeller, and Members of the Subcommittee.

I'm here this morning with my colleague Nick Sabatini to discuss FAA's plans to safely integrate very light jets and unmanned aircraft into the NAS. To reiterate what Mr. Sabatini just said, the FAA is involved in the introduction of new aircraft types, from the drawing board to the runway. We're there every step of the way to ensure that new aircraft are designed, manufactured, maintained, and operated safely. Our safety record is the envy of the world. We leave nothing to chance.

Our Nation's air traffic management system is also the most technologically advanced, precise, and robust system in the world. Our workforce is constantly striving to improve safety and efficiency. The ATO is producing results today that have already increased capacity and improved efficiency. In conjunction with the Joint Planning and Development Office, we're designing the Next-Generation Air Transportation System.

I'd like to take this opportunity to describe to you some of the programs we're implementing today that are laying the foundation for the NextGen system.

Last year, we implemented Domestic Reduced Vertical Separation Minimum. DRVSM has significantly increased capacity in the high altitude en route airspace by doubling the number of usable altitudes between 29,000 and 41,000 feet, which is the level where commercial airliners fly. DRVSM permits controllers to reduce minimum vertical separation at these altitudes from 2,000 feet to 1,000 feet; thus, allowing twice the capacity in the same airspace.

Last month, the FAA approved the updated *Roadmap for Performance-Based Navigation,* which was developed in cooperation with the aviation industry. The 2006 *Roadmap* focuses on addressing future efficiency and capacity needs while maintaining or improving the safety of flight operations by leveraging advances in navigation capabilities on the flight deck.

The strategy rests upon two key navigation concepts: Area Navigation, or RNAV, and Required Navigation Performance, or RNP. RNAV procedures provide flight-path guidance that is incorporated into onboard aircraft avionics system, requiring only minimal air traffic instruction. RNAV procedures allow for more precise routes for departures and arrivals, reducing time intervals between aircraft on the runways and allowing for increases in traffic, while enhancing safety.

In 2004, 13 RNAV departure procedures and four RNAV arrival procedures went into full operation at Atlanta Hartsfield-Jackson International Airport, the world's busiest. In addition, 16 RNAV departures were implemented at DFW International Airport in 2005. The FAA published 53 of these procedures in 2006, and plans to publish at least 50 more in 2007.

RNP procedures use onboard technology to allow pilots to fly direct point-to-point routes more reliably and accurately. It gives pilots not only lateral guidance, but vertical precision, as well. RNP potentially reaches all aspects of flight—departure, en route, arrival, and approach. As of today, the FAA has published 28 RNP approach procedures this year, and plans to publish at least 25 more in Fiscal Year 2007.

As we move toward implementing the NextGen system, we are actively working to incorporate VLJs and UAs into the current NAS. We've been working with the VLJ industry to learn about their business plans, to ensure we're prepared.

The advertised business models for the first companies say that they will fly point-to-point among the Nation's 5,400 smaller airports. In addition, we're expecting the VLJs to operate in the less-congested lower altitudes. Although it's expected that many of the VLJs will be certified to 41,000 feet, the planned stage links for these business plans are typically less than 600 nautical miles, which will limit most of their operating altitudes to between 15,000 and 28,000 feet.

It's expected that these aircraft will be delivered from the manufacturer with state-of-the-art avionics that will allow the VLJs to take advantage of RNAV and RNP procedures and routes that will assist us in accommodating these aircraft in all phases of flight.

Incorporating UAs into the NAS will require similar efforts at the FAA. UAs are also an evolving aviation segment. Safeguards are currently in place, through a Certificate of Authorization, or COA, for government agencies and Experimental Airworthiness Certificates for civil operations, to provide appropriate criteria to be met by UA operations to ensure they do not jeopardize safety of other aviation operations or the public on the ground.

Our objective in issuing a COA or EAC is to ensure an equivalent level of safety as manned aircraft. As the UA segment of aviation matures in both technology and types of missions, our service delivery will evolve to accommodate their operations, consistent with the mandate to maintain system safety.

We have the system in place at the FAA to assure the safe, successful integration of VLJs and UAs into the NAS, regardless of their size, speed, or performance capabilities. VLJs and UAs will enter a more advanced and more flexible air traffic control system than ever before. We've handled the introduction of new aircraft types successfully in the past while preserving system safety, and will continue to do so in the future.

This concludes my remarks. I'd like to thank you for the opportunity to discuss the introduction of new aircraft into the NAS with you, and I'd be happy to answer any questions you may have.

[The joint prepared statement of Mr. Sabatini and Mr. Cirillo follows:]

JOINT PREPARED STATEMENT OF NICHOLAS A. SABATINI, ASSOCIATE ADMINISTRATOR FOR AVIATION SAFETY, AND MICHAEL A. CIRILLO, VICE PRESIDENT, SYSTEMS OPERATION SERVICES, AIR TRAFFIC ORGANIZATION, FEDERAL AVIATION ADMINISTRATION

Good morning, Chairman Burns, Senator Rockefeller, and Members of the Subcommittee. It is our pleasure to be here today to discuss with you the introduction of new aircraft in our Nation's air traffic system. The Federal Aviation Administra-

tion is preparing to deal with the challenges presented by these and other new types of aircraft. Very light jets (VLJs) and unmanned aircraft (UAs) are examples of the on-going evolution of the aviation industry, and the FAA, working closely with the aviation industry, will develop safety standards and operating procedures to ensure their safe integration into the NAS.

VLJs and UAs are part of the future of aviation, and that future is on our doorstep right now. The system is in place *today* to accommodate the entry of new aircraft into the National Airspace System . . . this is nothing new for the FAA. It is our day-to-day business. From when FAA's predecessor agency certified the Buhl Airster in 1927, to the introduction of the Boeing 707 and the dawning of the jet age in the late 1950s, FAA has always been able to successfully assimilate new aircraft into the NAS. When the Boeing 707 began its transcontinental flights, the average airspeed of passenger aircraft more than doubled overnight, from about 220 knots to over 500 knots. And this transition into the jet age took place within an infrastructure that was 50 years old at the time. The system is more robust today, with better technology, more precision, and greater flexibility, than at any time in our history. FAA has long established operating procedures that ensure different types and vintages of aircraft are operated at compatible airspeeds in congested airspace or while en route to and from the high altitude airspace. From beginning to end, nothing is left to chance.

Relatively inexpensive twin-engine VLJs are believed by many to have the potential to redefine the business jet segment by significantly expanding business jet flying and offering performance that could support a true on-demand air-taxi business service. FAA forecasters project that up to 5,000 of these jets will be in operation by 2017.

The FAA has established a cross-organizational group to address the issues of safety and system capacity created by the anticipated introduction of thousands of VLJs within the next 10 years. This group includes elements from our Air Traffic Organization (ATO), Flight Standards Service (AFS), Aircraft Evaluation Group (AEG) and Aircraft Certification Office (ACO). The group has organized its work under separate committees that focus on specific issues: Pilot Training and checking; Flight Operations; Maintenance; Inspector Training; and Air Traffic.

Also, to address UAs, we have established an Unmanned Aircraft Program Office to develop guidance and regulations for certification and integration of UAs. Interest in using unmanned aircraft (UAs) for a broad range of purposes is increasing, not only by U.S. governmental agencies, but also by the civil aviation community. Integrating UAs with manned aircraft in the NAS presents significant challenges for the FAA, and both the public and private-sectors. At the outset, it is helpful to understand that UAs cannot be described as a single type of aircraft. UAs can be vehicles that range from a 12-ounce hand-launched model to one the size of a 737 aircraft. They also encompass a broad span of altitude and endurance capabilities. Obviously, the size of the UA impacts the complexity of its system design and capability. Therefore, each different type of UA has to be evaluated separately, with each aircraft's unique characteristics being considered before its integration into the NAS can be safely accomplished.

The certification of all government agency aircraft, including UAs, in the NAS is considered a public aircraft operation, the oversight for which falls outside the scope of the FAA. These public operations are, however, required to be in compliance with certain federal aviation regulations administered by the FAA and the FAA is and must be involved to ensure that the operation of these aircraft does not compromise the safety of the NAS. FAA's current role is to ensure that UAs do no harm to other operators in the NAS and, to the maximum extent possible, the public on the ground.

In working with government agencies, the FAA issues a Certificate of Authorization (COA) that permits the various public agencies to operate a particular UA for a particular purpose in a particular area. In other words, FAA works with the agency to develop conditions and limitations for UA operations to ensure they do not jeopardize the safety of other aviation operations. The objective is to issue a COA with terms that ensure an equivalent level of safety as manned aircraft. Usually, this entails making sure that the UA does not operate in a populated area and that the aircraft is observed, either by someone in a manned aircraft or someone on the ground. For example, in the interest of national security and because ground observers were not possible, the FAA worked with the Department of Homeland Security (DHS) to facilitate UA operations along the Arizona/New Mexico border with Mexico. In order to permit such operations, the airspace was segregated to ensure system safety so these UA flights can operate without an observer being physically present to observe the operation. With the steadily expanding purposes for which UAs are used and the eventual stateside redeployment of large numbers of UAs

from the theater of war, the FAA expects to issue a record number of COAs. In fact, the FAA has issued more than 75 COAs this year, compared with a total of 50 for the two previous years combined.

FAA's work with private industry is slightly different than with government agencies. The development of guidance and regulations for UAs for civil aviation use will be an evolving process. Standards development is required for all areas of UAs technology, including the airframe, maintenance procedures, pilot and controller training, powerplant and other areas. The FAA is working with industry, under the auspices of RTCA, Inc. to develop consensus standards for detect, sense and avoid systems; and command, control and communication systems. Until standards and minimum requirements are established, the FAA is working closely with companies that wish to operate UAs in the NAS today by applying the Experimental Airworthiness Certificate process.

Today, for civil operation, companies may obtain an Experimental Airworthiness Certificate by demonstrating that their aircraft can operate safely within an assigned flight test area and cause no harm to the public. They must be able to describe their unmanned aircraft system, along with how and where they intend to fly. This is documented by the applicant in what we call a program letter. An FAA team of subject matter experts reviews the program letter and, if the project is feasible, performs an on-site review of the ground system and unmanned aircraft, if available. If the results of the on-site review are acceptable, there are negotiations on operating limitations. After the necessary limitations are accepted, FAA will accept an application for an Experimental Airworthiness Certificate which is ultimately issued by the local FAA Manufacturing Inspection District Office. The certificate specifies the operating restrictions applicable to that aircraft. To date, we have received several program letters for UAs ranging from 39 to more than 10,000 pounds. We have issued two experimental certificates, one for General Atomics' Altair, and one for Bell-Textron's Eagle Eye. We expect to issue at least one more experimental certificate this year.

The COA and Experimental Airworthiness Certificate processes are designed to allow a sufficiently restricted operation to ensure a safe environment, while allowing for research and development until such time as pertinent standards are developed. They also allow the FAA, other government agencies, and private industry to gather valuable data about a largely unknown field of aviation. The development of standards is crucial to moving forward with UA integration into the NAS. Because of the extraordinarily broad range of unmanned aircraft types and performance, the challenges of integrating them safely into the NAS continue to evolve. The certification and operational issues described herein highlight the fact that there is a missing link in terms of technology today that prevents these aircraft from getting unrestricted access to the NAS.

So far we have discussed FAA's current efforts regarding certification and regulation of VLJs and UAs as we enable the safe introduction of these new aircraft into the NAS. There are still many challenges to be met in these areas before the procedures for certification, licensing, training, inspection, maintenance and operation of these aircraft are standardized and routine. The question many have is how FAA is going to integrate these new aircraft into the NAS, without adversely affecting safety, or increasing congestion and delays. The ATO is producing results today that are already improving capacity and efficiency, and in conjunction with the Joint Planning and Development Office (JPDO), laying the foundation for the Next Generation Air Transportation System (NextGen).

In 2005, the ATO implemented a new procedure, known as Domestic Reduced Vertical Separation Minima or DRVSM, which is truly exciting. DRVSM has significantly increased capacity in the en route airspace by doubling the number of usable altitudes between 29,000 and 41,000 feet. The procedure permits controllers to reduce minimum vertical separation at altitudes between 29,000 and 41,000 feet from 2,000 feet to 1,000 feet for properly equipped aircraft.

The User Request Evaluation Tool (URET) is a tool used by the controller to predict potential aircraft to aircraft, and aircraft to airspace conflicts earlier, allowing them to construct alternative flight paths. URET allows these conflicts to be addressed in a strategic sense rather than a tactical sense, with fewer deviations to the route or altitude.

In August, the FAA approved the update to the *Roadmap for Performance-Based Navigation,* developed in cooperation with the aviation industry. The 2006 *Roadmap* focuses on addressing future efficiency and capacity needs while maintaining or improving the safety of flight operations by leveraging advances in navigation capabilities on the flight deck. This revision updates the FAA and industry strategy for evolution toward performance-based navigation. The *Roadmap* is intended to help aviation community stakeholders plan their future transition and investment strategies.

The stakeholders who will benefit from the concepts in the *Roadmap* include airspace operators, air traffic service providers, regulators and standards organizations, and airframe and avionics manufacturers. As driven by business needs, airlines and operators can use the *Roadmap* to plan future equipage and capability investments. The strategy rests upon two key navigation concepts: Area Navigation (RNAV) and Required Navigation Performance (RNP).

The ATO is focused on expanding the implementation of advanced RNAV procedures to additional airports. These RNAV procedures provide flight path guidance that is incorporated into onboard aircraft avionics systems, requiring only minimal air traffic instructions. This significantly reduces routine controller-pilot communications, allowing more time for pilots and controllers to handle other safety-critical flight activities. Also, RNAV procedures use more precise routes for departures and arrivals, reducing time intervals between aircraft on the runways, and allowing for increases in traffic, while enhancing safety. In 2004, thirteen RNAV departure procedures and four RNAV arrival procedures went into full operation at Atlanta Hartsfield-Jackson International Airport—the world's busiest airport. Additionally, sixteen RNAV departures were implemented at Dallas/Fort Worth International Airport in 2005. The FAA published 53 of these procedures in FY 2006, and plans to publish at least 50 procedures in FY 2007.

FAA is currently implementing additional technological innovations, including a capability known as RNP. RNP uses on-board technology that allows pilots to fly direct point-to-point routes more reliably and accurately. RNP is extremely accurate, and gives pilots not only lateral guidance, but vertical precision as well. RNP potentially reaches all aspects of the flight—departure, en route, arrival, and approach. As of today, the FAA has published 28 RNP approach procedures this year, and plans to publish at least 25 more in FY 2007.

We must also make sure we are using the best technology to maintain a safe and efficient air traffic system. The en route air traffic control computer system is considered the heart of the NAS. En Route Automation Modernization (ERAM) provides the basic foundation upon which many of the transforming technologies moving us from the current NAS to NGATS needs. ERAM replaces the software for the Host Computer System and its backup. It will enable the FAA to increase capacity and improve efficiency in a way that cannot be realized with the current system, which is a mix of different technologies that evolved over the years and is extremely difficult to expand or upgrade. In addition to supporting new transformational technologies, ERAM itself can process more than double the number of flight plans, and use almost triple the number of surveillance sources as the current system. The ERAM system is scheduled to be deployed and operational at all 20 Air Route Traffic Control Centers by 2010.

Traffic Flow Management (TFM) is the "brain" of the NAS, and is the reason that we could handle more traffic at our major airports in 2005 than in 2000, without the long delays that made the summer of 2000 the worst on record. The TFM system is the mechanism by which traffic flows across the NAS are orchestrated. As the NAS is impacted by severe weather, congestion and/or outages, the TFM system provides timely information to our customers to expedite traffic and minimize system delays. The FAA is currently in the process of modernizing the TFM infrastructure through its TFM Modernization program. We are currently introducing new Airspace Flow Management technology to reduce the impact of delays incurred during the severe weather season. FAA estimates show that TFM provides roughly $340 million in benefits to our customers on a yearly basis in reduced direct operating costs through delay reductions. ERAM and TFM together will enable flexible routing around congestion, weather, and flight restrictions, and help controllers to automatically coordinate flights, during periods of increased workload.

The JPDO and ATO will work together to analyze the changes that will be needed to both ERAM and TFM so they meet the needs of the Next Generation System. Today's flight planning and air traffic paradigms will be transformed into a system that manages operations based on aircraft trajectories, regularly adjusts the airspace structure to best meet customer and security/defense needs and relies on automation for trajectory analysis and separation assurance.

The JPDO serves as a focal point for coordinating the research related to air transportation modernization for agencies across the Federal Government, including the Departments of Transportation, Commerce, Defense and Homeland Security, as well as NASA and the Office of Science and Technology Policy.

At the FAA, our eyes are focused on the NextGen Vision while using existing technology to provide important and tangible operational benefits now. We are finding ways to make existing capacity work more efficiently through advanced technology and operational improvements. Research is underway to explore ways of safely achieving reductions in separation standards, allowing for greater density of

operations, which the anticipated increase in these vehicles will demand. We are also examining the Human Factors implications of super density operations and traffic control automation. Moreover, as-yet unexplored concepts may be expected to play a role.

These innovations provide relief today as well as help to lay the foundation for the Next Generation System. Successful integration of VLJs and UAs into the NAS will represent a significant step in the process of evolution from the current NAS to the NextGen system. In order to fulfill the NextGen 2025 vision of handling significant increases in today's traffic, with improved safety, capacity, and efficiency, we must competently manage the introduction of VLJs and UAs into the NAS. The impact of these new vehicles on the NAS is addressed in the JPDO Concept of Operations (CONOPS). One overarching goal of the NextGen initiative is to develop a system that will be flexible enough to accommodate a wide range of users—very light jets and large commercial aircraft, manned and unmanned aircraft, small airports and large, business and vacation travelers alike, while handling a significantly increased number of operations with a commensurate improvement in safety, security and efficiency.

In 2005, the JPDO moved ahead with plans to accelerate the development of key NGATS projects, such as Automatic Dependent Surveillance-Broadcast (ADS–B), and System Wide Information Management (SWIM). In FAA's Fiscal Year 2007 budget request, the Administration proposed several targeted investment areas, to promote early implementation of elements of the NGATS system. One of these very promising initiatives, with potential for broad operational applications, is the Automatic Dependent Surveillance-Broadcast (ADS–B) system, a technology that will replace ground-based radar systems and revolutionize air navigation and surveillance. For FY 2007, the President's budget includes $80 million for the FAA for the ADS–B program.

Given its fundamental importance to the success of the NGATS System, establishing an initial Network-Enabled Operations (NEO) capability is a high priority for JPDO and its member agencies. Current efforts focus on identifying the network architecture and enacting standards for information and safety data sharing. In 2005, the JPDO, FAA and an industry team demonstrated how network-enabled concepts developed for the military customers can be applied to Air Traffic Management. The FAA's System Wide Information Management (SWIM) program—the beginning of network-centric operation in the National Airspace System—will continue developing this capability. The President's budget proposal for FY 2007 requests $24 million for FAA's SWIM program.

The FAA has already been working with industry to identify the near-term operational requirements of VLJs in the NAS. DayJet, a large Part 135 operation, expects to be operating 100 Eclipse EA–500s by the end of 2007. Its business plan calls for utilizing regional airports in the southeastern U.S., and DayJet is working in close cooperation with FAA so we can establish appropriate flight procedures as these jets are introduced. FAA is also currently working with Eclipse to contract for training for both FAA operations and maintenance inspectors for FY07. The EA–500 is unlike any other aircraft currently in production, and is unique in that it has highly integrated avionics systems.

Performance characteristics of VLJs are similar to some other business class aircraft that have operated in the NAS for many years. VLJs can operate from shorter runways than commercial airliners, and can utilize the 5000+ satellite airports around the United States. In fact, the advertised business models for the first companies state that they will fly point-to-point among the Nation's smaller regional airports that are situated within a half-hour's drive of over 90 percent of Americans. These jets are expected to be delivered from the manufacturers with state-of-the-art avionics, capable of taking advantage of RNAV and RNP procedures and routes. Manufacturers state that VLJs will be IFR-certified, with glass cockpits, with full RVSM and ADS–B equipage. They will be capable of flying with single or dual pilots, with 4–10 passenger seats, and will typically operate at intermediate flight levels between 15,000 and 28,000 feet, but capable of 38,000 to 45,000 feet. Cruising speeds will be between 315 and 450 KIAS or Knots Indicated Air Speed, with a range of 900–1750 nautical miles, although typical legs will be 200–600 nautical miles.

The FAA is conducting training throughout the ATO regarding performance capabilities of these aircraft to help mitigate any problems with blending VLJs with faster jets. The FAA's Cross Organizational Group will continue to work to monitor the safety and impact of these new aircraft, and address any unanticipated problems as they arise.

These technological and operational improvements are positive steps down the road to building the Next Generation Air Transportation System. The FAA and the

JPDO are continuing to explore near and far term innovations that will enable accommodation of increasing numbers of VLJs and UAs in the NAS. We know, however, that we continue to face many challenges. Over the next few years we will work to achieve better cost management; determine the best solution for our aging and deteriorating facilities; plan more effectively for catastrophic events, like hurricanes or terrorist attacks; and, conduct research on convective weather to reduce flight delays associated with summer storms. Everything in our business—pay, job performance, future technology, the Nation's economy—is linked together. We strive to improve efficiency, while searching for innovative ways to provide safer services even more efficiently. As we decide how to wisely invest in our future, we will continue to work closely with our customers, our employees, and of course, Members of Congress.

Mr. Chairman, this concludes our testimony, and we would be happy to answer any questions the Committee may have.

Senator BURNS. Thank you very much, Mr. Cirillo.

And let me—I will start this off, just—well, a question to you.

Now, we know that these new light jets, they have legs of about 1,100 miles. They fly around 350–375 miles an hour. They are lighter than 10,000—when they started out, I think, it weighed around 10,000 pounds. I understand that. They are backordered. They are, it seems like, costing from a million to a million-and-a-half dollars, with some of them costing more from some manufacturers. But those are the first figures that I have seen.

Do you have any indication just how popular this airplane is going to be, and the numbers that we might expect in the next 5 years?

Mr. CIRILLO. Well, maybe Mr. Sabatini can address the popularity, maybe not, but we have the same figures that you have, and that was 5,000 by the year 2017.

Senator BURNS. Mr. Sabatini, does that——

Mr. SABATINI. Mr. Chairman, I would offer that FAA has forecasted that by 2025 we'll have approximately 5,000 aircraft in the system. But I would say that, as I believe the system will work, and how they are in—at the present time, on order, the number on order, they will be assimilated into the system in an orderly fashion. We don't have 5,000 airplanes waiting to be launched overnight. So, it's going to be a very well-controlled and managed process to allow the introduction of these aircraft.

Senator BURNS. In the areas of UAVs—and I hear they can be as small as the models that we see flying on Sunday afternoon to as big as a 737. Is that correct?

Mr. SABATINI. That is correct, sir.

Senator BURNS. Does this present unique problems to you?

Mr. SABATINI. Yes, it would, but we have processes in place that certainly we've been, for the past several years, accommodating the need for these unmanned aircraft to enter into the system. We do work with the Department of Defense and other public agencies who have a need to put Predator-type aircraft up along, for an example, the southern border. We have protected airspace and very specific and tightly controlled procedures for the safe operation of those aircraft in the system. So, we accommodate them.

Senator BURNS. The reason I asked that question, we've got 570 miles of border with Canada in my home state, and we are now looking at a virtual kind of security border. And sometimes—those of us who are on the ground, "virtual" doesn't mean a lot. In other words—I always make the comment—if I put a virtual bull on a

virtual cow and get a virtual calf, do I get a virtual check when I take the calf to market? I want to see something, you know. But UAVs, the training and the certifications of operators of UAVs, be they Department of Defense or Homeland Security, do they have—is there a certification procedure that those operators go through? Are they—with the satisfaction of the FAA?

Mr. SABATINI. Yes, sir. What we're currently doing, whether we issue an Experimental Airworthiness Certificate to the civil side of the request or whether it's from a public agency such as DOD or Customs and Border Patrol, and issue a Certificate of Authorization, we require, at this point in time, a pilot license with instrument rating. That's the going-in model. We're also working in with the RTCA, where all interested members of this industry are participating with the RTCA to determine how best to develop the technology around "detect, sense, and avoid," as well as "command, control, and communications." So, I'm confident that we're putting in place the kinds of controls that assure the safe operation of these aircraft.

Senator BURNS. Those standards are in place now.

Mr. SABATINI. Yes, they're existing pilot——

Senator BURNS. OK.

Mr. SABATINI.—requirements.

Senator BURNS. All right.

Senator Rockefeller?

Senator ROCKEFELLER. Thank you, Mr. Chairman. Let me just take off from the Chairman's questioning.

Now, you've—we have agreed on about 350 knots, 80 knots, up to 550 knots, 41,000 feet. And I know that many in the industry state that very light jets will fly between 18,000 and 30,000 feet. They're—according to that logic, they wouldn't be—they'd not be interfering with long-haul traffic. But even at these altitudes, would they not pose an air traffic control problem? And I say this, because when I fly on turboprops from Charleston, West Virginia, to Washington, D.C., or to Dulles, as the case may be, they fly precisely in that range, at the lower end of that range. So, these are very congested airspaces. So, you indicate that the plans are place, and yet I've got to get a much better feel as to how you're going to handle this with respect to the air traffic controllers that Senator Lautenberg brought up, and I'm just, sort of, at a loss to figure out—there's so much traffic at a lower level, until everybody gets regional jets—and I don't even know, you know, how high they fly, whether there would be interaction there. But if there is, I'm worried about it. I'd like to have you discuss that.

Mr. CIRILLO. Well, the top range, of 31,000 feet, is—I think that's in the transition phase of flight out of a terminal area. There is—they will be intermixed with other aircraft of all different types. However, the routes can be segregated. We currently do not forecast that the major airports will be inundated with very light jets, that they will probably use a satellite airport, in which case we can segregate those flows. And so, the final altitude that the airliners will use will be also segregated from very light jets. And even in our major metropolitan areas today, the routes into the major airport and the satellite airports are different, so you can segregate the flows that way. And there is capacity at those airports. We

often talk about the capacity-constrained airports, and they do exist. But——

Senator ROCKEFELLER. But, Mr. Cirillo, you're talking as if there were a lot of satellite airports lying around. You know, I mean, if you apply that theory to West Virginia, I guess you've got to fly—you've got to land in the Greenbrier Airport and then drive 3 hours to Charleston. I mean, there just aren't satellite airports everywhere. Yes, there are, you know, Teterboro, et cetera, but I can see—that's meant to be a satellite airport, but it's also, I think, busier than LaGuardia. It has more traffic than LaGuardia. So, I can't assume that satellite—sort of, the release point for these planes.

Mr. CIRILLO. The—well, the business model we've seen shows a—for a particular airport, is a fairly small number of very light jets. And airports like Charleston do have capacity. And a very light jet can use a runway——

Senator ROCKEFELLER. I agree with that, yes.

Mr. CIRILLO. A very light jet can use a runway that is as short as 3,000 feet—3,000 to 5,000 feet. So, that opens up myriad airports available for their use, which I'm sure are—that you may have in the vicinity of Charleston. So, it is in their best interest to have a business model like this, because of the flexibility involved. They can go where the capacity exists, and it exists——

Senator ROCKEFELLER. But you're saying—I mean, I certainly can't make the case that Charleston, West Virginia Airport is overflowing with flights, but I would think, as one went about the country, there would be a lot of places that are larger than Charleston, had more air traffic than Charleston-Huntington, et cetera, where there would not be satellite airports. I'm just trying to—I'm just—you said there's going to be a mix in the air. I accept that, and I worry about that. So, I need to have you put me at ease.

Mr. CIRILLO. Well, we can—on the subject of the mix in the air, we can deconflict in the air. And the reason I brought up RNAV/RNP is because it does provide for precise navigation and less separation between routes. And so, in a—even in a busy terminal area, there is a way to deconflict the major flows from the big airports and the smaller flows from the satellite airports.

So—and then, in the en route phase of flight, there will be a disparity in altitudes, so there really is not a conflict there. And there is a lot of en route capacity. We talk about the New York area quite a bit, but there is a significant amount of en route capacity throughout the rest of the country, especially at those altitudes.

Senator ROCKEFELLER. My time is up. Thank you.

Mr. CIRILLO. Thank you.

Senator BURNS. Senator Lautenberg?

Senator LAUTENBERG. Thanks, Mr. Chairman.

Do we—do either—do you have any idea about how many of their airplanes may be in the sky at a busy hour, typically, in a day in the United States?

Mr. CIRILLO. Very light jets? The only business model I've seen is numbers of aircraft for particular airports, and they were all—they were all very low-activity airports, and the numbers were not overwhelming.

Senator LAUTENBERG. Well, I'm sorry—Mr. Cirillo, what I understand is that there are about 5,000, at a busy moment, in the sky today. Now, we're introducing an additional 5,000. And I—as someone who frequently uses the flights between here and the New York airports, Newark included, where we're under constant delay—half-hour the other—one night, I was told that the airplane couldn't take off for an hour and a half. They had just closed the door. And after sitting an hour and a half, the pilot said, "We've had some discouraging news. It's another hour that's contemplated. Too much traffic for the area." Well, what are we doing to get ready for that? What kind of airport changes have to be made? Do the very light jets land at the same speed as turbos or piston engines? There will have to be some accommodations made, I assume.

Mr. SABATINI. Well, Senator, I would offer—to expand on this subject of the compatibility, I would offer that, in addition to the precise navigation that these aircraft are capable of and the system that is in place today to accommodate that, we can do offsets safely. So, you can have parallel route structures because of the GPS capability that these aircraft now have.

Senator LAUTENBERG. In these smaller airports that you're talking about, these satellite airports?

Mr. SABATINI. Well, I would tell you that the aircraft are capable of doing that——

Senator LAUTENBERG. Oh, yes.

Mr. SABATINI.—and we are in the process of building and putting in place the kinds of instrument approaches that will permit that kind of capability. Mr. Cirillo offered examples of Atlanta, where we have demonstrated very clearly there is tremendous savings for the fuel conservation and tremendous savings in time——

Senator LAUTENBERG. Yes.

Mr. SABATINI.—as well as workload——

Senator LAUTENBERG. Yes.

Mr. SABATINI.—between the pilot——

Senator LAUTENBERG. But when—

Mr. SABATINI.—and the air traffic controller.

Senator LAUTENBERG.—when you get into an airport, and you've got—the only thing you've got is a UNICOM, and they said, "Well"—and that you've got a recording, "The winds are thus and"—and they're not—these are intended to land at shorter runways in order to make them really useful.

Let me leave that question, because we're in, apparently, some territory where we're—that's not clearly understood, and that—the number of controllers to take care of the—our needs. Right now, it's estimated that we need 15,000 controllers, but we barely have 14,000. That's under current conditions. We have these retirements facing us. Is that something that you folks are looking at as we contemplate heavier use of the airspace?

Mr. CIRILLO. We currently have in the neighborhood of 14,600 controllers, which we—which was the projection of our need for this year. We actually hired more this year. By the end of the fiscal year, we will have hired more than we had anticipated. And—now, we do have a fairly sophisticated hiring plan, over the next more-than-decade, that includes more than a thousand hires per year.

Senator LAUTENBERG. Would you certify an airplane, knowing that, over the airplane's life, that, then, 25 percent of them might crash?

Mr. SABATINI. Sir, the certification of an aircraft has to demonstrate that it complies with a particular rule. They'll——

Senator LAUTENBERG. Have you looked at the M–2—the Mitsubishi, Mr. Sabatani?

Mr. SABATINI. Well, the airplane, at the time of—it was certified, demonstrated that it could meet——

Senator LAUTENBERG. How about its performance now, where one out of four of them that were built have crashed?

Mr. SABATINI. Well, we've been quite vigilant on that subject, sir, and I——

Senator LAUTENBERG. What does that mean?

Mr. SABATINI. Well, we've been reviewing the history of that aircraft, and have, as a matter of fact, as early as earlier this week, we have a special Federal Aviation Regulation that has been posted at the *Federal Register* to address the special training that we have determined needs to be put in place, and which industry has voluntarily adopted, even before the regulation became effective. So, we've worked very closely with the industry. We recognize that, as the aircraft has transitioned from where it started, in terms of its introduction, being operated with a certain class and group of people, migrating to a different category, we have identified that, in fact, there have——

Senator LAUTENBERG. Would you put your family in an MU–2?

Mr. SABATINI. I'm a pilot, sir, and I would fly one today, myself, with my family.

Senator LAUTENBERG. You would fly one. Would you put your family in it?

Mr. SABATINI. I would put my family in it.

Senator LAUTENBERG. Um-hmm. Well, I wouldn't. And I sit second seat a lot of times. But——

Thank you very much, Mr. Chairman.

Senator BURNS. Thank you, Senator.

With the new technologies, I would tell you that, in general aviation, we do a great deal of flying with GA in Montana. And those of you with the new GPS systems that can be put in there, you tell me where you're strip is, give me the coordinates—I don't care if it's a grass strip in Augusta, Montana—we can find it, we can put—we can get it in there. And—under some conditions that we didn't use to have, to be right honest with you, years ago.

Some of these light jets will be going into air taxi service, I understand. How do we deal with Part 135 of the FAA regulations on single pilots requiring two pilots in air taxi, or to allow those operations to go ahead with just one pilot? How do we deal with that, Mr. Sabatini?

Mr. SABATINI. Well, the current regulation, Part 135, has, for a long time, accommodated that option by on-demand-type operations in—with a single pilot. So, we have a long history and a methodology and a process where an applicant, an operator who wishes to avail themselves of that capability, must demonstrate that they have the appropriate training program in place for its pilots, that they have the appropriate autopilots and functioning for that air-

craft, because it is not just a single-pilot operation, it is also compatible—has to be compatible with the equipment onboard the aircraft. So, we do permit it today, and have a long history of safe operations with single pilots.

Senator BURNS. I have no more questions for this panel. I do have some more, but they are, sort of—I think it'll be an ongoing discussion with both of you gentlemen as we work our way through the reauthorization process next year. I appreciate your testimony.

And if you have any more questions, why, I'd—I'm going to do that, but, as far as I'm concerned, I want to thank you for being candid with us and—in your testimony, and also in our daily dealings with the FAA. I appreciate that very much.

Senator Rockefeller?

Senator ROCKEFELLER. Thank you, Mr. Chairman.

It's been very interesting to me to watch all of the rigors and the people involved in the certification process. And I don't mean to come back to Sino—the SJ–230, but that has 13,000 parts. They all have to be certified by the FAA, every single one of them. And my question is—and it's a long process. Adjustments were made as a result of that process. So, as these new lighter planes are coming onto the market—there are—I think there are about 20 different models that are being considered, at the present time—I'm interested in—do you have—and to make the point more strongly, getting the FAA certifiers out to Martinsburg, West Virginia, has been tough, to get enough of them, on a present—larger small passenger jet. You get 20 more coming online, and I just want to be sure—I want you to tell me, one, how many people you have involved in certification. How, in general, are they dispersed, by what order of priority? And how are they going to handle these new models coming on?

Mr. SABATINI. Thank you, Senator.

From the safety side of the house, sir, our first order of business and first priority is continued operational safety. That is number one. And, from that point on, we then have to prioritize the work that we do. And as a result, because we focus our attention on continued operational safety, where you tend to see the impact of staffing is in the arena of applicants coming to us for new certification, starting in 2006 we've had to put in place a queuing system. So, while applicants will eventually be served, they are put in a queue, and it could some time for us to get to those folks to deliver the service they're looking for from the FAA.

So, when we do certify an aircraft—and I will tell you this, the current models that are in place today are not suffering from a certification backlog. Those folks were in the queue early on, and we've—are certainly providing the necessary resources to get that work done. But those other applicants that will be coming online, while there may be 20 thinking about it—some, seriously; some quite—not so seriously—they have expressed their desire to build airplanes—but they have been informed that there is a queue, and that there is a period of time, most likely, they will wait. Congress has certainly recognized that—in 2006, you plussed us up, and certainly recognized that in the 2007 budget. So, we certainly appreciate that, but that's where the impact does show up. But never at the level of safety—at the safety level.

Senator ROCKEFELLER. Thank you.

Senator BURNS. Senator Lautenberg, do you have——

Senator LAUTENBERG. A couple, Mr. Chairman, if you'd indulge me. And thanks for calling this hearing. I think it's very important.

Did you say, Mr. Cirillo, that you have 14,600 people on duty now in the air—air traffic controllers?

Mr. CIRILLO. Yes, in—well——

Senator LAUTENBERG. They're on duty. Now, I'm not——

Mr. CIRILLO. They're on duty. Some are in various stages of training.

Senator LAUTENBERG. Of—various stage—so, they're not on duty, those stages of training. And those that you've hired this year—you said 14,600, that this was a big hiring year. But the question is, What's the standing population of the controller force?

Mr. CIRILLO. That was the 14,600.

Senator LAUTENBERG. Yes, we have reason to challenge it, and we'll discuss that at a later moment, if you will.

All right. Do these have any—Mr. Sabatini, do these airplanes have any commercial viability? Will they—can they be used—I mean, you know that there are places that fly a Cessna 402 and put eight passengers in there, and they function.

Mr. SABATINI. Well, we certainly have certified the airplane to perform under many different circumstances and operating environments. It would certainly be up to an operator to decide to use it in a business model that they choose to.

Senator LAUTENBERG. But you'd have no restriction.

Mr. SABATINI. None. We have regulations that would be specific for the type of operation that operator——

Senator LAUTENBERG. So that they can put as many people as they can comfortably fit in there, right?—in one of these airplanes.

Mr. SABATINI. Yes, and they can use it, under Part 135, on demand, or they can use it—well, basically, that's the regulation——

Senator LAUTENBERG. Yes.

Mr. SABATINI.—they would be able to——

Senator LAUTENBERG. Yes.

Mr. SABATINI.—use it under.

Senator LAUTENBERG. Right. I wanted to ask you this, that when we look at the accommodations needed, did—do you think at—with the present restrictions—we've got a 1,000-foot separation, and delays, constantly, on the East Coast and other fairly busy places. They cause delays all over, because what happens if New York is jammed with flights coming North-South, then they can't take the airplanes from the West, coming there. At what point do you say that skies have finite—has a finite limit and that there's a point at which we can't take any more, based on the fact that delays count? Is there a delay marker that we use that says that every flight should be off in 10 minutes, or something like that, from its advertised time?

Mr. CIRILLO. Well, safety is our number-one priority, so we don't put those types of parameters around the operation, because our ultimate mandate is to maintain the safe operation. But we do have a sophisticated traffic flow management system, and it's generated from the Air Traffic Control System Command Center in Herndon and our traffic management units around the country,

and we have the ability to put a traffic management initiative in at any airport, and also, as recently as this year, for the airspace. And the reason is obviously to maintain efficiency, but, more importantly, is to maintain safety so that airports or airspace or sectors don't get overloaded and we have the maximum throughput while still maintaining our safety mandate.

Senator LAUTENBERG. Would it make sense for FAA to publish delay statistics? Do they do it now?

Mr. CIRILLO. Yes, sir.

Senator LAUTENBERG. How frequently?

Mr. CIRILLO. On a daily basis, we——

Senator LAUTENBERG. All airports?

Mr. CIRILLO. Yes, sir.

Senator LAUTENBERG. I would ask you a question. What about the noise level from these aircraft? Will they be significantly less or more than, let's—turboprops or other—the lightest of the jets that are flying now?

Mr. SABATINI. They will certified to the most recent noise requirements. And I will tell you that when they fly by, you will hardly hear them.

Senator LAUTENBERG. Really? That would be excellent. Well, does that mean we can get rid of some of the old, noisier ones that are not yet—that don't meet the standard in a lot of airports?

Mr. SABATINI. Well, sir, I believe today that all aircraft that are operating today, regardless of their weight, meet or exceed the noise requirement contained in their certification basis. As technology for aircraft and engine design has improved over the years, many aircraft today are quieter than their predecessors. This is also true for small jets in general. Market forces will determine the attrition rate of the noisier jets.

Senator LAUTENBERG. Most. Not all.

Mr. SABATINI. Well, I'm not aware of any, so I'd have to get back to you, Senator.

Senator LAUTENBERG. Thanks very much, Mr. Chairman. Thank you, gentlemen.

Senator BURNS. Thank you. And I thank both of you for coming this morning and offering your testimony. We'll—we look forward to working with you as we work through next year. Thank you very much. Thank you.

We'll go to our second panel: Mr. Vern Raburn, President and Chief Executive Officer of Eclipse Aviation Corporation, out of Albuquerque, New Mexico; Mr. Edward Iacobucci, President and Chief Executive Officer, DayJet Corporation, Delray Beach, Florida; Jack Pelton, Chief Executive Officer from Cessna Aircraft out of Wichita, Kansas; and Mr. Matt Andersson—and I suspect it's "Anderson," though—Senior Aviation Consultant, Aerospace, Defense and Transportation, CRA International, out of Chicago. We appreciate you gentlemen coming today.

[Pause.]

Senator BURNS. As we tackle with this new challenge in aviation of UAVs and very light jets, we appreciate your testimony. I read most of it last night. I appreciate some of your testimony. And if you have a 5-minute version of your testimony, that would certainly be helpful to us, at this time.

Mr. Vern Raburn, Chief Executive Officer of Eclipse, thank you for coming today.

STATEMENT OF VERN RABURN, PRESIDENT/CEO, ECLIPSE AVIATION CORPORATION

Mr. RABURN. Thank you, Mr. Chairman. I appreciate the opportunity to speak to the Committee today on the really exciting opportunities and changes that are happening in aviation today.

I founded Eclipse Aviation in 1998 to really revolutionize air travel through a low-cost, high-performance jet that we believe is delivering unprecedented levels of performance, efficiency, reliability, and safety, to customers. I do so with the knowledge that our air transportation system would not be equipped to meet the needs of 21st century air travelers. And, in fact, the need for a whole new layer of air transportation would be crucial to our country's future leadership and economic development.

We believe that, enabled by this emergence of these new VLJs, that there's a whole new generation of entrepreneurs that will be emerging to offer services using these aircraft. These air-taxi or on-demand air travel companies intend to leverage the breakthrough performance and costs of VLJs to provide point-to-point on-demand service through hundreds, not just a few, communities in the United States.

The beneficiaries of VLJs will be individuals who regularly endure the 5- to 10-hour drives, not airline travel, because they cannot access commercial airlines for their transportation needs. In other words, consumers will be using this form of air transportation to go to new levels of companies, new levels of communities, whether it's small, medium, or even large-sized companies will be using these aircraft to increase their travel needs or their travel capabilities.

Last, these aircraft will offer owner/operators—people who, like myself, own aircraft—conduct business and personal air travel in a way that hasn't been possible heretofore.

There are a number of faulty assumptions about VLJs that I'd like to address. These are myths that are primarily being generated by current users of the system that do not understand the capability of these aircraft.

This first myth is that these VLJs will be flown by inexperienced pilots, and training will be a concern. The simple fact of the matter is that we have over 800 individuals who have bought these aircraft, and these individuals typically have a commercial pilot's license, have over a thousand hours of experience, and are already qualified to fly aircraft that are far more difficult to fly.

Training. Eclipse pilots will receive the most advanced flight training, far beyond any mandate from the FAA. In fact, they will receive training that is in excess of what airline pilots typically receive. So, we will be training the pilots, with the ultimate context of, "If you can't meet the training criteria, we won't sell you an airplane." No other manufacturer has ever made that claim previously in the history of aviation.

Another myth is that VLJs will cause airport congestion. There's a lot of ample evidence to show that en route airspace to accommodate new aircraft with today's antiquated ATC system is able to

handle this. VLJs will rarely be accessing major hub airports. In fact, they will be accessing the satellite airports. To Senator Rockefeller's question earlier, every major city, ironically, with the exception of Washington, D.C., has significant number of satellite airports around it, including, by the way, Charleston. And passengers will be able to use time-sensitive, on-demand air travel, to go where they need to go when they want to go. Once again, I want to emphasize the point, not where the airlines go today, but where the airlines don't go.

The myths continue with this idea that VLJs will disrupt en route traffic flows. Again, this is simply not a fact. In fact, we rarely will fly at higher altitudes. I've flown the Eclipse 500 now well over 150 hours, and I've only been above 28,000 feet six times; principally on test flights. That's because at even 28,000 feet, the aircraft offer 100 knots of additional speed for the same fuel burns as turboprops. For the ranges and the typical trips that these aircraft will be using, whether it be up and down the East Coast or to the West Coast or to Montana or to Wyoming, this airplane will be able to use these altitudes, very effectively.

There is another myth or concept that VLJs drive cost into the air transportation system. Well, the simple fact of the matter is, once again, that most of the cost in the air transportation system today is driven by the airlines, by their need to go to and from a very, very small, finite number of airports, whether it's the 22 PACER airports or the 35 OEP airports. That's what drives the congestion in the system today, is the fact that they all go in, and want to depart and arrive at, the same places. VLJs will, once again, be operating out of the airports, out of the communities where there is no congestion today.

So, the fact is that a lot of these concepts are fully misdirected, and it's endangering the economic future of this country. The airlines are approaching air transportation as a zero-sum game, as a game that simply says, "There's no more space left, let's restrict the access to the system." In fact, a recent study that Matt will be talking about, from CRA, says that, based solely on the VLJ projections from the FAA, that there will be over $24 billion in economic output, over $7 billion in earnings, and over 176,000 jobs created by 2017, from VLJs alone. In Albuquerque, alone, we now employ 850 employees that, 2–5 years ago, were not employed in Albuquerque, with an average salary that's three times that of the average salary in the State of New Mexico. It is unfathomable that we, as a Nation, will not move forward aggressively to tap into this significant growth opportunity for businesses and economic expansion.

Thank you very much for your time.

[The prepared statement of Mr. Raburn follows:]

PREPARED STATEMENT OF VERN RABURN, PRESIDENT/CEO, ECLIPSE AVIATION CORPORATION

Good morning. My name is Vern Raburn, and I am President and CEO of Eclipse Aviation Corporation (Eclipse), located in Albuquerque, New Mexico. I appreciate the opportunity to address the Senate Committee on Commerce, Science, and Transportation Subcommittee on Aviation, concerning the incorporation of the very light jet (VLJ) into the national air space (NAS) and into our Nation's economy. My goal today is to first summarize Eclipse Aviation, the Eclipse 500 and the current air transportation system. Second, I want to dispel the many myths that the airlines

are creating about VLJ integration into the National Airspace System. And finally, I will show how the national economy will benefit from a new layer of air transportation.

Sadly, with the exception of the very top end of the market, the spirit of innovation has long been absent in general aviation, where growth contracted dramatically following airline deregulation in 1978. The reality is that general aviation has been sidelined to the domain of the elite few. Since its inception, Eclipse Aviation has demonstrated an unwavering commitment to return innovation and growth to general aviation. I founded Eclipse in 1998 to revolutionize air travel through a low-cost, high-performance jet that will deliver unprecedented levels of performance, efficiency and safety to customers.

Before I go into detail about Eclipse or why we pioneered the VLJ market, I would like to briefly touch on the role of air transportation in our society and national economy. Recently, the U.S. economy has entered what some call a post-industrial phase. Employment growth is primarily in professions and services, and this type of employment is very flexible in its location. Consequently, the U.S. population has begun to shift toward the interior of the nation, where things like quality of life and cost of living are massively, measurably better. High-speed Internet access, express package delivery and the expansion of go anywhere phone numbers (*i.e.,* cellular phone) are enabling this migration.

And so, more than ever before, goods and people must be able to move freely between regions. Companies must have fast, flexible, safe and cost-effective access to destinations across the country. Small and medium communities must have viable links to each other. In short, a robust, broad and deep transportation network is more critical than ever to our Nation's economic growth and prosperity.

Yet at the same time, our ground transportation system is weakening. Long distance passenger rails are a thing of the past and commuter trains are rare except in a couple of really specialized areas like Chicago, Boston and New York. The highway transportation system is ever more clogged, difficult and dangerous to navigate. The end result—people are increasingly interested in traveling by air.

Yet in spite of the fact that smaller communities desperately need air transportation to drive business development and economic growth, the reality is that there is significantly less air service available today as measured by communities directly served. Virtually all of these communities have underutilized airports that can be used as economic growth engines. In the face of these challenges and nascent opportunities, the advent of the very light jet (VLJ) is playing a critical role in revitalizing the GA industry and improving our overall air transportation system.

Eclipse Aviation has successfully designed, developed, certified—and is now manufacturing and delivering the world's first VLJ—the Eclipse 500. To create the Eclipse 500, Eclipse used technologies and business practices forged in the technology industry to drive down cost while increasing performance. Eclipse applied innovation across every facet of its business to make the Eclipse 500 significantly easier and less expensive to operate than traditional business aircraft, and more efficient to certify and produce. Some of the groundbreaking innovations that we are applying to the Eclipse 500 include friction stir welding, the PhostrEx fire suppression system, electro-mechanical actuators and digital electronics with integrated software. These technologies are changing the status quo of what we recognize today as general and corporate aviation, and inspiring new and better methods of aviation transportation for the masses.

The resulting Eclipse 500 is a high-performance aircraft with technology and capabilities normally found in jets costing many millions more. With an acquisition cost of one half of today's small jets and the lowest operating cost per mile of any jet, the Eclipse 500 provides the lowest cost of jet ownership ever achieved. This breakthrough has made the benefits of jet transportation available to a broader segment of the population, and inspired an emerging generation of entrepreneurs to bring a new form of air travel to the flying public—the air taxi. It has also opened up a new world of convenient air transportation to a majority of the communities in the U.S. that are simply not served by commercial airlines, thereby enabling significant economic growth.

Potential markets for the Eclipse 500 include owner operators, corporations, airman training institutions, same-day express services, and one of the most promising markets of all, the new air taxi industry. Testimony specific to the new air taxi industry will be presented by DayJet at today's hearing. For small to mid-sized companies, the availability of small affordable jets will open up the convenience and time savings of corporate transportation to new levels of company management. This will create much leaner fiscal operations, while providing new levels of service to customers in the field. These aircraft will also allow owner/operator pilots to conduct business and personal travel in jets offering sophisticated performance and

safety features that were previously available only in high-end corporate and transport aircraft.

The operational characteristics of the Eclipse 500 clearly demonstrate the aircraft's versatility. Although certified to operate at 41,000 feet at 370 knots, the Eclipse 500 is very efficient at lower altitudes and speeds. Many of the shorter trip profiles will have operators flying at altitudes from 20,000 to 30,000 feet. For the five hundred mile, two to three passenger trips that will constitute a significant portion of the workload of the Eclipse 500, those often underutilized altitudes will serve as the most efficient. Further, with the ability to land and take off from 2,500 foot runways, the Eclipse 500 can utilize 10,000 (5,000 public and 5,000 private) landing facilities in the U.S. This will allow communities and remote geographic regions of our country that do not enjoy the safety and reliability of twin engine jet aircraft transportation, to become the beneficiaries of modern-day transportation, and the economic benefits that will follow.

Bringing turbine safety to a whole new class of aircraft, the Eclipse 500's standard safety features rival those of aircraft costing millions more and include: autothrottle; color weather radar; a dual-redundant flight management system with sophisticated aircraft performance computer; "smart" electronic checklists and an intelligent crew alert system. The state-of-the-art Eclipse 500 cockpit is designed for safety. For example, to ensure availability of critical flight data, the Eclipse 500 is equipped with redundant, high reliability, solid state electronic sensors and displays. In addition, both Primary Flight Displays (PFDs) and the Multi Function Display (MFD) have a reversionary mode, allowing them to transfer information to one of the other displays if required.

Through digital electronics, the Eclipse 500 incorporates a level of systems integration and safety previously available only in advanced military aircraft and commercial airliners. This extensive level of aircraft systems integration, known as Avio in the Eclipse 500, is delivered through integral, redundant computer systems, and an advanced power distribution system. Avio systems contain extensive built-in-testing capabilities that are used to constantly monitor and ensure the integrity of the aircraft. More than just an integrated avionics and instrument suite, Avio expands integration technology beyond the cockpit and applies it to the entire aircraft. Aircraft systems—including avionics, engine operation, fuel system, flaps, landing gear, cabin pressure and temperature—are centrally controlled by Avio. Avio significantly reduces pilot workload by simplifying tasks, generating useful information, managing systems and assisting with troubleshooting. In fact, the Avio-equipped Eclipse 500 is more capable of operating in our current and future national airspace than most of the aircraft currently used in air carrier operations.

There are a number of faulty assumptions about VLJs, and one of them is that they will be flown by inexperienced pilots. The reality is that the people who are purchasing these airplanes are not just beginning to learn how to fly. They are licensed, seasoned pilots who have earned multi-engine and instrument ratings from the FAA. As I will detail in a moment when I walk you through Eclipse's training process—training will be done through the best aviation training school in the world. In all cases, the curriculum goes far beyond what the FAA requires and the core curriculum goes beyond all existing airline training programs. Moreover, this is not a matter of simply sitting through a course. Pilots will have to demonstrate proficiency.

As the category leader, Eclipse's comprehensive approach to training demonstrates its unwavering commitment to safety and has set a very high bar for VLJ training overall. In 2005, Eclipse kicked off an unprecedented training partnership with United Airlines, a proven industry leader in cockpit resource management and crew safety innovations. This partnership is designed to provide Eclipse pilots with the most advanced flight training available in general aviation. The training program will provide a level of professional pilot training normally available only to commercial airline pilots. Eclipse takes its responsibility to create an environment for pilot success so seriously, it has committed to refund the deposit of any customer who cannot successfully complete its training program.

Eclipse is actively participating in the FAA's Industry Training Standards (FITS) program. The FITS program uses scenario-based training and case studies of previous aviation accidents and incidents to provide a learning environment that more closely resembles day-to-day flight experiences.

Eclipse's curriculum is unprecedented in the industry and is focused on creating safe pilots. The Eclipse pilot training program consists of multiple phases that provide training experiences from initial introduction to the Eclipse 500 to recurrent training. At the beginning of the Eclipse training program, pilots will have to complete a Flight Skills Assessment in a full-motion simulator focusing on instrument proficiency and airmanship skills. A written Pilot Qualification Review will be com-

pleted by each pilot in advance of the Skills Assessment. Each pilot will also be required to take the Myers-Briggs Type Indicator personality test to help tailor the training program to their individual personality type. Based upon the results of the Skills Assessment, supplemental training may be required for some customers prior to beginning the Eclipse 500 Type Rating.

After the flight skills assessment, each pilot will be provided with information on the basics of operating a jet, and will have to complete emergency situations training. The Jet Basics Self-Paced Study Course, in a CD format, provides an overview of jet aircraft and their operating environment. The topics covered in the course are: Introduction to Jet Engines; High Altitude Physiology; High Altitude and High Airspeed Aerodynamics; High Altitude Flight Planning; and, High Altitude Weather and Radar. The emergency situations training will provide hands-on upset recovery training in Eclipse's L–39 jet. Further, in addition to classroom work on physiology and hypoxia, the pilot candidates will experience actual hypoxia training with a mixed gas simulator.

After all of this foundational training is complete, pilots will transition to the Eclipse 500 type certificate transition training. The training is comprised of four parts. They include: self-paced study of the Eclipse 500 aircraft systems; classroom training; simulator training; and, actual flight training in the Eclipse 500. The type rating transition course will provide classroom instruction that emphasizes FITS scenario-based training to build good judgment. Following completion of the type rating course, each pilot will take a type rating examination in the Eclipse 500, or in a full-motion simulator once the simulators are certified.

Depending upon the pilot's experience level, following completion of the type rating examination, some pilots will receive their type rating to fly the Eclipse 500 in single-pilot operations. Others will be required to fly with experienced mentor pilots, which is similar to an airline-style initial operating experience. This pilot mentor program will include operations in high-density traffic areas, the high-altitude weather environment, and will generally ensure that the airman displays the proper proficiency to operate as a single pilot in the jet environment. Completion of the mentor program is not based upon a predetermined number of hours flown with the mentor pilot, but rather is based upon the previously mentioned display of proficiency.

Recurrent training will be required for all Eclipse 500 pilots. The frequency of recurrent training will be determined by individual pilot skill level and experience. For the more experienced pilot, one-year recurrent training will be the norm. For the pilots requiring an initial mentor program experience, six-month recurrent training will be an initial requirement. Recurrent training will also include web-based home study, classroom review and a proficiency check in a simulator.

I would now like to address some of the confusion that is emerging about the integration of VLJs into our national airspace. The FAA and Joint Planning and Development Office (JPDO) are doing very important work to modernize our national air transportation system through the Next Generation Air Transportation System (NGATS) initiative. A recent article by a member of the Strategy, Advanced Traffic Management group, The Boeing Company, illustrated that the need to modernize our Air Traffic Control (ATC) system is necessary to simply move away from the 1950s technology that is in place today, and completely utilize the system efficiencies and increased safety available through NGATS technology. *Journal of Air Traffic Control, January–March 2006, (Attachment "1", page 43).*

The article also dealt with misconceptions surrounding VLJs and airport congestion. Specific to congestion, the reality is that VLJs will neither require nor seek regular access to major hub airports. The FAA data supports this with general aviation operations accounting for only 6 percent of the operations at the Operational Evolution Plan (OEP) 35 airports. In addition, there is absolutely no correlation when comparing the 20 busiest general aviation airports to the 20 busiest airports for airlines. As the article states, "The VLJ business model is based on providing convenient, personal point-to-point services through non-congested airports. VLJ passengers will be time sensitive and convenience-minded, and they will use VLJs precisely to avoid the hassles associated with large hubs. Second, VLJ aircraft are specifically designed to operate from runways as short as 3,000 feet (including many grass strips). This makes them ideal for providing point-to-point services to most of the 5,000+ U.S. airports serving small to medium sized markets." *Journal of Air Traffic Control, January–March 2006, (Attachment "1", page 42).*

In fact, even if a VLJ operator decides to operate into a hub airport, that operation will not cause congestion. "The effect of VLJ operations into hub airports will be minimal for a number of reasons: VLJ pilots will need adequate prior experience and will receive rigorous training, equivalent in many cases to that for commercial pilots; VLJ aircraft will have advanced integrated avionics to provide enhanced pilot

situational awareness, enable seamless traffic flow integration and optimal spacing with commercial traffic flows; VLJs are capable of operating at speeds compatible to those of commercial jet aircraft, throughout the terminal area and until well inside the final approach fix; VLJ climb and descent rates are compatible with commercial turbojet aircraft; VLJ aircraft can land and depart safely using shorter runways, unusable by commercial jet traffic. Even regional jets require those same longer runways. On intersecting runways, VLJ aircraft are capable of routine (LAHSO) Land and Hold Short Operations; and finally, to enhance traffic integration even more, new procedures that take advantage of VLJ performance and avionics capability can be developed." *Journal of Air Traffic Control, January–March 2006, (Attachment "1", page 42).*

Some believe that VLJs will clog our airspace and create gridlock in the skies. The reality is that there is significant available airspace to accommodate these new aircraft. Under Marion Blakey, great progress has been made and the transformation to NGATS has already begun. Last year we doubled the capacity of airspace system between FL290 and FL410 with RVSM, so there is plenty of capacity in those altitudes. WAAS is now a reality, and RNAV and RNP are happening. Moreover, it is important to note the airspace is three dimensional. This is not a two lane highway where you are permanently stuck behind the truck in front of you. VLJs are technologically advanced and nimble. They are more than capable of getting out of the way of faster airplanes. Moving around in the airspace is something airplanes do everyday, most often when the commercial airlines go up and down in altitude looking for a smooth ride.

As stated in the Journal of Air Traffic Control, "Commercial jet traffic will continue to dominate in the higher altitudes. VLJ operations will generally be on shorter routes under 600 statue miles and mainly at altitudes below those on longer-range commercial operations. Sometimes, especially on longer stage lengths, VLJs will want or need to operate at the higher altitudes, but even then VLJs will not disrupt en route traffic flows, even though they cruise at 0.64 mach, slightly slower than commercial airliners. Current Flight Management System (FMS) technology already enables faster moving aircraft to establish offset tracks so as to pass slower aircraft en route." The article goes on to say, "In the ongoing debate about the impact of VLJ operation, the question of VLJ speed compatibility has been raised frequently. In large measure, this is a red herring. The commercial and business fleets of today operate at a variety of climb, cruise, descent, and approach speeds, based not just on aircraft type, weight, and performance differences but also on variations in company policies. Even with today's 1950s ATC technology, controllers are able to integrate traffic of varying speeds quite efficiently, so VLJs will add no significant complexity." *Journal of Air Traffic Control, January–March 2006, (Attachment "1", pages 42&43).*

The current hub-and-spoke system used by the airlines is reaching capacity regardless of the integration of VLJs into the NAS, and as was established in 1997, it is this airline hub and spoke operation that drives the majority of system cost. VLJs will not change this dynamic. VLJ operators and owner pilots will use their aircraft to go where the airlines don't, avoiding the congestion associated with the hubs. Moreover, when these airplanes are flown by air taxi operators they will pay the commercial ticket tax. Because the air taxi charge will likely exceed a typical coach ticket, the typical air taxi passenger will end up paying more in taxes than the scheduled airline passenger.

It would be irresponsible not to point out the elephant in the room—and that is the fact that airlines see air transportation as a zero sum game and are acting to limit air transportation capacity vs. expand it. In other words, fearing they will lose passengers to VLJ operations, the airlines are propagating a series of myths to impede the air transportation expansion our country so desperately needs. This energy is misdirected and harmful to our economic future. As mentioned earlier, most VLJ passengers want to travel where the airlines do not offer service and will be choosing VLJ air transportation in lieu of their cars. Additionally, the ample airspace capacity and new aircraft capabilities exist to make this expansion possible today. It is clear that the sophisticated technologies that are available on today's VLJs, including ADS–B, WAAS and LPV, are not advancements the airlines are interested in retrofitting on their fleet.

I would like to close by recognizing the significant economic impact of the VLJ market on the Nation's economy. At EAA AirVenture 2006, Acting Secretary of Transportation Maria Cino, prior to awarding the Eclipse 500 type certificate, stated that "air travel drives economic growth." At the same event, FAA Administrator Marion Blakey, said "Eclipse is more than about just building a plane . . . it's about building a company, it's about building our economy."

A recent study, conducted by CRA International and based upon FAA VLJ market projections, estimated a potential annual VLJ economic impact of $24 billion in output, $6.9 billion in earnings and 178,000 jobs in 2017. Based upon the unprecedented market acceptance of the Eclipse 500 VLJ, there is a very real potential for higher production of VLJs than the FAA has forecast. Increasing the FAA projection by 50 percent (for a total fleet size of 7,425 aircraft), economic activity in 2017 related to VLJs would total over $32 billion in output, $9.4 billion in earnings, and over 249,000 jobs. If the forecast of VLJ production is increased beyond the FAA projection to reflect an additional increment of corporate sales equal to the level of aircraft purchased by air taxi operators (for a total fleet size of 8,250 aircraft), economic activity in 2017 related to VLJs would total over $35 billion in output, $10.4 billion in earnings, and over 276,000 jobs. *The Economic Impact of Very Light Jets, CRA International, May 2006.** More specific information on the potential economic impact of the VLJ market on our Nation's economy will be presented by CRA International at today's hearing.

Thank you for the opportunity to testify before the Senate Committee on Commerce, Science, and Transportation Subcommittee on Aviation. I hope that my comments have assisted in your understanding of the emerging VLJ market; the potential impact of VLJs on our society and economy; and the incorporation of the VLJ into the NAS.

ATTACHMENT 1—

Journal of Air Traffic Control—January–March 2006

VERY LIGHT JETS, IMPACTS ON NAS OPERATIONS

(By Captain J Leslie Robinson, Aviation Consultant, Neil Planzer, Vice President, Strategy, Advanced Air Traffic Management, The Boeing Company)

"Without the unique benefits of air transportation, our quality of life would be dramatically reduced. Whether those benefits will continue to be available in the future will depend on actions we begin taking now. The system is already showing signs of stress and it is clear that projected demand will soon surpass the system's capacity." [1]

"Now imagine an alternative world where a traveler or shipper determines the departure and arrival times—instead of being confined to a predetermined schedule . . . Think of the possibilities if owning a recreational plane, a micro-jet, or a share of a jet capable of flying in nearly all weather conditions were affordable to more Americans." [2]

In the *Next Generation Air Transportation System Integrated Plan,* published in December 2004 by the Joint Planning & Development Office, JPDO projects a range of outcomes by year 2025 that can include increases in demand to a level of up to 3× times the number of operations in today's current National Airspace System (NAS).

The vital work of the FAA and JPDO in transforming the NAS from its current 1950s technology to a modern information-centric, network-enabled system of systems is finally gaining traction inside the Beltway. Nevertheless, the sheer magnitude of the systems-of-systems planning, funding, and engineering required, as well as the accompanying political and social issues, continue to stall NAS modernization. If this delay continues, the result could be monumental air traffic gridlock, with unimaginable economic and social consequences. No one can predict when this could occur, in some measure because the timeline can be affected by several disruptive technologies.

Some of these technologies will likely have minimal effects on the NAS in the near to mid-term. The integration of unmanned or remotely operated aircraft into the NAS does not seem likely in the near to mid term. The NASA Small Aircraft Transportation System (SATS) concept, which suggests that someday individuals with little or no aviation skills may be operating private air vehicles controlled and separated from each other by computer systems, seems even more remote.

In contrast to these more remote technologies, however, there is a third very real, disruptive technology approaching in the very near term—the Very Light Jet (VLJ). Next year, with virtual certainty, these small, moderately priced, six-passenger twin-engine jets will be certified and will begin to populate the NAS in increasing

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*The information referred to has been retained in Committee files.

[1] JPDO. *Next Generation Air Transportation System Integrated Plan.* U.S. GPO: Washington, 2004. P.2.

[2] *Ibid.* P.i.

numbers, enabling personal and on-demand, point-to-point air service to most of the Nation's approximately 5,400 airports.

What Industry & Government Are Saying About the VLJ

The pending introduction of the VLJ has raised some concerns. Airline operators see a possibility that the skies and airports they use will suddenly be filled with large numbers of smaller and slower aircraft. Increased airport and airway congestion could mean more delays and higher operating costs for an industry that is already hanging by a thread.

At the same time, the FAA, NASA, and the JPDO have expressed similar concerns regarding the potential impact of VLJs on the NAS Air Traffic Control System:

- "The FAA predicted this spring that 4,500 microjets will be flying by 2016."[3] To put this in perspective, according to the Boeing 2005 *Current Market Outlook,* the 2004 year-end *global* fleet of commercial aircraft consisted of just 16,778 aircraft, and by 2025 that fleet is expected to more than double to 35,287.[4]
- "An FAA computer simulation last year predicted that flight delays would climb more than 300 percent by 2010 if microjets {VLJs} arrived as expected and the Agency made no improvements, said its author, FAA mathematician Doug Baart."[5]
- "NASA says the number {of VLJs} could be even higher. It estimates the market at more than 8,000 by 2010."[6]
- The JPDO Next Generation Air Traffic System Integrated Plan states that "a shift of 2 percent of today's commercial passengers to micro-jets that seat 4–6 passengers would result in triple the number of flights in order to carry the same number of passengers as today."[7]

These rather stark projections raise two important questions. First, can VLJ aircraft be assimilated seamlessly into today's NAS? And second, would a rapid growth in VLJ deliveries in the mid- to long term overwhelm the air traffic control system and create widespread gridlock, long before any Next Generation Air Traffic System (NGATS) could be implemented? Are these concerns justified? Let's take a look at the issues.

The Very Light Jet & "Disruptive Technology"

Recently, some aviation experts have referred to the VLJ as a "disruptive technology,"[8] Clayton M. Christensen of Harvard Business School originated the term in his 1997 book *The Innovator's Dilemma.* Christensen described "disruptive technology" as "a technology bringing to market a very different value proposition, . . . products typically cheaper, simpler, smaller, and frequently, more convenient to use."[9] He also said that a disruptive technology can initially appear to be of limited application and minimal consumer appeal, but can ultimately trigger changes (sometimes deadly) to industries that fail to recognize these changes and continue to rely on existing business models and associated "sustaining technology."

With respect to the airline industry, it can be argued that VLJs will provide business and upscale leisure travelers with a cheaper, simpler, smaller and more convenient point-to-point substitute for traditional hub airline services. Since airlines rely heavily on revenues from these valuable passengers, substantial skimming of that traffic could have major consequences.

FAA and other air traffic management experts are also concerned about the possible impact of VLJs on the ATC system. If just a small amount of traffic were skimmed to VLJs from commercial carriers, it could mean a significant increase in the number of NAS operations. And if the era of personal air vehicles is indeed coming soon, VLJ-like traffic volume could grow rapidly.

FAA and JPDO are busily trying to develop a Next Generation Air Traffic System based on a timeline intended to meet current projections of traffic. The possibility

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[3] Levin, Alan. "High Tech Gizmos Propel Aviation into the Future." *USA Today:* Washington, 2005.

[4] The Boeing Company. *Current Market Outlook.* The Boeing Company: Seattle, 2005. P. 11.

[5] *Ibid*.

[6] *Ibid*.

[7] JPDO. *Next Generation Air Transportation System Integrated Plan.* U.S. GPO: Washington, 2004. P. 5.

[8] Christensen, Clayton M. *The Innovator's Dilemma, When New Technologies Cause Great Firms to Fail,* Harvard Business School Press: Cambridge, 1997. P. xv.

[9] Ibid, Page xv.

of early, rapid VLJ growth could mean that aviation gridlock might come a lot earlier than expected. So let's take a look at the VLJ. Will it be a "disruptive technology," and just exactly what will its impact be on the NAS in the near to far term?

The Near-Term Operational Impact of the VLJ

Very Light Jets are a different breed. Serving stage lengths of up to 1,300 nautical miles, they are capable of operating at altitudes of up to 41,000 feet, carrying 4 to 6 passengers rapidly and comfortably above the weather and in airspace customarily used by commercial airlines. Let's examine the possible impact of VLJs, from an operations perspective.

VLJ Aircraft—Safety & Equipage

The Eclipse is a great example of VLJ aircraft design. Designed as an integrated airframe and avionics platform, these aircraft are subjected to rigorous certification standards set by the FAA. And precisely because these aircraft are new, integrated designs, not just rehashes of old airframes with new black box avionics, they are getting even more rigorous attention from FAA. VLJs will clearly be safe upon certification!

As to equipage, most VLJs will include advanced integrated avionics as standard or optional equipment. For example, the Eclipse will be equipped to support:

- ADS–B for precision surveillance monitoring;
- Dual GPS with WAAS for precision navigation;
- Auto-throttles;
- Data link communications capability to connect to tomorrow's network-centric ATM architecture;
- Color Weather Radar;
- Dual FMS (Flight Management Systems) for trajectory-based operations in today's environment and in the NGATS of tomorrow.
- The only option the Eclipse does not yet include is data link to FMS integration linkage.

In short, the typical VLJ will distinguish itself as better equipped than many of the aircraft in today's commercial fleets.

The Pilots—Training and Qualifications

A VLJ pilot will be required to hold an FAA Pilot certificate with type rating, which implies appropriately high levels of training and experience. In addition, because VLJ manufacturers are particularly sensitive to the need for high-quality training, they are taking training curricula one step further. For example, Eclipse Aviation signed an agreement with the United Services division of United Airlines to provide a mandatory training program similar to that of commercial airline pilots.

There are still a few unanswered questions as to whether VLJs will be certificated to fly with a single pilot crewmember, but current evidence supports such a step for several reasons:

1. Meticulous attention has been given by both industry and FAA to new advanced training standards for high performance aircraft (*i.e.,* FITS—FAA/Industry Training System);

2. The VLJ's integrated aircraft design and advanced avionics platform will help make flight training and flight operations much safer, yet much simpler;

3. Using advanced VLJ avionics capability, pilots can maintain higher levels of situational awareness.

This combination of rigorous training and sophisticated design will place VLJ pilot operating capabilities and operating environments near to, at or even above the sophistication and capability of many airline cockpits.

Air Traffic Operations—Near- to Mid-Term VLJ Impacts

Airport and Terminal Area Operations

There is speculation that even in the near to mid-term VLJ traffic will trigger congestion or gridlock at major hub airports. They won't, for several reasons.

With few exceptions, VLJs just won't want access to major hub airports. The VLJ business model is based on providing convenient, personal point-to-point services through non-congested airports. VLJ passengers will be time-sensitive and convenience-minded, and they will use VLJs precisely to avoid the hassles associated with large hubs.

Second, VLJ aircraft are specifically designed to operate from runways as short as 3,000 feet (including many grass strips). This makes them ideal for providing point-to-point services to most of the 5,000+ U.S. airports serving small to medium sized markets.

Some of those airports lack the runway, taxiway, or terminal facilities to support larger aircraft. Others serve markets for which there is no business case for commercial service. Still others have some commercial service but offer few point-to-point travel options, forcing travelers to connect through congested hub airports. For these communities, the VLJ will provide convenient new service options. This is their market niche. Narrow body jets and RJs just can't serve most of those cities.

Third, of all the reasons why VLJs won't frequent major hub airports, the biggest one is pure economics. Projected passenger cost-per-mile for VLJ travel will be equal to or higher than full commercial coach fares. VLJs will also probably provide no frequent flier benefits. Therefore, business or upscale leisure travelers flying through hub airports will be inclined to choose a traditional airline. VLJ travel at its currently projected costs will never be a viable economic substitute for commercial travel at major hub airports.

But what if despite all these reasons, VLJ operators decide to operate into hub airports. Will those operations disrupt traffic or induce gridlock? Absolutely not! The effects will be minimal, for the following reasons:

- VLJ pilots will need adequate prior experience and will receive rigorous training, equivalent in many cases to that for commercial pilots;
- VLJ aircraft will have advanced integrated avionics to provide enhanced pilot situational awareness, enable seamless traffic flow integration and optimal spacing with commercial traffic flows;
- VLJs are capable of operating at speeds compatible to those of commercial jet aircraft, throughout the Terminal area and until well inside the final approach fix;
- VLJ climb and descent rates are compatible with commercial turbojet aircraft;
- VLJ aircraft can land and depart safely using shorter runways, unusable by commercial jet traffic. Even regional jets require those same longer runways.
- On intersecting runways, VLJ aircraft are capable of routine (LAHSO) Land and Hold Short Operations; and finally
- To enhance traffic integration even more, new procedures that take advantage of VLJ performance and avionics capability can be developed.

In summary, for the near and mid term, Very Light Jet technology will not only bring point-to-point travel convenience and enhanced economic development to many smaller towns and cities, it will do so with minimal impact on the existing crowded hubs frequented by traditional air carriers.

En Route Operations

It has been suggested that VLJs will cause or exacerbate en route traffic congestion, either by their growing numbers or because of their somewhat slower (mach .64) cruise speeds. This is certainly not the case in the near to midterm.

There is ample available en route airspace to accommodate new aircraft, even with today's antiquated ATC system. Commercial jet traffic will continue to dominate in the higher altitudes. VLJ operations will generally be on shorter routes under 600 statute miles and mainly at altitudes below those of longer-range commercial operations.

Sometimes, especially on longer stage lengths, VLJs will want or need to operate at the higher altitudes, but even then VLJs will not disrupt en route traffic flows, even though they cruise at 0.64 mach, slightly slower than commercial airliners. Current Flight Management System (FMS) technology already enables faster moving aircraft to establish offset tracks so as to pass slower aircraft en route. And in the near future, the addition of high altitude "tubes" with passing lanes should enhance that capability.

The General Question of VLJ Speed Compatibility—Terminal and En Route

In the ongoing debate about the impact of VLJ operations, the question of VLJ speed compatibility has been raised frequently. In large measure, this is a red herring. The commercial and business fleets of today operate at a variety of climb, cruise, descent, and approach speeds, based not just on aircraft type, weight, and performance differences but also on variations in company policies. Even with today's 1950s ATC technology, controllers are able to integrate traffic of varying speeds quite efficiently, so VLJs will add no significant complexity.

Air Traffic Operations—Mid- to Long-Term VLJ Impacts

We have discussed the near- to mid-term integration of Very Light Jets into NAS operations and concluded that their impact will be minimal. It's time to take on the larger question—will the VLJ prove to be a "disruptive technology" in the mid- to long-term?

Often the term "disruptive technology" seems to have mostly negative connotations, perhaps due to the havoc such technology can sometimes create in an industry or institution that fails to recognize and adapt to change. Yet "disruptive technology" is generally a positive thing in the longer term and is accompanied by periods of exciting growth. Such periods of innovation and growth should be expected and encouraged, if our goal is for the U.S. economy and domestic productivity to continue to grow.

VLJ technology could have this kind of substantial positive economic impact and could emerge as a "disruptive technology," but the results may also create increased demand for ATC and airport services:

- By bringing personal and on-demand travel within the reach of the small business and middle class user, the VLJ may usher in a new paradigm of personal travel freedom and mobility. This could result in substantial, as yet unanticipated, increases in future travelers and NAS operations, with increased congestion in en route airspace;
- By providing a jet aircraft tailored to serve smaller airports and markets, the VLJ can broaden airport usage in the NAS to include many more currently under-served airports. This could mean increased demand for terminal services at those airports;
- By answering the need for personal and on-demand point-to-point air service, driven by user needs, the VLJ can enhance domestic productivity and economic activity, while linking smaller markets directly to the domestic and global economies. This could generate increased needs for VLJ cargo operations.
- By including a fully integrated aircraft and avionics platform, the VLJ can assume a leadership role in advancing the JPDO NGATS, by assuring that VLJs will be full and efficient participants in the NGATS of tomorrow.

All this new activity could add to the scope of the overall NAS congestion problem, which is largely focused on hub airports. A convergence with possible new terminal demand at VLJ airports, plus increased en route operations, could be the makings of an ATC "Perfect Storm" of gridlock.

The Solution—Demand Management or Capacity Enhancement

Regrettably, instead of concentrating our collective efforts on capacity enhancement and NGATS, there are those who favor demand management solutions. In particular, the idea of user fees or other surcharges for Regional Jets has re-emerged for VLJs. This is an unfortunate and distracting debate.

Demand management is a flawed concept that constrains innovation and economic activity, while distorting market forces. If a new era of personal travel options is possible, we should do everything possible to encourage the development of an NGATS in which traditional air carrier services can operate in harmony with personal air vehicles such as VLJs. We should not try to constrain or inhibit innovation by disincentives such as demand management.

Instead of wasting time considering ways to generate higher fees in support of current inefficient, antiquated systems, shouldn't we tackle the real problem? Isn't it time for the FAA, Congress, and industry to make jointly a full commitment to a Next Generation Air Traffic System?

Conclusion

Very Light Jet technology may represent the beginning of a new and exciting era of increased personal and on demand travel. If the business model succeeds, VLJ technology can broaden usage of the NAS and its under-served airports, and it can boost the economies of small to medium sized communities, which today may lack adequate point-to-point connections to domestic and global market places.

Such a potential revolution in personal travel can have significant beneficial effects on domestic productivity and economic growth, but "disruptive technologies" sometimes leave casualties in their wake, often because the institutions and industries affected either fail to recognize the paradigm shift or else refuse to deal with it.

Time is growing short. FAA, Congress, and industry should recommit to forging with all possible speed the partnership necessary to assure timely transformation of our antiquated air traffic management system into the scalable, network-enabled

system of systems required to satisfy tomorrow's demand, and in so doing assure continuing U.S. economic growth and opportunity.

Senator BURNS. We thank you.

And now we hear from Mr. Edward Iacobucci, President and Chief Executive Officer of DayJet Corporation, down in Delray, Florida. Thank you very much for coming.

STATEMENT OF EDWARD E. IACOBUCCI, PRESIDENT/CEO, DAYJET CORPORATION

Mr. IACOBUCCI. Thank you. Good morning, Chairman Burns, Senator Rockefeller, and other Members of the Committee. I want to thank you for the opportunity to testify here to you—with you today on the topic of VLJs, and specifically the work that my company has been doing in conjunction with the FAA, the JPDO, NASA, TSA, and our partners, Eclipse Aviation, over the past 3 years.

The mission of our company is to develop and deploy what we consider to be the world's first commercial—what we call "per-seat, on-demand" service, as opposed to air-taxi. It's a seat-oriented on-demand system. It's a regional air transportation system, and it's exclusively deployed between secondary markets, using community airports.

The Jet Age in the United States has delivered a very affordable transportation methodology. It's ushered in a broadbased economic opportunity, and it's done so by connecting major cities in the—over the past years. However, despite that, trips of 600 miles or less remain—have been, and remain, a frustrating experience and very inefficient for millions of travelers. According to DOT statistics, there were 29 percent fewer scheduled flights less than 500 miles in length in 2005 than in 2000—only a 5-year period, 29-percent reduction. While scheduled flights at small regional airports still exist, they dropped, for the same period, by over 17 percent. For many years—in fact, for decades—broadbased subsidies and programs have failed to bring self-supporting commercial air service to the secondary communities of our country. Even in the case where air flights were available, typically it involves multiple steps with long layovers, unpredictable layovers through a large hub, and it costs time and money, and, as a consequence, a lot of regional travelers have taken to driving. In fact, BTS travelers survey—here, let me make sure I quote it properly—is 136 million of the 192 million business trips identified in that survey in 2003 were spent driving to regional meetings 100 to 750 miles away.

As I said, our corporate mission is to make direct on-demand air transportation between secondary markets a commercial reality. Our passengers will enjoy safe and secure transportation to these markets and produce economic development opportunities at—in those markets.

For example, earlier this year, DayJet announced our first five locations. We've actually announced our southeast region as our first region; and the first five locations, within that region.

The VLJs themselves are going to enable new travel options and, to the cost point, allow us to aggregate passengers in ways that haven't been done before. Our marketing studies, focus groups, agent-based technology shows us that most of the travelers will

come off the highway. Our optimization systems show us that these services can be deployed at scale on a profitable basis.

We will connect smaller communities, metropolitan exurbs, and rural areas with point-to-point service, strictly point-to-point service. Our missions are all 100 to 600 miles. And seldom will we ever have to enter Class B airspace.

As was mentioned before, all our flights are between—somewhere between 18,000 and 30,000 feet, and we plan to deploy the Eclipse 500 using two-person crews. Despite the fact that we could do it with one, we're going to do it with two, as part of our business model.

The training is done in conjunction with Eclipse—work that we're doing with Eclipse, United Airlines. And the training is going to be done to standards that are well beyond the typical standard that you would see in FAR 135 operations.

As far as security goes, we will plan to implement the 12–5 rule. Again, even though the aircraft is only 5700 pounds, we will be putting in place all the rules that are in place today for 12,500-pound aircraft. Our pilots, maintenance personnel, will have 10-year background checks. Parking lots are going to be monitored—ramps, fence, passengers cleared through TSA lists and escorted to and from the airplanes.

I could talk quite a bit more about the work that we've been doing with the air traffic control and NASA, in terms of developing some of the new technologies within our network as we grow it. I'm going to run out of time, so that I'm—so that I'll leave that for the questions and answers. The topics have been covered.

But, in short, we believe that the network-enabled operations that we're developing view DayJet as a network of airplanes, not individual airplanes, that are all managed by a system. That innovation and the innovative business model will bring new business to communities, new transportation options, and ultimately economic growth.

Thank you so much.

[The prepared statement of Mr. Iacobucci follows:]

PREPARED STATEMENT OF EDWARD E. IACOBUCCI, PRESIDENT/CEO, DAYJET CORPORATION

Good morning Chairman Burns, Senator Rockefeller, and Members of the Subcommittee. Thank you for the opportunity to testify today on the topic of very light jets (VLJs) and the work we are doing together with the Federal Aviation Administration (FAA), the Joint Planning and Development Office (JPDO), National Aeronautics and Space Administration (NASA), Transportation Security Administration (TSA) and Eclipse Aviation to develop and deploy the world's first commercial "per seat—on demand" regional air transportation service between secondary communities using community airports.

In the United States the jet age has delivered safe, affordable transportation ushering in broad based economic opportunity by connecting major cities. Yet trips of 600 miles or less remain frustrating and inefficient for millions of travelers. According to the Department of Transportation (DOT) there were 29 percent fewer scheduled flights less than 500 miles in 2005 than in 2000, while scheduled flights at small regional airports dropped 17 percent during the same period. For decades, despite concerted effort, a variety of subsidies and programs have failed to bring broad-based, sustainable, self-supporting commercial air service to secondary communities and rural areas of the Nation. Even in the case where flights are available, multiple legs must be flown through a hub airport costing time and money. Often regional trips require a forced overnight stay due to flight scheduling. As a result, 136 million of the 192 million business trips identified in the 2003 BTS Business

Travelers Survey were spent driving endless hours to regional meetings 100 to 750 miles away.

DayJet's corporate mission is to make direct on-demand jet air transportation between secondary markets a commercial reality. DayJet passengers will enjoy affordable, safe and secure air transportation between these markets and our air transportation service will expand local economic development opportunities in the communities we serve. Earlier this year DayJet announced our initial service area in the southeastern region including Florida, Georgia, Alabama, Mississippi, North Carolina, South Carolina and Tennessee.

VLJs enable new travel options. DayJet's new "per seat, on-demand"* service lowers the cost for individual travelers traveling on a VLJ by aggregating other passengers on the aircraft (for a total of up to three (3) passengers per flight) even as we manage all of the factors of logistics and costs of providing the air service. Our marketing studies, focus groups and agent-based demand generation technology shows us that most of our travelers come off the highway. Our Advanced System Technology for Real Time Operations (ASTRO) makes it possible to establish a profitable business to serve customers with the highest levels of safety, security and a great customer experience.

DayJet will connect smaller communities, metropolitan exurbs and rural areas with a point-to-point service. With missions in the 100 to 600 statute mile range our short flights will avoid entering Class B air space. Instead we will fly in underutilized air space at flight levels typically in the 18,000 ft to 30,000 ft range. DayJet plans to fly our Eclipse 500 jets using a two-person crew meaning we will train and fly with two pilots. Our business plan supports this level of personnel. We will train our flight crews in a program that is similar to that of a traditional airline. Eclipse Aviation in cooperation with United Airlines will train our pilots using the most up-to-date methods and equipment including flight simulation. As a FAA FAR 135 certificated operator we choose to train our pilots and maintenance personnel at a level that goes above and beyond minimal requirements. We do the same when it comes to security.

DayJet will follow the TSA 12–5 rule for security, setting a higher standard for an aircraft in this weight class beyond today's TSA requirements. Our pilots and maintenance personnel will have 10 year background checks, our parking lots will be monitored, ramps will be fenced and all passengers will be escorted to and from our aircraft. While this is not required by TSA at this time and many community airports do not have security practices, at DayJet we believe security and safety must be nurtured and lived everyday. This is why our training, best practices and corporate culture are founded upon of safety, security and accountability.

DayJet's investments in next generation technology are a factor driving modernization of the National Air System (NAS). Working in partnership with the FAA over the past 3 years and leveraging technical research and development by NASA, we have identified key areas in which operational best practices combined with new technology will be implemented. These implementations on our aircraft and in our training, maximize safety and operational availability while minimizing our impact on workloads for air traffic control (ATC). Our investments in on-board technology and in training will allow DayJet to use new Required Navigation Performance (RNP) routes and Wide Area Augmentation System (WAAS) lateral precision vertical (LPV) approaches. We will equip our fleet with Automatic Dependent Surveillance Broadcast (ADS–DB) transponders allowing for much improved ground-based surveillance. As "ADS–B in" capability becomes available, we expect to reap the benefits of reduced minimum separations and much improved situational awareness. These innovations result in lower costs for all parties while enhancing safety through greater flight precision in the utilization of air space and in a greater variety of weather—all meaningful near term advantages of modernization.

In the longer term our active participation on the JPDO's Agile Airspace Integrated Product Team (Agile IPT) provides an appropriate dialogue mechanism for technical input and the sharing of information for future planning purposes. As a business person with an in-depth understanding of digital technology, who played a role in shaping the information networked age over the past two decades, I believe that the JPDO's development of the Concept of Operations and the Enterprise Architecture working toward Network-Enabled Operations (NEO) is essential to realize the vision of a scaleable network-centric automated NAS model.

Innovation comes from setting standards and encouraging entrepreneurs to invest in the realization and commercialization of the vision. We saw this in the application of digital technology in telecommunications, the Internet and Hi-Definition

*The report "*Per Seat, On-Demand Jet Services—How to Keep Air Transportation Moving at the Speed of Business*" has been retained in Committee files.

broadcasting. Many innovations come from small companies and start-ups with new approaches and ideas. In aviation we need to foster similar innovation by encouraging new entrants while accommodating an evolutionary pathway for legacy stakeholders in their move to modernize.

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

Senator BURNS. Thank you very much for your testimony.

We have Mr. Jack Pelton here now, Chief Executive Officer, Cessna Aircraft Company, from Sedgwick County, Kansas.

STATEMENT OF JACK J. PELTON, CHAIRMAN, GENERAL AVIATION MANUFACTURERS ASSOCIATION; CHAIRMAN, PRESIDENT, AND CHIEF EXECUTIVE OFFICER, CESSNA AIRCRAFT COMPANY

Mr. PELTON. Chairman Burns, Senator Lautenberg, and Members of the Subcommittee, my name is Jack Pelton. I join you this morning in a dual capacity of Chairman of the General Aviation Manufacturers Association, or GAMA, and as Chairman, President, and Chief Executive Officer of Cessna Aircraft Company. Thank you for the invitation to join you and offer testimony on the development of what has become known to be called very light jets, or VLJs.

Mr. Chairman, I would like to ask that my full statement be included in the—for the record.

Senator BURNS. Without objection, it sure will. And all of your—all of the statements will be included.

Mr. PELTON. Since its founding in 1927, Cessna has introduced, participated in, or witnessed firsthand every major innovation in aviation. From radials to pistons to jets, Cessna built half of the airplanes in the world today and trained the majority of the world's pilots. It's with that background that I join you today to address the development of VLJs.

The introduction of "very light jets," a term that was defined by the industry as jet-powered aircraft with a maximum takeoff weight of 10,000 pounds or less, is merely another step in the evolutionary cycle of general aviation, or GA, aircraft development. Although the significance of the arrival of the VLJs will be best assessed after several years of experience, this is an exciting time for the general aviation community.

I believe that soon the traveling public will also realize how VLJs can fulfill an unmet need for air transportation.

Mr. Chairman, in recent months, some have expressed concern regarding the effects of the introduction of VLJs on the National Airspace System. Although I do see VLJs as an exciting expansion of the GA market, there are at least five specific reasons why I strongly disagree with some of the opinions that I've heard.

First, very light jets will not darken the skies. Based on the forecasts made in the development of Cessna's own entry into this sector, the Citation Mustang, fears of traffic congestion are unfounded and unwarranted. Cessna's been manufacturing jets since 1971. Today, our Citation fleet is the largest business jet fleet in the world, numbering around 4,500 aircraft, and it took us 35 years to put those jets into our customers' hands. Based on my experience, I believe general aviation will see steady and linear, not exponential, growth. Cessna believes that the VLJ market will develop

like every other turbine-powered GA aircraft, in an evolutionary, rather than revolutionary, way.

Second, VLJs will not place an undue burden on the Nation's air traffic control system. Concerns about integrating VLJ operation with other aircraft flying in the National Airspace System have been greatly exaggerated. Currently, the air traffic control system accommodates a variety of airplane types, each with a different speed and performance capability. VLJs will operate within the speed envelop of a broad spectrum of aircraft that are operated today by the airline fleet, and will be able to coexist with these aircraft.

Third, VLJs will not increase congestion at the Nation's busiest airports. At the Operational Evolution Plan, 35 airports comprised mainly of airline hubs and where a majority of the FAA expenditures are made, GA currently accounts for less than 6 percent of the total operations. We have no reason to believe that GA's usage of these airports will change with the introduction of VLJs. In fact, VLJ operators have a powerful incentive to avoid the traffic congestion and delays found at these airline-dominated airports. In short, Cessna sees the introduction of VLJs at a rate that will permit them to be transparently and smoothly absorbed into the system.

Fourth, VLJ pilots will be trained to the same standards as commercial pilots. To obtain a type rating in a very light jet, a pilot will have to go through FAA-approved training, the same that's mandated for today's air-carrier and corporate pilots. Manufacturers have selected their training partners, United Airlines and FlightSafety, both worldwide leaders in pilot training recognized for their leadership and safety. These pilots, who will operate in the very light jet operations or on-demand charter, will also meet the training, testing, and currency standards specified and overseen by the FAA. These type-rating requirements and proficiency standards have been established to ensure competent pilots operate airplanes in private and commercial operations.

Fifth, VLJ operations will pay taxes into the Airport and Airways Trust Fund in the same manner as all other aircraft operators, based on the operation.

Mr. Chairman, the introduction of very light jets into the market is an exciting time for general aviation. The General Aviation Manufacturers Association, Cessna, and all of our industry partners look forward to working with you and your colleagues to ensure seamless integration of the VLJ into the United States aircraft fleet.

Thank you, again, for the opportunity to testify before you this morning, and I look forward to your questions.

[The prepared statement of Mr. Pelton follows:]

PREPARED STATEMENT OF JACK J. PELTON, CHAIRMAN, GENERAL AVIATION MANUFACTURERS ASSOCIATION; CHAIRMAN, PRESIDENT, AND CHIEF EXECUTIVE OFFICER, CESSNA AIRCRAFT COMPANY

Chairman Burns, Senator Rockefeller and Members of the Subcommittee, my name is Jack Pelton and I join you this morning in the dual capacity of Chairman of the General Aviation Manufacturers Association (GAMA) and as Chairman, President and Chief Executive Officer of Cessna Aircraft Company. I am pleased to appear before you to discuss the unique and growing contribution general aviation (GA) makes to our Nation's economy and air transportation system. At large, me-

dium and small sized airports across the country, general aviation operations supplement and complement the air transportation services provided by our partners in air transportation—scheduled airlines. Without general aviation services, thousands of communities, especially those in remote or rural areas, could not realize the economic benefits of air transportation.

General Aviation Development

Not many years ago, the existence of general aviation was in doubt. If the value of GA had not been recognized, its role in the current air transportation system would have been significantly diminished. If we had failed to act then, the traveling public would be suffering now. This Subcommittee played a significant role in resolving those threats, so I would like to take this opportunity to update the Subcommittee on the many positive outcomes of your past actions. I believe they also provide a conceptual framework for resolving some of the issues we are discussing today.

In 1994, recognizing the unique and essential contribution GA makes to the Nation's air transportation system, Congress enacted the General Aviation Revitalization Act (GARA). GARA instituted a Federal, 18-year statute of repose for general aviation products, removing an impediment that had caused some to conclude that the GA industry was "dead." Subsequent to GARA's enactment, the number of frivolous lawsuits filed against GA manufacturers dropped dramatically.

During the GARA debates, the General Aviation Manufacturers Association (GAMA) predicted that if the legislation was enacted, former GA airplane manufacturers would return to the market, new manufactures would emerge and advanced GA products would once again be widely available. The public, especially small communities, would benefit from an improved margin of safety, enhanced economic growth and a more effective air transportation system. I am pleased to note that the public benefits predicted by GAMA in 1994 have more than materialized and there are still more to come.

The growing demand for general aviation airplanes reflects the increased need for air transportation, which is driven by a growing economy. No single segment of aviation can fulfill this country's transportation needs. Major airlines serve only 150 U.S. airports, regional airlines serve an additional 300, while general aviation is still the only means of air transportation at more than 5,000 public-use airports and thousands of private-use airports. It's easy to understand why the economic benefits from general aviation are significant.

A recent economic study by some of the country's most knowledgeable transportation economists quantified the economic value of general aviation to the national economy, as well as each state. GA contributes more than $150 billion to U.S. economic output, and directly or indirectly, employs more than 1,265,000 people whose collective earnings exceed $53 billion. I have attached a state-by-state summary of this analysis to my statement and the entire study is available on GAMA's website (*www.gama.aero*).

General Aviation Safety

While economic benefits are very important, our highest priority is improving GA's margin of safety. Recent FAA statistics indicate that, at the current rate, the number of fatal general aviation accidents will hit an all-time low in 2006.

Safety improvements have been enabled by four main factors:

- Development of innovative designs and production processes for airplanes, engines, avionics and other components, thereby enhancing the reliability, performance and efficiency of GA operations.
- Development of affordable avionics with advanced capabilities, sized for installation in even the smallest GA airplane, thereby allowing every type of GA airplane to fully benefit from available communication, navigation and surveillance services, and to interface seamlessly into the air traffic control system.
- Introduction of integrated, digital cockpits and electronic displays, thereby improving a pilot's situational awareness while reducing human error.
- Introduction of more effective and efficient training curricula for both pilots and maintenance technicians, and growing use of advanced-technology training simulators and devices for pilot training.

The integrated, digital cockpits available on GA airplanes today rival any equipment installed on commercial airliners. GA manufacturers and pilots recognized the safety benefits of this technology so quickly that "all-glass" cockpits are now standard equipment on almost all new GA airplanes capable of flying under instrument flight rules (IFR).

Very Light Jets

The introduction of very light jets (VLJs), a term defined by industry as jet powered aircraft with a maximum take off weight of 10,000 pounds or less, is merely another step in the evolutionary cycle of GA aircraft development. Although the significance of the arrival of VLJs will be best assessed after several years of experience, this is an exciting time for the general aviation community. I believe that soon, the traveling public will also fully realize how VLJs can fulfill an unmet need for air transportation.

As airplanes enter service, GAMA will continue to be a strong advocate for GA safety risk management. GAMA will work closely with current and future manufacturers, operators, training providers, aviation advocacy groups, and appropriate representatives from the FAA, including the Air Traffic Organization, to ensure the safe operation of very light jets. Our purpose will be to help collect, assimilate and distribute any reported incidents or other occurrences related to the continued airworthiness and operation of VLJs. In line with FAA's work on safety risk management to proactively manage the safe operation of all airplanes in the NAS, the data available about very light jet operations will exceed that of any previous airplane type. This will help us ensure safe operation, and enable us to make real time modifications to training programs and target operator oversight from the FAA.

The Future and Impact of Very Light Jets

In recent months some have expressed concern regarding the effects of the introduction of VLJs on the National Airspace System. Although I do see VLJs as an exciting expansion of the GA market, there are a number of reasons why I strongly disagree with some of the opinions I have heard.

VLJs Will Not "Darken the Skies"

Based on the forecasts made in the development of Cessna's own entry into this sector, the Citation Mustang, fears of traffic congestion are unfounded and unwarranted.

Cessna has been manufacturing jets since 1971. Today, our Citation fleet is the largest business-jet fleet in the world, numbering around 4,500 aircraft and it took us 35 years to put those jets into our customers' hands. Based on this experience, I believe general aviation will see steady and linear, not exponential, growth.

Cessna believes that the VLJ market will develop like that of every other turbine powered GA aircraft, in an evolutionary, rather than revolutionary way.

VLJs Will Not Place an Undue Burden on the Air Traffic Control System

VLJ operations will not place an undue burden on the air traffic control system today or in the future. In addition, VLJ operations will not increase operational delays for other operators.

Concerns about integrating VLJ operations with other aircraft flying in the National Airspace System (NAS) have been greatly exaggerated. Currently, the air traffic control system accommodates a variety of airplane types, each with different speed and performance capabilities. VLJs, which operate within the speed envelopes of the broad spectrum of aircraft operated by the airline fleet, will be able to coexist with these aircraft.

FAA Administrator Marion Blakey apparently agrees. In a July 28, 2006 feature on very light jets, following the provisional certification of the Eclipse 500, the Administrator told NBC Nightly News, "I think the people who are anticipating congestion problems way up at high altitudes are probably anticipating a problem that we don't necessarily expect to have."

VLJs Will Not Increase Congestion at Operational Evolution Plan Airports

At the Operational Evolution Plan (OEP) 35 airports, comprised mainly of airline hubs and where a majority of FAA expenditures are made, GA currently accounts for less than 6 percent of total operations. We have no reason to believe that GA's usage of these airports will change with the introduction of the VLJ. In fact, VLJ operators have a powerful incentive to avoid the traffic congestion and delays found at these airports, and they will have several ways to do so. The flexible nature of a GA operation, and the operational characteristics of a VLJ, make it relatively easy for operators to avoid congestion and delay.

VLJs can fly fuel-efficient profiles using altitudes both above and below those typically used by airlines. Unlike larger aircraft, the operating costs for VLJs will not significantly increase when the aircraft is flown at less-than-optimum altitudes. Also, unlike scheduled operations, the departure time for a VLJ operation can be easily adjusted to accommodate current congestion in the ATC system, or current weather conditions.

VLJ Operators Will Pay Their Fair Share

VLJ operators will pay into the Airport and Airways Trust Fund (AATF) in the same way as all other aircraft operators, based on the operation.

VLJs Will Provide Service to Many Underutilized and Neglected Markets

Due to their unique operating characteristics, VLJs will be able to provide commercial service to communities currently ignored by the airlines. Today, most GA operations occur at airports with excess capacity. It is preposterous to think that VLJ operators will not follow suit, as doing so would alleviate the primary benefit of owning and operating your own personal airplane: time savings and flexibility.

VLJ Pilots Will be Trained to Standards Applicable to Commercial Pilots

To obtain a type rating in a very light jet, a pilot will have to go through FAA approved training, the same as that mandated for today's air carrier and corporate pilots. Manufacturers have selected their training providers—United Airlines and FlightSafety International—both worldwide leaders in pilot training, recognized for their leadership in safety. Those pilots who will operate a very light jet for commercial purposes, such as an air taxi operation or on-demand charter, will also meet the training, testing, and currency standards specified and overseen by the FAA's principal operations inspectors and at the discretion of the FAA Administrator. These type rating requirements and proficiency standards have been established to ensure competent pilots operate airplanes in both private and commercial operations.

The Delivery of VLJs to Market Will Take Place Over Time

There is simply no large parking lot full of VLJs poised to soar into America's skies in the coming days and weeks. In fact, as we speak, there are less than two dozen VLJs flying (including prototypes). Regardless of consumer demand for these aircraft, it will take significant time for industry to produce, flight test and deliver aircraft to customers.

Summary

The development and introduction of VLJs should be lauded as a significant technical achievement by U.S. manufacturers. GA makes a unique contribution to the air transportation system and generates significant benefits to the U.S. economy. The introduction of new technology, such as the VLJ, further expands and enhances GA's contribution to the air transportation system.

GA operators and manufacturers continue to give safety the highest priority. Advanced technologies are an essential precursor to innovative airplane designs. Innovative designs enhance the margin of safety and efficiency of GA operations.

VLJs will operate under the same pilot training standards required for all U.S. jet pilots.

Based on the most likely estimate of VLJs to be delivered in the next 10 years, for the foreseeable future VLJ operations will not contribute to air traffic delays suffered by airlines. Most GA airplane operators, including those that will operate VLJs, will continue to avoid congested airspace and airports in order to make their movements as quick and efficient as possible.

The VLJ's impact on both the National Airspace System and the GA market has been greatly exaggerated on a number of fronts. The VLJ will develop in a similar fashion to other general aviation aircraft, as a tide, rather than tidal wave.

VLJ operators will pay their fair share for use of the NAS through a combination of ticket and fuel taxes.

APPENDIX B

Summary of Results

Table B1—State Impacts—Total value and per capita, 2005

State	($ millions)	Per Capita	State	($ millions)	Per Capita
Alabama	$1,703	$370	Montana	$260	$259
Alaska	$400	$571	Nebraska	$721	$409
Arizona	$2,766	$529	Nevada	$962	$465
Arkansas	$1,033	$376	New Hampshire	$639	$499
California	$18,202	$529	New Jersey	$4,351	$518
Colorado	$2,141	$479	New Mexico	$761	$378
Connecticut	$2,409	$726	New York	$9,267	$508
Delaware	$577	$722	North Carolina	$4,140	$503
District of Columbia	$483	$914	North Dakota	$218	$322
Florida	$7,520	$462	Ohio	$5,462	$478
Georgia	$8,751	$1,040	Oklahoma	$1,215	$348
Hawaii	$412	$307	Oregon	$1,832	$507
Idaho	$581	$393	Pennsylvania	$6,009	$489
Illinois	$6,040	$492	Rhode Island	$465	$460
Indiana	$3,352	$539	South Carolina	$1,606	$398
Iowa	$1,413	$481	South Dakota	$303	$374
Kansas	$7,072	$2,561	Tennessee	$2,571	$431
Kentucky	$1,746	$426	Texas	$11,237	$523
Louisiana	$2,059	$454	Utah	$912	$378
Maine	$521	$405	Vermont	$274	$430
Maryland	$2,085	$381	Virginia	$3,333	$455
Massachusetts	$4,046	$641	Washington	$3,186	$509
Michigan	$4,138	$424	West Virginia	$616	$333
Minnesota	$2,976	$595	Wisconsin	$3,523	$643
Mississippi	$860	$296	Wyoming	$353	$621
Missouri	$2,498	$437			

Senator BURNS. Thank you, Mr. Pelton. We appreciate that very much.

Mr. Andersson?

STATEMENT OF MATTHEW G. ANDERSSON, SENIOR AVIATION CONSULTANT, AEROSPACE, DEFENSE, AND TRANSPORTATION, CRA INTERNATIONAL, INC.

Mr. ANDERSSON. Members of the Senate Aviation Subcommittee, my comments here——

Senator BURNS. Am I pronouncing that right, or do you have another pronunciation when you put to "s's" in it?

Mr. ANDERSSON. No, it's just that that's the Swedish variety.

Senator BURNS. OK.

[Laughter.]

Senator BURNS. You Svedes. OK.

[Laughter.]

Senator BURNS. Ja, sure.

[Laughter.]

Mr. ANDERSSON. Members of the Senate Aviation Subcommittee, my comments here, as well as my purpose today in answering your questions, are necessarily limited to VLJ economic, business, and policy issues and their implications for the NAS. Of course, I welcome any questions you may have on broader civil aviation development, and will endeavor to respond to the best of my abilities.

My background, briefly, includes more than 25 years of private and commercial aviation management experience, including over 10,000 hours as an airline transport pilot. I was the founder and CEO of Indigo Airlines, an American Express Corporation-backed venture, and currently serve as a senior aviation consultant to CRA International, or Charles River Associates, a leading provider of

economic, financial, business, legal, and regulatory consulting, recently ranked by Forbes as one of the top 100 fastest-growing service firms. Founded and in business continuously since 1965, with over a thousand specialists around the globe, serving Fortune 500, government, and new businesses across more than 12 sectors, including aerospace, defense, and transportation, our firm is known worldwide for its innovations and expertise in travel analysis and forecasting.

My objectives here today in this particular forum are not to provide an oral defense, per se, of the economic impact study, but to help explain some of the features of the results, and to translate these into real-world examples, including their merit as indicators of industrial market development.

As for the report's accuracy, only one thing is certain: it will be wrong. All forecasts are. But getting it right also means what "right" means. This can range from the right numbers to the right market and industry direction to the right trend, the right reality.

For some descriptive comparison of previously unexpected developments in air travel, consider, among others, the growth of shared or so-called fractional jet services. In 1985, this industry didn't exist; today, one company alone is considered a top-ten airline, with a fleet that rivals the world's largest. In 2005, the private jet industry was the recipient of over $10 billion in new business; the consumers diverted from traditional airline service. Why? This is how consumers, your constituents, increasingly want to travel regionally.

Allow me to preface the remarks concerning NAS management with an underlying position. The current debate or contest between the airline industry and general aviation and the private-jet sector is unproductive and unnecessary. Far from a nuisance, the VLJ industry will represent a family of worker bees pollinating their environment and experts at making honey. And traditional airlines will continue to work toward improving their products and services, and mass public transportation will continue to be a central critical backbone of our Nation's economy. Both air networks will share a need for increasingly intelligent ATC capabilities and financing, such that these advances in benefits can be operationalized.

Airlines and GA need not fight an antagonistic battle. Working together on strengthening our aviation industry, in all its forms, along with a—along with driving forward breakthroughs in technology, material science, propulsion, and processing, will only best serve the American public, American business, and America's future.

NAS ramifications are, in my view, straightforward and clear. There's no shortage of airspace. VLJs will not constrain airspace. Business jets will not compromise airline operations. VLJs will productivize dormant aviation assets. Intelligent ATC will revolutionalize density assumptions. NGATS must be funded, regardless of the slope of UAV and VLJ growth curves, because NGATS is really a recapitalization issue.

As for new aircraft in the NAS, the topic of today's hearing, it is helpful to consider that long before the concept of an airline was introduced, aviation was born from individual aspiration, with individuals operating small private aircraft for personal and business

purposes. And right alongside the introduction of the very first passenger jets were also the very first business jets, including the Sabre, JetStar, Learjet, Falcon, Gulfstream, Cessna, and now the VLJ, a natural development from a long series of built-to-purpose aircraft.

Relatedly, it is important to maintain context over relative representation of airline and GA aircraft in the NAS. Airline capacity, operational intensity, and inventory levels vary based on several competitive issues and can often represent significant excess levels over demand. A generally held view is that airline capacity is still excessive, some believe as much as 30 percent. Moreover, our deregulation regime supports nearly constant entry of new carriers, and "Open Skies" will invite yet more capacity. GA business, jet or air-taxi flight operations, on the other hand, do not compete, per se, for market share through blind inventory creation. They fulfill actual demand in regional catchment areas; indeed, they are demand-pulled, rather than supply pushed, and may represent an inherent efficient equilibrium. Further, VLJ production levels and air taxi operations, among others, will generally reflect actual consumer demand. Aircraft and seat inventory will not spoil on a daily basis, like traditional airline inventory. VLJs and VLJ services will be mass-customized rather than mass-supplied.

Implied economic impact, jobs, and earnings from our recent study are, indeed, meaningful. It indicates to me that we could witness not merely a new segment of civil aviation, but a whole new industry, one based on the powerful effects of decreasing product and service cost and its ability to make individual jet transportation available to the broader public. Moreover, the indications of work productivity achievable from such travel tools and services are serious, millions of precious travel hours worth billions of dollars saved every year, ones that can be reinvested back in our economy.

Please keep in mind, however, that these initial estimations of future production impact are, in the context of other current forms of transportation, are still modest. Indeed, it is my view that the study is conservative in its conclusions, but literal in its implications: that the democratization of personal air travel may be upon us; and, if so, the future of urban and short-distance air travel will be very much different from the one we know today.

Regardless of your acceptance or rejection of this view, one thing is certain, individuals will continue to gain increasing control over their air mobility, as we have witnessed over communication and computing tools. We can argue over forecasts. What we cannot deny, however, is inexorable fact, technology, in all its forms, gets smaller, better, cheaper, faster, smarter, and more broadly diffused across the marketplace.

Allow me to conclude with what I believe to be a key message. The topic under our consideration is not just important, it is of vital national significance. Air travel is a young industry. Only 50 years ago, the first jet aircraft was introduced into commercial service. The aviation industry is capable of developing in ways just as dramatic as it did when we went from the Wright Flyer to the first passenger jet. More so, in fact. It will be led by U.S. aviation

entrepreneurship while advancing and building on aviation know-how.

No one rivals the U.S. in aviation. India may have call centers; China, low-tech manufacturing; the Middle East, oil; and Japan, its auto industry. But the U.S. owns aerospace. It is critical that all of us do not unintentionally neglect or short sell U.S. aviation dominance expertise with the future of this industry.

I urge you to join forces with the Nation's entrepreneurs and professionals, some of whom are here today, to make certain that we succeed. As American technology pioneer Alan Kay said, "The best way to predict the future is to invent it." This Nation's aviation future is too important and promising to leave to chance.

Thank you, and I look forward to your questions.

[The prepared statement of Mr. Andersson follows:]

PREPARED STATEMENT OF MATTHEW G. ANDERSSON, SENIOR AVIATION CONSULTANT, AEROSPACE, DEFENSE, AND TRANSPORTATION, CRA INTERNATIONAL, INC.

Introduction

Members of the Senate Aviation Subcommittee, I appreciate this opportunity and am pleased to testify this morning on a very important topic.

My comments here, as well as my purpose today in answering your questions are necessarily limited to VLJ economic, business and policy issues and their implications for the NAS, ATC modernization and FAA reauthorization. I am an exclusive senior consultant to CRA, not an employee; some views may be strictly my own professional ones.

Of course I welcome any inquiries you may have on broader civil aviation development, and will endeavor to respond to the best of my abilities.

Background

My relevant background briefly, includes more than 25 years of private and commercial aviation management experience, including over 10,000 hours as an Airline Transport Pilot. I come from an aviation family. My father, Lee, was a Navy veteran and Eastern Airlines Captain. My mother, Bobbi, was a Colonial Airlines DC–3 "stewardess." I leaned to fly at age 11 in a Piper Cub on a grass field in Connecticut, and graduated from Embry Riddle Aeronautical University at age 19. I received a B.A. degree and studied economics with W.W. Rostow at the Johnson School of Public Policy at the University of Texas at Austin and received an MBA in economics from the University of Chicago. I was the Founder and CEO of Indigo Airlines, an American Express Corporation backed venture and currently serve as a Senior Aviation Consultant to CRA International (Charles River Associates) a leading provider of economic, financial, business, legal and regulatory consulting, recently ranked by Forbes among the top 100 fastest growing service firms, founded and in business continuously since 1965 with over 1,000 specialists around the globe serving Fortune 500, government and new businesses across more than 12 sectors including aerospace, defense and transportation. Our firm is comprised primarily of Ph.D. level economists, engineers and other specialists and is known worldwide for its innovations and expertise in travel analysis and forecasting.

Overview of VLJ EI Analysis

The VLJ economic impact study that you have been supplied with and that our firm produced was commissioned by Eclipse Aviation and is part of a growing body of formal analysis directed at producing a sharper understanding of this important new transportation initiative.

My objectives here today in this particular forum are not to provide an oral defense per se of the study but to help explain some of the features of the results, and to translate these into real world examples, including their merit as indicators of industrial and market development, such that the Nation's aviation infrastructure is contemplated in light of demands on system modernization and processing capacity, consumer/constituent benefits—and of course, ATC funding.

The EI study concludes that a range of VLJ production is reasonable and provides from a base-case and higher production scenario, likely economic impacts organized as user, direct, indirect and induced. There is not a probability weighting across the scenarios but a sensitivity to variance addressed through production variation.

Moreover, it is important to understand that our focus was on EI, given certain assumptions of VLJ production. We are currently conducting a much more formalized and comprehensive unit forecasting analysis.

As for the reports accuracy, only one thing is certain: it will be wrong. All forecasts are. But getting it "right" also means what "right" means. This can range from the right numbers, to the right market and industry direction, the right trend, to the right reality, the right view of the world. And for some descriptive comparison of previously unexpected developments in air travel, consider, among others, the growth of shared or so-called fractional jet services. In 1985 this industry didn't exist. Today, one company alone is considered a "top-ten" airline with a fleet as large as the world's largest airline, and as an industry continues to attract record numbers of consumers. In 2005, the private jet industry was the recipient of over $10 Billion in new business that consumers diverted from traditional airline service. Why? This is how consumers—your constituents—increasingly want to travel.

Competitive Airspace Considerations

Allow me to preface some remarks concerning NAS management with an underlying position: the current debate (contest) between the airline industry and the general aviation/private jet sector is an ill-founded one; it is unproductive, distracting and unnecessary. Various sound bites including "a blip is a blip;" "mosquito fleet" or "Pterodactyl airlines" are not helpful and needlessly antagonistic. Most importantly they are not accurate. Consider for example, the airline industry. Their position may not even be relevant to today's topic. Airlines are concerned right now especially, not so much with the future, but with survival. Airlines are subject to a legacy regulatory system that is central to their struggles. The "Hill" is merely another platform for cost divestiture in the absence of a comprehensive, supportive regulatory and policy regime. As for the notion of a "mosquito fleet," I prefer a smart team of peregrine falcons, of fast swallows, or a VLJ family of "worker bees," pollinating their environment and experts at making honey.

Relatedly, the consternation over so-called user fees may be misplaced. The FAA broadly, is in my view a public good that will be publicly financed, with targeted private participation. User fees may serve as a proxy for private sector financing preconditions. Then again, they may not. And future infrastructure finance requirements likely in high excess of both funding levels and funding duration stemming from this limited component. And of course the source of funding is fungible and always the same: the consumer. Whether various income, sales, estate, transaction or ticket tax receipts; user fees passed through to the consumer; or private equity investing pension funds, the consumer pays. We can vary the descriptor but the subject remains unchanged. As for "new aircraft in the NAS" it may be helpful to consider that long before the concept of an airline was introduced, aviation was born from individual aspiration; of individuals operating small, private aircraft for personal and business purposes. And right alongside the introduction of the very first passenger jets were also the very first business jets; including the Sabre, Jetstar, Lear Jet, Falcon, Gulfstream (in civil and military use) and now the VLJ: a natural development from a long series of built-to-purpose aircraft.

UAVs in the NAS

Concerning UAVs, I limit my response to the following issue: detection. UAVs must possess 4-Pi steradian or full spherical coverage to operate safely outside restricted airspace in the NAS. UAVs must posses a sensor capable of fulfilling the FAA's "sense and avoid" requirement and this must be applied across the full range of UAV types, from large winged loiter craft to small tactical UAVs that may require a ultra-wide-band (UWB) capability for high range-resolution across microstrip patch-array antennas directed at object avoidance (power lines, telephone poles, buildings, towers, trees, etc). I direct your attention to Mr. William Cotton, President, Flight Safety Technologies, Inc. for further elaboration and possible expert testimony on this subject.

Position on New Aircraft Vis-à-Vis the U.S. Aviation System

NAS ramifications are in my view, straight forward and clear:

1. There is no shortage of airspace.
2. VLJs will not constrain airspace.
3. Personal jets will not compromise airline operations.
4. VLJs will productivize dormant aviation assets.
5. Intelligent ATC will revolutionize density assumptions.
6. NGATS must be funded regardless of the slope of UAV and VLJ growth curves (NGATS is really a recap issue).

Indeed, not unlike automotive development, there are various sports cars, family cars, SUVs, motorcycles, campers, LTL and LH trucks and many other forms of surface vehicles and multimodal interaction that all rather peacefully coexist, if not mutually reinforce each other (and one could compare telecommunication networks similarly, from copper, fiber, ISDN, cable, satellite, PCS, cellular, radio, VoIP) as airspace will becomes "digitized."

Finally, implied EI, jobs and earnings from our recent study are indeed meaningful. It indicates to me that we could witness not merely a new segment of civil aviation, but a whole new industry, one based on the powerful effects of decreasing product and service cost and its ability to make individual jet transportation available to the broader public. Moreover, the indications of work productivity achievable from such travel tools and services are serious: millions of precious travel hours saved every year, ones that can be "reinvested" back in our economy.

Please keep in mind, however, that these initial estimations of future production and impact are, in the context of other current forms of transportation, still modest. Indeed, it is my view that the study is conservative in its conclusions but liberal in its implications: that the "democratization" of personal air travel may be upon us, and if so, the future of urban and short-distance air travel will be very much different than the one we know today.

Regardless of your acceptance or rejection of this view, one thing is certain: individuals will continue to gain increasing control over their air mobility, as we have witnessed over communication and computing tools. As Steve Forbes insightfully stated over a decade ago, "Small jets are starting to do to the airline industry what PCs did to mainframe computing; minimills did to steel; cellular is doing to telephony; mutual funds are starting to do to centrally managed corporate and government pension plans and eventually will do to Social Security; and what coming minigenerators will do to massive power plants—give customers more service, more flexibility, more control at less cost, as well as generate new products and services. Its about power moving away from the machine-age center toward individuals of the microchip era."

Moreover, traditional airlines will continue to work toward improving their products and services and mass public transportation will continue to be a central, critical backbone of our Nation's economy. Both air networks will share a need for increasingly "intelligent" ATC capabilities (and financing) such that these advances and benefits can be operationalized. Airlines and GA need not fight an antagonistic battle. Working together on strengthening our aviation industry—in all its forms—along with driving forward breakthroughs in technology, material science, propulsion and processing, will only best serve the American public, American business, and American government.

Conclusion

Allow me to conclude with what I believe to be a key message: the topic under our consideration is not just important, it is of vital National significance.

Air travel is a young industry. Only 50 years ago the first jet aircraft was introduced into commercial service. The impact on communication, economic development and business productivity has been profound. But perhaps we have lost our perspective as well as our ambition: in all the confusion and turmoil of aviation dramas we may easily lose sight of the real goal; it isn't just commercial survival, but continuous modernization, fundamental scientific advancement and technical and service progress. The aviation industry is capable of developing in ways just as dramatic as it did when we went from the Wright Flyer to the first passenger jet. More so, in fact. It will be lead by U.S. aviation entrepreneurship while advancing and building on U.S. aviation know-how.

But rather than fixating on what one airline's quarterly financial results were, we should ask first where America's future is; what the next generation of flight will look like, and what it will take to get there. Some of that future is testifying today. In addition to VLJs and personal air mobility services such as air taxi, we should be engaged in a flurry of inventive activity that brings us new, quiet supersonic aircraft, new blended wing designs, new forms of propulsion and material science, entirely new ways of processing a flight from take-off to touch-down, and especially, new kinds of thinking.

The airline industry is capable of developing in ways just as dramatic as it did when we went from the Wright Flyer to the first passenger jet. More so, in fact. But first we're going to have to get our economics right. And that also means crafting a U.S. national airline policy.

Most observers often forget just how big and how important the overall U.S. market is to the rest of the world. America's GDP is over $11 Trillion; Japan is a very distant second of $4.5 Trillion while Germany and France around $2T each. The

GDP of California alone is larger than Spain, Italy and even Russia; over twice the size of Australian GDP and together with several other states including Texas, larger than all of China. If the U.S. grew 10 percent in 1 year it would produce another "Canada." America's aviation markets are no less dramatic. More passengers fly more often on more aircraft to more places than in any other country. Our aerospace, defense, commercial and space programs lead the world. No one rivals the U.S. in aviation. India may have call centers, China low tech manufacturing, the Middle East oil and Japan its auto industry, but the U.S. owns aerospace.

It is critical that all of us do not unintentionally neglect or short sell, U.S. aviation dominance, U.S. aviation expertise or the potential and future of the U.S. aviation industry.

America's aviation system can't meet all of its challenges alone. Industry can't carry all the load. But neither can government. Until we raise aviation's modernization requirements to a national policy level of importance, can we expect the private sector and government to be able to join forces coherently and reliably around a comprehensive modernization objective, and then actually realize it.

The late President Ronald Reagan said that everyone American is a shareholder in government; so for my 1/300 Millionth equity share, I urge you to join forces with the Nation's entrepreneurs and aviation professionals, some of whom are here today, to make certain, that we succeed. As American technology pioneer Alan Kay said, "The best way to predict the future, is to invent it." Captain Picard might say "Make it so." Nike would say, "Just do it."

I say, this Nation's aviation future is too important and promising to leave to chance.

Thank you and I look forward to your questions.

Senator BURNS. Thank you very much.

I was interested in your assumption that—the important part or your testimony said, "No matter what we do, we'll probably be wrong." I can remember sitting at this dais whenever we did the telecom bill in 1996, when we tried to predict the use of cell phones by the year 2000.

[Laughter.]

Senator BURNS. How far could we be wrong? And I will tell you, I'm not a very good forecaster, because the first cell phone that I looked at, I said, "Who in the world would ever own one of those? We still have pay phones, don't we?" And——

[Laughter.]

Senator BURNS.—I think I said the same dumb thing about facsimile machines, also.

[Laughter.]

Senator BURNS. But, nonetheless, I appreciate your testimony.

Mr. Raburn, your testimony, you state that the most promising market for the Eclipse 500 is the new air taxi industry. In fact, the largest percentage of your orders will be for those designed for that market. Some are skeptical of that growth. That already is an existing market. Why are you confident that the air taxi market will continue to grow with the introduction of the lighter jets?

Mr. RABURN. Well, just to follow onto your comments, Senator, I've been involved in introductions of lots of new technology, including opening one of the very first computer stores in the Nation over 30 years ago, to being the 18th employee of Microsoft, when we introduced all kinds of new technology, and all I can tell you is, the forecasters are always wrong. The skeptics are always wrong. The numbers are always bigger when you actually solve a problem. And it's very simple, when you look at the air tax model, the "per-seat, on-demand" model, they're solving a problem. And the problem is, people today need to take a lot of time to go between secondary, smaller communities, especially if you're not going from a small

community to a large city and you're going between two small communities. I live in a State where that happens every single day, just as you do. And the simple fact of the matter is, there are a lot of people out there today who need a better form of transportation.

So, I find it inconceivable that the air taxi model couldn't work. It does require two things. It requires a very different kind of airplane, an aircraft that is designed, from the beginning, to be not only efficient, from a cost standpoint—meaning fuel expense and maintenance—but also very, very reliable. In other words, it has to be like a Boeing. The second thing that it requires—and our friends at DayJet have done a marvelous job of this—is a whole new way of dispatching and managing these aircraft. And it's really technology out of the Internet world that's providing that—not just web access, but the theory behind network management—that will make this possible.

So, there really are two technology changes that is enabling the air taxi. The fact that there is demand, I have no problem with, because I live in the pain every day, personally, of trying to get around this Nation if I don't have my own airplane to fly.

Senator BURNS. I would pose the same question to Mr. Pelton, because you're competitors, of course, in the market of building airplanes, and I would like to hear his view on that.

Mr. PELTON. Well, certainly at Cessna we are hoping that the air taxi market does emerge, because it will be good for our industry. We built our Citation Mustang in our business plan around conventional wisdom, in the assumption that what we know today will hold true going forward, and that there would not be an emerging air taxi market. So, certainly our forecasts are significantly lower than some of the other competitors within the industry.

When we look at the very light jet market in concept, we're addressing it with the existing known fractional providers, air charter providers, individual owner/operators, and corporations buying that airplane. And today, we've successfully sold into that market and have not been able to penetrate the air taxi market. So, I think there are probably two different ends of the spectrum, although we are optimistically hoping that the market does emerge, because it will be good for everybody in the industry.

Senator BURNS. The folks from DayJet, do they concur with that model?

Mr. IACOBUCCI. Well, Chairman Burns, with all due respect to my industry partners here, I think that the VLJ is a part of the story. It is what we'd like to term a necessary, but not sufficient, condition for the creation of this new market. We view this—and the reason that there's so much skepticism around this is that aviation hasn't seen an incremental market, much in the same way that technology's seen—you cited cell phones; I could cite the Internet, even desktop computing—are all examples of markets that, when we started, everyone was very skeptical, because it didn't exist before.

In the context of aviation, in particular, there hasn't been any transformative changes that have created new groups of users coming to the market. I believe—firmly believe—DayJet believes—that the short-haul transportation between hard-to-get-to places not

only serves a good common cause, but has, also, the potential for developing a true incremental market where people—not CEOs, COOs; I'm talking about servicepeople, engineers, auditors, lawyers, you name it—that today are forced to drive the 500–600 miles, yet are willing to investigate other options, but just don't have that option today. Going all the way up to a charter is far too cost prohibitive for a CEO to cut loose his senior salesperson to close a couple of deals or for a support person to fix something. Happens sometimes, but it's very unlikely.

So, yes, I believe that there is a market. I believe that both gentlemen here actually demonstrate the two ends of the spectrum, in terms of the assessment of that market. And naturally, from our perspective, we're very confident the market exists, and that's what our business plan is built on.

Senator BURNS. Senator Lautenberg?

Senator LAUTENBERG. Thanks, Mr. Chairman.

The topic is one of great personal interest to me. I like aviation, and have spent a lot of time flying around; never at the helm, but always interested in what's going into technology. And over the years, I wrote legislation to insist on transponder C's in all areas, except the busiest. And I'm concerned about safety.

I worry about one thing. By the way, Mr. Raburn and Mr. Pelton, I am also very excited about the prospects that this new—the new light jets bring. I really—I see it in so many ways. Every time I get in the car between here and the New York area and find out that the car is never fast enough to make a decent—trip decent, I look longingly at aviation. And then I get to the airport, and I wait an hour or a half-hour to take off, and the flight's 36 minutes, but the waits are an hour and a half. So, these are terrific opportunities.

And I asked a question of the earlier panel about commercial viability. I view general aviation as something that companies own and people own and so forth, but I—of course, commercial viability is expressed in different manners. I worry about whether or not the infrastructure for dealing with this new phenomenon is in place. Because it can't be the same.

Mr. Raburn, I think you said something about, "We won't see parking—airports become parking lots for very light jets," but I think, in some cases, you will see that kind of a condition. And it's—and will a tower or some kind of a management system be required? In a way, I hope so.

Let me ask you this question. The noise factor in light jets, relatively insignificant, a lot less than the typical stage-3 aircraft?

Mr. RABURN. Senator, if I may, we just finished our FAA certification testing for noise levels on the Eclipse 500. It has been certified at a noise level that's 41 decibels lower than stage-4 requirements, which is not even yet promulgated. In other words, that's 51 decibels lower than the current stage-3 requirements.

What that means, practically, is, this jet is quieter than any other jet flying today. It's quieter than any twin propeller flying today. And it's quieter than all but about a dozen single-engine piston airplanes flying today.

So, this jet—and I think Mr. Sabatani made the comment that—because he's seen demos of the aircraft—that you really can't hear the aircraft as it takes off and goes by.

Senator LAUTENBERG. Depends upon your hearing, huh?

Mr. RABURN. Well, that's true, too. I've flown for so long, I don't have much hearing left, either.

[Laughter.]

Senator LAUTENBERG. No, but that's a kind of surprise, that you can't notice it. I—so, do you think these aircraft can help replace some of the stage-2s that still—that remain around?

Mr. RABURN. I'm sure Mr. Pelton and I would just love to replace those airplanes.

[Laughter.]

Senator BURNS. Well, Mr. Pelton, how do you feel about——

Mr. PELTON. Well, I guess I'd like to answer it on behalf of GAMA, not Cessna, because GAMA's looking very hard at, How do we, as an industry, recognize that noise is an issue that upsets people at local airports and ends up causing problems with our future growth? So, we are very active in looking at, How do we move forward with getting into mandatory stage–3 requirements? And, as Mr. Raburn mentioned, all of our new airplanes are certified well beyond stage 3 and well beyond proposed stage–4 requirements. So, we feel we're doing the right things, environmentally, long term with our new products, and we also support the necessary regulatory rules to move into the stage-3 environment.

Senator LAUTENBERG. Do the VLJs, more than—are they single-engine or are they all twins or——

Mr. RABURN. The current certified ones are twins. That's the Mustang——

Mr. PELTON. Twins.

Mr. RABURN.—and the Eclipse.

Senator LAUTENBERG. Is it intended that there will be singles out——

Mr. RABURN. There are announced single-engine airplanes, yes.

Senator LAUTENBERG. There are now.

Mr. RABURN. None of them are certified now.

Senator LAUTENBERG. Well, I wish you luck. I think it would be a terrific addition to our convenience and economic well-being. And, without dating myself too much, I watched the first unmanned jet bombs ever flown. I was a solder in Antwerp, Belgium, while the city was being hit by B–1s, B–2s. The B–1 was the jet. But I also saw—I think the airplane was made by Fokker—a jet airplane followed by British Spitfires. And the distance that opened between them was incredible. It—and I thought—and I was young once, and——

[Laughter.]

Senator BURNS. Aw.

Senator LAUTENBERG. And I thought—yes.

[Laughter.]

Senator LAUTENBERG. Wiseguy. Don't talk. Look in the mirror.

[Laughter.]

Senator LAUTENBERG. Well, I—but what scared me, even as a 20-year-old—"My God, what's—if these people have that kind of technology, where are—will we be if this war continues?" And, fortu-

nately, the fates had it that we changed the course of events and came out a stronger country for it all.

Thanks very much. Thanks, Mr. Chairman.

Senator BURNS. Thank you, Senator Lautenberg.

Well, I will tell you that I'm not as young as you think I am, because I can remember when the—when Continental flew the first 707 into Kansas City, old MKC, downtown Kansas City. And that was—that's been several years ago. And I went to work for Ozark Airlines, and we were still flying—at the time, we were flying—still flying DC–3s, but, I'll tell you what, they were modified, and they had the wheel covers, if you remember.

[Laughter.]

Senator BURNS. We were the only airline that had wheel covers on a DC–3. But we were pretty modern.

And tell me about the new powerplants. We are all concerned about fuel, fuel efficiency, cost of fuel, which is probably your biggest cost in operating air taxis, or whatever you're doing with aircraft. Tell me about the new powerplants. Can anybody bring me up to date on that? Mr. Andersson probably could, and Mr. Pelton, for sure. Can you——

Mr. PELTON. It's——

Senator BURNS.—comment on those, please?

Mr. PELTON. Yes. It's been—the engine manufacturers have done a remarkable job of addressing the fuel efficiency issue, and Mr. Raburn's airplane and my airplane both has a Pratt & Whitney 600-series powerplant on it, which is the latest technology and the most efficient engine out there today. It's probably 20 percent less fuel consumption of what the turbine engines of 20 years ago consumed, and it's fully electrical—electrical, digitally controlled. We see continual movement by the engine manufacturers in addressing the efficiency aspect of fuel, along with probably what's most important, as what comes out the back end of the engine. The real issue—we're dealing with the environment and making sure that low carbons, low NO_x, is being addressed by the engine manufacturers. And with our two new products, we've really made a step-function change in that area, and we're seeing engine manufacturers aggressively addressing that issue.

For the manufacture—for the engine companies to compete globally, they have to address that, because of the—the green standards in Europe, which are far more stringent than they are here, are going to drive where aviation goes.

Senator BURNS. Use of new materials. Are they lighter engines than we've known in the past?

Mr. RABURN. Both engines are for—on a per-pound, per-thrust basis, are about—again, about 20 percent lighter than previous. That's a combination of not necessarily new materials, but new manufacturing techniques and, to some extent, new materials.

Senator BURNS. In other words, you've got some—OK.

Tell me about—we are looking at developing new fuels. We think we can—through coal gasification, we can build a cleaner and—more trending toward the green side of a jet fuel. And we know we can, as far as diesel is concerned, and that's a very close kind of operation. So, I appreciate that, and—but the efficiency of the en-

gines, I think, are of primary concern, because of fuel costs and this type thing. And that.

I just want to—I appreciate your testimony. I read all your testimony last night. And I look forward to working with all of you, because, as we go down this road of FAA reauthorization—I'll come back to that again, that I think you folks ought to be at the table whenever we do this, for new technologies and how we handle our traffic. And, there again, we're in the business of safety. And I appreciate your views and your insight on entering a new era, I think, probably in aviation here in this country. So I appreciate all of you.

Mr. Andersson, I was particularly interested in yours—in your testimony, and I'll—I want you at the table, too, because you're pretty candid, and because—but I'll—but it's really good, though, if we have folks like you that have hands on in the industry, in every phase of it, as we go down this trail.

So, I think there will be questions posed to this panel by other Members of this Committee. If there are, if you could respond to the Committee and to the individual Senators, that would be very good.

We look forward in working with you. And, at this point, we're going to call this hearing to an end. Thank you very much.

[Whereupon, at 11:40 a.m., the hearing was adjourned.]

A P P E N D I X

PREPARED STATEMENT OF HON. DANIEL K. INOUYE, U.S. SENATOR FROM HAWAII

Rapid advances in technology present both tremendous opportunities and significant challenges for our system of air travel. The introduction of hundreds, maybe thousands, of very light jets (VLJs) into our Nation's air space could transform the way people travel, but it presents challenges the Congress must address. If our policies do not support improvements to our system of air traffic control, the impact of very light jets and other new aircraft in the national airspace could have severe consequences for safety and air traffic management. Wise decisions now will allow our aerospace system and industry to evolve in a way that could provide significant benefits for American consumers and businesses.

I am very familiar with air charter operations, which have long served my state of Hawaii, and the idea of introducing these new VLJs to develop air taxi services in targeted markets is intriguing. Yet this type of service is still in the planning stages and no one is sure how this business will develop and how great the impact of micro-jets will be on our airspace.

All accounts indicate that the very first VLJs will begin to enter our skies by the end of this year, and we will need to pay close attention to how these aircraft are used and whether the system can handle the additional air traffic. VLJs hold a lot of promise for those underserved or isolated communities that have not received adequate air service in the past. If these new micro-jets will make remote communities more accessible to the rest of the country and give their residents better travel options, then they will serve the American public well.

The Senate Commerce Committee already has begun to consider aspects of the Federal Aviation Administration (FAA) reauthorization legislation which will need to be passed during the 110th Congress. Air traffic modernization and FAA funding will be key components of this bill, and we must be certain that the National Air Space is flexible enough to accommodate changes in aircraft capability both in the near-term and well into the future. The impact of new aircraft like VLJs will be part of this equation and will require close attention from the Congress.

RESPONSE TO WRITTEN QUESTION SUBMITTED BY HON. CONRAD BURNS TO EDWARD E. IACOBUCCI

Question. What about convective weather in the United States. The FAA air traffic control system suffers huge unavoidable system delays that often impact all traffic in regions. How will you schedule around such weather interruption?JLW

Answer. DayJet has developed an Advanced System for Real Time Optimization or ASTRO. Because our "per seat—on demand" service is unscheduled we dynamically manage our fleet and personnel to meet the needs of our customers. When weather forces changes in itineraries and flight plans we can adapt in real-time. The result is that as weather approaches or develops we change our movements to accommodate the weather with the least level of service disruption for passengers while maintaining a high fleet optimization and efficiency.

Additionally, our routes and altitudes avoid airline traffic and Class B airspace so we do not add challenges for FAA Air Traffic Control during challenging recovery times due to weather or other circumstances. Our investment in the most advanced on-board technology allows us to be very precise on all four dimensions of flight including time. The result of our collaborative work with the FAA and ATC over the past several years will increasingly enable us to leverage the use satellite-based high precision approaches, precision navigation and precision performance to fly routes and approaches which require minimal workload for air traffic control under all conditions.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. CONRAD BURNS TO VERN RABURN

Question 1. Since we are talking about new more modern ways of producing and operating new aircraft, do you have any recommendations about the FAA aircraft certification process at this point? If very light jet expected sales doubled as the industry study estimates, do you think the FAA regulatory and safety and certification process keep up with demand for new aircraft? If not, do you have any recommendations for improvements?

Answer. There are two basic aspects to the certification process—design approval and operational approval. The FAA has been very proactive in accepting the new technologies and capabilities very light jets deliver in the design approval process. However, a "fear of jets" mindset still plays a role in the operational approval process. The FAA is asking that very light jets meet higher regulatory standards than similarly sized propeller-driven aircraft, simply because they are "jets." Moving forward, we recommend a fundamental shift in thinking. Small jets should not be viewed as more complex aircraft from an operational perspective. Rather, they should be acknowledged as modern aircraft that have more reliable systems than similar propeller driven aircraft and are easier to operate.

As far as the FAA keeping up with the possible growth in this market, we were very fortunate that the FAA committed adequate resources to help us achieve our goal of type certification. However, if the same FAA office had been forced to divide its attention between two similar projects at the same time, they could not have adequately supported both. We think there are two primary ways to address this problem: (1) allocate additional FAA funding to ensure adequate resources or (2) provide for more creative and efficient means of delegation.

We believe that the FAA's pursuit of enhanced Organizational Delegation (ODA's) is a step in the right direction. This puts more of the responsibility of "day-to-day" certification activity on the manufacturer, with the FAA evolving more to an oversight organization that focuses on specific safety-critical items. This will require a cultural change with both manufacturers and within the FAA. Manufacturers will need to take this responsibility very seriously as they will be acting on behalf of the FAA. Manufacturers should be required to develop structured training, and a system of checks-and-balances to ensure efficiency, effectiveness and objectivity. The FAA will need to adjust to not being involved in the details of engineering/certification activity, and successfully evolve into a project management organization.

Question 2. In terms of competition with airlines, do you see your Eclipse customers taking customers away from airlines for complete (origination to destination) trips or just flying passengers from remote places to the air lines for connecting service? Wouldn't flying passengers to places where there is commercial air service put these aircraft in congested terminal airspaces?

Answer. VLJ operators will not be competing directly with airlines at the congested hub airports. At a foundational level, air taxi operators would not be able to compete on a cost basis with the airlines if they were flying from one hub to another, or from a hub to a medium-size community. Existing FAA data supports this assumption, as general aviation operations account for only 6 percent of the operations at Operational Evolution Plan (OEP) 35 airports. In addition, there is absolutely no correlation when comparing the 20 busiest general aviation airports to the 20 busiest airports for airlines. In fact, there are no airlines operating out of the 20 busiest GA airports.

I want to further illustrate this point by referencing *Journal of Air Traffic Control,* January–March 2006, (Attachment "1", page 42). "The VLJ business model is based on providing convenient, personal point-to-point services through non-congested airports. VLJ passengers will be time sensitive and convenience-minded, and they will use VLJs precisely to avoid the hassles associated with large hubs. Second, VLJ aircraft are specifically designed to operate from runways as short as 3,000 feet (including many grass strips). This makes them ideal for providing point-to-point services to most of the 5,000+ U.S. airports serving small to medium sized markets."

Even if a VLJ operator decided to operate into a hub airport, that operation would not cause congestion. Once again, as detailed in the *Journal of Air Traffic Control,* January–March 2006, (Attachment "1", page 42), "The effect of VLJ operations into hub airports will be minimal for a number of reasons: VLJ pilots will need adequate prior experience and will receive rigorous training, equivalent in many cases to that for commercial pilots; VLJ aircraft will have advanced integrated avionics to provide enhanced pilot situational awareness, enable seamless traffic flow integration and optimal spacing with commercial traffic flows; VLJs are capable of operating at speeds compatible to those of commercial jet aircraft throughout the terminal area and until well inside the final approach fix; VLJ climb and descent rates are com-

patible with commercial turbojet aircraft; VLJ aircraft can land and depart safely using shorter runways, unusable by commercial jet traffic. Even regional jets require those same longer runways. On intersecting runways, VLJ aircraft are capable of routine (LAHSO) Land and Hold Short Operations; and finally, to enhance traffic integration even more, new procedures that take advantage of VLJ performance and avionics capability can be developed."

Today, businesses are moving away from the coastal metropolises and toward the center of the country. Consequently, an increasing number of individuals want and need to travel from smaller communities to other smaller communities. Currently, these travelers face a frustrating lack of commercial air transportation service. If they attempt air travel, they are spending excessive amounts of travel time being routed through hubs to make connecting flights. As a result, these individuals are choosing one of three alternatives: (1) planning and suffering through a day of travel for even the shortest trips, (2) driving or (3) not traveling at all. Our nation is filled with communities in which citizens do not benefit from a convenient level of air service. As a result, these communities are grappling with growing citizen frustration, business inefficiency, dwindling business development opportunities and little to no economic growth.

Question 3. You state that VLJs will not use or overtax congested airspace around hub airports, could you explain about how these aircraft will use of the rest of FAA controlled airspace both en route and terminal? Will these flights adversely impact this airspace? Will VLJ flights add to the FAA workload?

Answer. As I stated in my testimony, the reality is that there is significant available airspace to accommodate these new aircraft. Under Administrator Marion Blakey, great progress has been made and the transformation to NGATS has already begun. Last year we doubled the capacity of airspace system between FL290 and FL410 with RVSM, significantly increasing the amount of space between those altitudes. WAAS is now a reality, and RNAV and RNP are happening. Moreover, it is important to note the airspace is three dimensional. This is not a two-lane highway where you are permanently stuck behind the truck in front of you. VLJs are technologically advanced and nimble. They are more than capable of getting out of the way of faster airplanes. Moving around in the airspace is something airplanes do everyday, most often when the commercial airlines go up and down in altitude looking for a smooth ride.

As stated in the *Journal of Air Traffic Control,* "Commercial jet traffic will continue to dominate in the higher altitudes. VLJ operations will generally be on shorter routes under 600 statute miles and mainly at altitudes below those on longer-range commercial operations. Sometimes, especially on longer stage lengths, VLJs will want or need to operate at the higher altitudes, but even then VLJs will not disrupt en route traffic flows, even though they cruise at 0.64 mach, slightly slower than commercial airliners. Current Flight Management System (FMS) technology already enables faster moving aircraft to establish offset tracks so as to pass slower aircraft en route." The article goes on to say, "In the ongoing debate about the impact of VLJ operation, the question of VLJ speed compatibility has been raised frequently. In large measure, this is a red herring. The commercial and business fleets of today operate at a variety of climb, cruise, descent, and approach speeds, based not just on aircraft type, weight, and performance differences but also on variations in company policies. Even with today's 1950s ATC technology, controllers are able to integrate traffic of varying speeds quite efficiently, so VLJs will add no significant complexity." *Journal of Air Traffic Control,* January–March 2006, (Attachment "1", pages 42 & 43).

Response to Written Questions Submitted by Hon. Conrad Burns to Matthew G. Andersson

Question 1. What is the reason why your underlying model in your analysis shows that over time travelers (business and others) will shift out of cars and commercial aircraft to on demand air taxi services?

Answer. Value, pricing, disposable income, choice criteria and behavioral/cognitive assumptions from economic theory are among factors affecting consumer decision-making. The modes (or technologies) get adopted as their utility increases over time. The utility is a function of network effects (scale): the more users, the more valuable the service, the higher the utility associated with joining the network (this may be squared: Metcalfe $V=n^2$ (square of the number of users); Log: Odzliko/Tully: V=n(logn) (connections vary; logarithmic); or exponential: Reed: number subgroups=$n2-N-1$ or 2^n which grow exponentially (subgroups + all other connections). Utility also increases as user costs decrease, and which is realized when

fixed costs are allocated over more users. Technological advances can also decrease cost. An illustration of a utility expression:

$$\log\left(\frac{P_A}{1-P_A}\right) = \beta_0 + \beta_1 (c_A - c_T) + \beta_2 (t_A - t_T) + \beta_3 I + \beta_4 N = v_A$$

where

P_i = Probability of choosing mode i.

P_A = Probability of taking auto

c_A, c_T = cost of auto, transit

t_A, t_T = travel time of auto, transit

I = income

N = Number of travelers

Utility theory assumes that (1) users and suppliers have perfect information about the market; (2) they have deterministic functions (faced with the same options, they will always make the same choices); and (3) switching between alternatives is costless.

Question 2. Looking at your first map in your testimony on the distribution of annual originating trips by VLJ air taxi by U.S. county, please explain the huge number of trips in Southern California and the Southwest?

Answer. These maps indicate among other elements, the level of forecast trip origination to other counties by a "gravity" model structure. Factors affecting trip origination include population density, trading patterns, travel patterns, income and other socioeconomic elements. Number of trips depend on population, airport choice and intensity of several socioeconomics factors. The gravity model reflects certain relationships between places (*e.g.,* households and work locations). It has been posited that the interaction between two locations declines with increasing distance, time, and cost between them, but is positively associated with the amount of activity at each location (Isard. 1956). Reilly (1929) formulated a "law of retail gravitation", and Stewart (1948) formulated definitions of demographic force, energy, and potential, now called accessibility (Hansen, 1959). The distance decay factor of 1/distance has been updated to a more comprehensive function of generalized cost, which is not necessarily linear—a negative exponential tends to be the preferred form. In analogy with Newton's law of gravity, a gravity model is often used in transportation planning. The rate of decline of the interaction (called alternatively, the impedance or friction factor, or the utility or propensity function) has to be empirically measured, and varies by context. While the gravity model is very successful in explaining the choice of a large number of individuals, the choice of any given individual varies greatly from the predicted value. As applied in an urban travel demand context, the disutilities are primarily time, distance, and cost, although discrete choice models with the application of more expansive utility expressions are sometimes used, as is stratification by income or auto ownership (ref: GNU documentation/license).

Mathematically, the gravity model can take the form:

$T_{ij} = K_i K_j T_i T_j f(C_{ij})$

$\sum_j T_{ij} = T_i, \sum_i T_{ij} = T_j$

$$K_i = \frac{1}{\sum_j K_j T_j f(C_{ij})}, K_j = \frac{1}{\sum_i K_i T_i f(C_{ij})}$$

where

- T_{ij} = Trips between origin i and destination j
- T_i = Trips originating at i
- T_j = Trips destined for j
- C_{ij} = travel cost between i and j
- K_i, K_j = balancing factors solved iteratively.
- f = distance decay factor, as in the accessibility model

It is doubly constrained so that Trips from i to j equal number of origins and destinations.

Question 3. How does that compare to today in that area? What do you think accounts for the increase in air taxi trips?

Answer. The map does not indicate current or historic trip origination. The forecast in part reflects economic relationships between counties; over time these may change.

PREPARED STATEMENT OF THE AIR TRANSPORT ASSOCIATION OF AMERICA, INC.

I. Introduction

A. ATA Introduction and Purpose

The airspace system in the United States is fast approaching a critical point. Several very decisive factors are in plain view; they will profoundly affect the system and its future ability to serve users. First, the system must be modernized. Existing and anticipated satellite-based navigation and communications technologies must be leveraged to improve the efficiency of the system and its ability to accommodate substantial new demand for air traffic services. Second, an equitable way to fund those system improvements must be developed. Third, the impact on the system of the much-anticipated introduction of great numbers of very light jets (VLJs) must be evaluated and dealt with. It is this last matter—the airspace implications of this new category of system user—that is the subject of our statement.

The Air Transport Association of America, Inc. (ATA) is the principal trade and service organization of the U.S. airline industry, and its members [1] transport over ninety percent of U.S. airline passenger and cargo traffic. As of June 30, 2006, ATA member airlines were operating a fleet of 4,316 airplanes.

As a key stakeholder in our Nation's aviation system, ATA respectfully submits these comments to the Aviation Subcommittee of the Senate Committee on Commerce, Science, and Transportation.

B. ATA Member Airlines Enable our Nation's Economic Engine

The U.S. civil aviation sector (including air transportation, related manufacturing and air-based travel and tourism) was collectively responsible for $1.37 trillion of national output (i.e., economic activity) in 2004, supporting 12.3 million U.S. employees and $418 billion in personal earnings. Commercial aviation accounts for the majority of this impact with $1.2 trillion in output, $380 billion in earnings and 11.4 million jobs.

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[1] Members are: ABX Air, Alaska Airlines, Aloha Airlines, American Airlines, ASTAR Air Cargo, ATA Airlines, Atlas Air, Continental Airlines, Delta Air Lines, Evergreen International Airlines, Federal Express Corporation, Hawaiian Airlines, JetBlue Airways, Midwest Airlines, Northwest Airlines, Southwest Airlines, United Airlines, UPS Airlines and US Airways. Associate members are: Aerovías de México, Air Canada, Air Jamaica and Mexicana de Aviación.

The national economy is highly dependent on commercial aviation, which, in 2004, was directly or indirectly responsible for 5.8 percent of gross output, 5.0 percent of personal earnings and 8.8 percent of national employment. [2]

These extraordinary economic benefits could not have been generated without an aviation infrastructure that enables air carriers to provide the services that passengers and shippers demand. Any changes to our Nation's aviation system, such as the introduction and proliferation of a new and different aircraft type, must be carefully assessed to ensure that the public continues to benefit from a safe, healthy aviation system.

C. The Introduction of VLJs Will Affect All National Airspace System Stakeholders

The introduction of VLJs into the National Airspace System (NAS) constitutes a significant change and will have far reaching and—at this point—not entirely known consequences. What we do know is that their impact will eventually be felt by all stakeholders, including airlines, FAA, manufacturers, Fixed Base Operators (130s) and many others. However this plays out, stakeholders share an obligation to ensure that their introduction does not jeopardize the unparalleled efficiency and safety of our NAS.

II. Overview of Very Light Jets

A. What is a Very Light Jet?

A VLJ, also called a microjet or personal jet, is generally defined as a technologically advanced, high-performance turbine engine-powered aircraft weighing 10,000 pounds or less (maximum certificated takeoff weight) and certificated for single pilot operations. These aircraft will feature advanced cockpit automation, such as moving map GPS and multi-function displays, automated engine and systems management, and integrated autoflight, autopilot and flight-guidance systems.

The cost of VLJs, somewhere in the range of $1.0M to $3.0M, places them well within the reach of many businesses and individuals.

B. Manufacturers and Models

FAA estimates that there are presently some 20 models of VLJs in various stages of design, certification and production. Exhibit 1 highlights a sampling of VLJs.

Exhibit 1. Sample of Very Light Jets in Development

Name	Company	Orders	First Delivery
Eclipse 500	Eclipse Aviation	2,111 as of July 2004	2006
Mustang	Cessna	250 as of June 2004	2006
Adam700	Adam Aircraft	77 as of July 2004	2006
EMB–VLJ	Embraer	Not Disclosed	2008
Epic LT	Epic	Not Disclosed	Not Available
HondaJet	Honda	Pending Commitment	Pending Commitment
D–Jet	Diamond Aircraft	Not Disclosed	2006

C. Performance: Not Your Father's Airplane

VLJs will offer performance comparable to high-end business jets at a fraction of the price. They will be capable of operating from shorter runways than commercial airliners and larger business jets, enabling them to utilize a large number of airports.

VLJs will be certificated to operate at maximum altitudes of roughly 41,000 feet, enabling them to join commercial airliners and business jets in competing for finite en route airspace. Unfortunately, VLJs will have maximum cruise speeds at those altitudes that are significantly slower than other aircraft (380 knots versus 550 knots). This difference in cruising speed will pose a potentially significant airspace management issue. They will have a range of roughly 1,200 nautical miles and carry up to four passengers.

D. Expected Uses

Current and projected aircraft orders illustrate two primary categories of VLJ buyer. The first is an individual who plans to use the aircraft for recreational transportation. The second, and much larger segment of buyer, is that which involves transporting passengers conducting business between major metropolitan areas. It

[2] The total impact of commercial aviation is compared to national aggregates of Gross Outputs and Personal Earnings (from the Bureau of Economic Accounts) and Total Covered Employment (from the Bureau of Labor Statistics) for the 50 states and the District of Columbia combined.

is important to note that while VLJs will frequently utilize secondary airports, those airports are typically near—and share the airspace above—major metropolitan areas.

E. Projected Deliveries

Predictions regarding the number of VLJ deliveries vary from source to source. FAA predicts roughly 4,000 aircraft deliveries over the next 10 years, while others put the number at twice that. NASA translated their projections into flight activity and estimates that VLJs could account for 20,000 flights daily by the end of the 10-year period.

While aviation industry experts may debate the actual number of aircraft eventually ordered, most agree that VLJs will appear in sufficient numbers to significantly increase demand on an already strained air traffic control system.

III. Economic Implications

The early interest in VLJs clearly illustrates the demand in the marketplace for an aircraft with its capabilities. It appears to fill the void between conventional piston aircraft and high-end business jets at a price considered reasonable by its buyers.

Clearly the VLJ manufacturers and their suppliers stand to benefit from the sale of these new aircraft. Furthermore, the downstream activities linked to the operation and support of these aircraft will increase access and revenue to smaller airports. VLJs will drive new business for FBOs due to demand for storage, fuel, maintenance and related services.

Using VLJs, air taxi operators could open access to new business centers that previously were beyond the reach of available aircraft. This new access could generate new markets and opportunities resulting in further economic benefit.

At the same time, any incremental economic benefits would be quickly erased if the introduction of VLJs leads to an increase in airspace congestion. The airspace above major metropolitan areas is already or rapidly becoming congested, and any further increase in demand would cause an increase in delays for all users.

Delays are especially expensive to airlines and their customers. The Department of Transportation has estimated that delays cost U.S. airline passengers $9.4 billion in 2005. In addition to those direct costs to passengers, delays cost airlines an estimated $62 per minute in direct (*i.e.,* aircraft) operating costs. Applied to the 94.1 million cumulative delay minutes recorded in 2005 reveals $5.9 billion in industry costs. Combining the passenger and airline costs produces a U.S. economic cost of $15.3 billion or $484 every second.

IV. Implications for Our National Airspace System

A. VLJs Will Place Additional Demands on an Already Constrained ATC System

The existing U.S. ATC system is based on vintage 1950s design concepts that can no longer be efficiently expanded to meet future demand. As the number of aircraft using the system increases, congestion will worsen resulting in artificial limits on demand—access to our Nation's airspace will be restricted to prevent total gridlock. Industry experts [3] have expressed concern over the ability of the ATC system to accommodate growing demands:

> "The non-airline turbine powered fleet is much larger than the air carrier turbine-powered fleet. And the total turbine-powered fleet is projected by FAA to increase by 49 percent over the next 11 years, putting considerable stress on the ATC system."

It isn't hard to imagine a system where access to airspace is rationed. That is precisely what exists today at New York's LaGuardia and Chicago's O'Hare airports. Congested airspace above New York and South Florida threatens to force further restrictions. It is critical to note that capacity limitations are not necessarily tied to a lack of runway or terminal capacity. More and more, airport accessibility is driven by the ability of the airspace above to accommodate the traffic. For example, VLJs attempting to access Fort Lauderdale Executive Airport may be blocked by saturated airways even though the airport itself could handle the traffic.

Integrating VLJs into the current ATC system will present challenges for FAA and existing users. VLJs will be incompatible with existing aircraft using high-altitude airspace because they cruise at significantly slower speeds. Introducing VLJs into these routes is analogous to allowing tractors on a freeway. Air traffic controllers would be faced with an increased level of complexity. This increasingly complex

[3] Vaughn Cordle and Robert W. Poole, Jr., "Resolving the Crisis in Air Traffic Control Funding," 2005.

environment translates into increased controller workload, leading to excessive and inefficient aircraft separation.

Clearly it is in the best interest of VLJ operators and all other users of our Nation's airspace system to collaborate in building a system that safely, efficiently and equitably accommodates all users. Vern Raburn, President and CEO of VLJ manufacturer Eclipse Aviation, clearly recognizes the importance of NAS transformation on the success of his business:

> "In my opinion, we need to be asking and answering the hard questions that will lead to implementation of a next-generation distributed ATC system. And we should be doing it sooner, because later is already here."[4]

Unfortunately, the revenue collected by FAA will not cover their costs to provide ATC services to VLJ operators and will fall far short of the amount needed to finance NAS modernization. FAA will be faced with significantly increasing demand for services without a corresponding increase in revenue. To illustrate the problem caused by today's FAA funding mechanism, consider that a typical 737 commercial airliner flying from New York to Fort Lauderdale pays $1,506[5] toward funding FAA, while an Eclipse 500 corporate VLJ on an identical route using the same ATC services pays only $53.[6] Based on an analysis of FAA's cost data, ATA estimates that it costs FAA approximately $781 to provide those services.

B. VLJs Could Introduce New Operational and Safety Risks

Historically, the cruise performance capabilities of the aircraft operated by the various segments of the aviation community naturally segregated them into distinct operating environments. Larger, faster aircraft (like business jets and commercial airliners) typically cruise above 28,000 feet, while piston-driven recreational and on-demand charter aircraft primarily operate at lower altitudes.

VLJ performance will blur the lines between the blocks of airspace conventionally used by the different types of operators. VLJ operators will be able to climb to and cruise at altitudes that previously were inaccessible due to the performance limitations of their previous aircraft.

While the impact of VLJs on the airport terminal airspace environment will be more a function of the number of operations rather than an issue of compatibility, the FAA must assess a broad array of integration considerations. Approach and departure patterns, wake turbulence interaction and ramp congestion are but a few.

In recognizing that the potential will exist for relatively inexperienced pilots to be operating high-tech aircraft in a complex and challenging environment, the FAA must ensure that current training, experience and medical standards are adequate to ensure the continued safety of the system.

C. VLJs Will Consume Limited FAA Resources

1. Initial Certification

With some 20 VLJ models in various phases of certification, FAA is applying significant resources in an effort to support manufacturers' production and delivery schedules. While some certification work is handled indirectly by FAA through the designees, the direct burden on FAA is significant. FAA resources allocated to VLJ certification efforts delay other certification activity.

2. Ongoing Safety and Regulatory Oversight

After certification of the aircraft, FAA is responsible for ensuring that the users of VLJs comply with Federal regulations applicable to their use of the aircraft. While oversight of individuals flying VLJs recreationally is relatively straightforward, oversight of large air taxi operators operating hundreds of aircraft is a complex and resource-intensive effort. In recent testimony before the House Aviation Subcommittee, the GAO observed that:

> "Meeting the challenges posed by recent safety trends and program changes will be exacerbated by other changes in human capital management; the acquisition and operation of new safety enhancing technologies; and new types of vehicles, such as very light jets (VLJ), that may place additional workload strains on FAA inspectors and air traffic controllers."[7]

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[4] Vern Raburn, President and CEO, Eclipse Aviation, October 15, 2005.

[5] Commercial airliner tax revenue based on passenger, cargo and fuel taxes, and assumes 70 percent load factor. Cargo and fuel taxes derived from DOT Form 41.

[6] Corporate VLJ tax revenue based on Part 91 operation and assumes full fuel load at departure.

[7] U.S. Government Accountability Office, Testimony before the Subcommittee on Aviation, Committee on Transportation and Infrastructure, House of Representatives, GAO–06–1091T.

3. Air Traffic Control

The performance of VLJs and their apparent incompatibility with existing traffic in the terminal and en route environment will make air traffic control more challenging. Mixing fast and slow traffic on high-altitude routes, as described previously, increases controller workload. Sequencing large and small aircraft in terminal areas to reduce the effect of wake turbulence adds complexity for controllers. In limited cases, FAA may be able to respond by adding additional controllers. The more common response will be to increase spacing to manage the difference in aircraft speeds and reduce workload. This results in wasted capacity and ultimately constraints on demand.

In the July 2005 issue of *Flight Safety Digest,* the director of safety and technology for the National Air Traffic Controllers Association, and a former controller, identified the relatively low cruising speeds of VLJs as the biggest concern for controllers:

> "The biggest impact most likely will be in the en route environment . . . In the upper flight levels, speed will be an issue"

He also expressed concern that VLJs will have an impact similar to other, relatively slow aircraft:

> "The early (Cessna) Citations are already an issue for us. As a controller, you have to be aware of their slower speeds so that you don't run them down. The very light jets are going to create the same issue if they're put into the same flow with commercial aircraft . . . I don't think the VLJs will mix in well with the flow that we have today."

4. Use of Flight Service Stations

The introduction of VLJs, or any aircraft other than those used by large commercial air carriers, will drive a proportionate increase in the use of Flight Service Stations (FSS). FSS provide flight planning, weather and other related services to pilots free of charge. As the number of users increases, so will the demand on FSSs. Unlike general, corporate and business aviation users, commercial airlines typically do not use FSSs.

V. Unmanned Aerial Vehicles Must Also Be Considered

An issue closely related to the introduction of VLJs is that of unmanned aerial vehicles (UAVs). While not the focus of this particular hearing, ATA is concerned about the aggressive pace of their introduction into the NAS. Although most are used in military applications today, UAVs are rapidly being deployed in a variety of non-military surveillance roles.

Unfortunately, the nature and capabilities of most UAVs today, combined with operators' apparent limitations in handling UAVs, require that large blocks of valuable airspace be quarantined when UAVs are in use. Clearly this approach is not a viable, long-term solution.

The aviation industry will continue to work collaboratively to develop certification standards and operational procedures that will allow UAVs to be safely integrated into the NAS.

VI. Summary

VLJs are an exciting innovation and a testament to the capabilities of the U.S. aircraft manufacturers. Their long-term viability, however, will be governed by the ability of our National Airspace System to safely and efficiently accommodate them.

ATA believes that the successful integration of VLJs hinges on the following:

- FAA must ensure that robust standards are in place for certification, operation and training.
- FAA must segregate incompatible traffic to streamline flows.
- FAA must employ a reliable and equitable funding mechanism that links revenues to costs.
- FAA must use that revenue to create capacity through modernization of the ATC system.

ATA will continue to advocate a safer, smarter and fairer system that satisfies the current needs *of all users* while scaling to meet future demand.

PREPARED STATEMENT OF HONDA AIRCRAFT COMPANY

Mr. Chairman and Members of the Aviation Subcommittee:

Thank you for the opportunity to submit a statement for the record on the September 28, 2006 hearing entitled. "New Entrants Into the National Airspace System."

On July 25, 2006, Honda announced its intention to introduce the innovative HondaJet into the very light jet (VLJ) market. The HondaJet is the culmination of more than 20 years of aviation research, development and testing to validate our technology. The initial test flight took place in December 2003 and more than 240 hours of test flights have occurred between December 2003 and July 2006. Production of the HondaJet will occur in the U.S. with specific details on location and timing to be announced in the future.

The design specifications of the HondaJet are as follows:

Seating: 6 to 8.

Length×Width×Height: 41.7×39.9×13.2 ft.

Maximum Speed: 420 knots.

Operational Ceiling: 41,000 ft.

Range: 1,100 nautical miles.

The HondaJet has several significant technological innovations that help it to achieve superior fuel economy, a larger cabin and more luggage base, and a higher cruising speed compared with other aircraft in its class.

The HondaJet has a natural-laminar flow (NLF) wing and fuselage nose that allows it to have a low drag coefficient along with a high lift coefficient. These were developed through extensive analyses and wind tunnel testing including sessions at the Boeing and NASA test facilities.

The HondaJet's patented over-the-wing mounted engines have the advantage of eliminating the need for significant structures to mount the engines to the rear fuselage. This in turn maximizes space for passengers and luggage. In addition, this design feature reduces drag at high speeds resulting in improved fuel economy.

The all-composite fuselage of the HondaJet consists of honeycomb sandwich structures and stiffened panels. These reduce both weight and manufacturing costs.

The flight deck is all glass state-of-the-art with integrated avionics and digital graphics on a high resolution flat screen display. The HondaJet also has an autopilot function.

In August 2006, Honda announced the formation of Honda Aircraft Company, based in Greensboro, NC. Honda Aircraft Company will be responsible for getting FAA type certification and production certification. The new company will also be responsible for taking sales orders beginning this fall as well as carrying out marketing activities.

Honda has formed a business alliance with Piper Aircraft. Inc. to collaborate on sales and service. The alliance will also look for new opportunities in the areas of engineering as well as general and business aviation.

The goal of our aviation endeavor, consistent with our other Honda products, is to provide convenient and efficient transportation to improve the quality of life for our customers. The entry of the HondaJet expands the list of mobility products Honda has to offer.

Honda is one the world's leading producers of mobility products including its diverse line-up of automobiles, motorcycles and ATVs, power products, marine engines and personal watercraft. Honda is the world's preeminent engine-maker, with annual worldwide production of more than 20 million engines. Honda began assembling motorcycles in the U.S. in 1979, with U.S. automobile manufacturing starting in 1982. We currently have 10 manufacturing plants in the U.S. with a workforce of more than 29,000 associates.

Thank you for the opportunity to submit this statement. We look forward to working with the Committee.

A copy of the article, The Business Jet Market: Here to Stay, by Richard Aboulafia, from the April 2006 issue of *World Military & Civil Aircraft Briefing* has been retained in Committee files.

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