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**Burning Platforms and Brick Walls: The Case for Performance-Based**  
**Navigation in a Carbon Conscious World**  
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Good Afternoon. I'm delighted to be here today to talk about Performance-Based Navigation and its two main components, Area Navigation (RNAV) and Required Navigation Performance (RNP). I'd also like to talk about some of the challenges we face in implementing routes and procedures that will wring the most benefit from emerging technologies and capabilities, along with the primary driver for adopting these new approaches: the politics of climate change.

Before I begin, let me qualify all that follows with two warnings: Number one – I will throughout these remarks refer to NextGen and PBN almost interchangeably. While I know they are not synonymous, I do believe their futures are inexorably tied to one another and, in my humble opinion, so are their respective future contributions to reducing CO2 in our atmosphere. The second thing I will tell you is that you can take the pilot out of the airplane, but you can't take the airplane out of the pilot. So forgive me in advance if my hands start flying around my head.

But, if we're going to talk PBN, we have to talk pilot stuff. For instance, right outside my office window at AIA is a terrific PBN laboratory, or case study, if you will. AIA's offices are right on the Potomac River, and the River Approach to Runway 19 at DCA goes right past my window. In fact, I started my commercial airline career in Washington flying the river approach as a DC-based pilot flying for American Airlines. Back then, if we weren't in visual conditions by the time we were abeam AIA's offices on the approach (700 feet above the ground and about 2 and a half miles from the runway), we had to abort and go somewhere else. Today, aircraft and crew that are PBN trained and equipped – like Alaska Airlines – can fly the infamous River Approach in weather all the way to the 14<sup>th</sup> Street Bridge – 200 feet above the ground and a half mile from the runway.

Let me reiterate an important point: PBN is nothing more than our latest and most efficient attempt at getting from Point A to Point B. It is the next iteration. Just like exit ramps and flyovers became our modern method of moving vehicular traffic over our roadways. Everything we've done to improve navigation or lessen air traffic are just earlier versions of PBN.

To get a sense of that evolution, I want to take a few minutes to walk through a brief history of airborne navigation and traffic control.

We all know how the early barnstormers of aviation got from here to there – they flew in open cockpits, over treetops, navigating by reference to visible landmarks on the ground. So, their PBN was their eyes and clear view of the ground. But, when the Post Office started airmail, it needed to operate around the clock. Here’s a quiz for you — do you know who said, “If you ever want to worry your head, just try to find Iowa City on a dark night with a good snow and fog hanging around.”? The answer is a daring young airmail pilot named, appropriately enough, Jack Knight. On a cold February night in 1921, Knight put a revolutionary new navigation technology to the test with his all-night flight through mist and snow to Chicago from North Platte, Nebraska. He found his way across the black prairie with the help of bonfires lit by Post Office staff, farmers, and the public. The point to this story – as I’m sure many of you have already guessed – is that the paths blazed for Knight with bonfires in 1921 are the same routes we’re still using today.

The next few years saw the development of one and two-way radio communication and lighted airport beacons. But, the first true example of navigation without outside reference ... the event that would eventually lead to our gathering today, was in September 1929, when an unknown Army Lieutenant ... who I’m sure everyone thought at the time was a few cards short of a full deck ... became the first pilot to use only aircraft instrument guidance to take off, fly a set course, and land. His name? James H. Doolittle. Was Jimmy Doolittle crazy? Maybe a little. Was he brilliant? I think so. Did he change aviation and its horizons? Absolutely.

By the mid 1930s beacons emitting radio waves to onboard receivers began replacing the light beacons. And, during World War II, radar technology first developed by the British was refined and subsequently deployed to control U.S. commercial traffic in the 1950s. Aircraft could now fly along fixed air corridors while being monitored by radar on the ground.

The need for sophisticated air traffic control and federal oversight became more apparent through the first half of the 1950s, with a series of midair collisions culminating in a crash over the Grand Canyon in 1956 and the loss of 128 lives. Shortly thereafter in 1958 the Federal Aviation Agency was formed.

In the 1960s we began using transponders. Radar became more efficient. And there, basically, is where we remained until the advent of modern PBN and the concept of satellite-based communication, navigation and surveillance – or, NextGen.

But this concept we’ve come to know as NextGen hasn’t really gotten off the ground. Why is that? We could probably point to a number of reasons, but I will give you three that matter very much today: Number 1 – while RNP accuracy has enhanced

safety, there is no immediate safety imperative driving PBN or NextGen. Can we say that PBN will get you safely into a given airport like Juneau, Alaska more frequently and more safely than legacy procedures and avionics can? Yes. But, that's not seen as an immediate safety imperative because the safe way to fly the Gastineau Channel in the weather before PBN was not to fly it at all. So that leads us to the second reason PBN and NextGen haven't generated tickertape parades in cities around the world: commercial and GA air traffic, and hence, delays, are down. The general public hasn't seen the kind of delays they experienced in 2007. The final reason is directly related to the second—the economic conditions that are driving the decline in traffic are also putting pressure on the aviation industry. Installing the required avionics equipment on board airplanes is a substantial investment for aircraft operators and owners. Most companies and individuals aren't in a position right now to make that kind of investment.

So if there's no emergency safety benefit in most places, delays are down because traffic is down and the lack of capital creates substantial economic obstacle for industry to invest in NextGen, what will be the burning platform that will deliver this momentous transformation? The politics of climate change. Aviation environmental politics have changed rapidly the last few years. For instance contrails, once the positive symbol of travel to far off places, are now avoided in pictures of aviation because of their global warming connotation.

The climate change debate centers mainly on who should have the responsibility to regulate aviation emissions and what is the best way to achieve real progress in CO2 emission reduction. Unfortunately, where you stand on solutions depends very much on where you sit. The politics of aviation's contribution to global warming differ greatly in different regions of the world. For instance, Europe has become almost rabid in its rhetoric against the evils of aviation emissions. Ian Pearson, British Member of Parliament and then- Minister of State for Climate Change and Environment characterized one airline as “not just the unacceptable face of capitalism, they are the irresponsible face of capitalism. [They] just seem to take pride in refusing to recognise that climate change is a genuine problem.” He also described the attitude of American carriers as “disgraceful.” And the media is no better; Guardian columnist George Monbiot notoriously stated in 2006 that “every time someone dies as a result of floods in Bangladesh, an airline executive should be dragged out of his office and drowned.”

Compared to that, rhetoric in the United States is pretty mild.

Here in the United States, two regulating agencies, EPA and FAA view aviation in widely different fashions. The FAA is primarily concerned with safety and increasing capacity. Environmentally, FAA supports some climate change research, works closely with other nations as a member of the International Civil Aviation Organization, and monitors local noise and pollution. It does not regulate emissions. The EPA is responsible for regulating harmful emissions whatever the source. But, it must first

check with the Transportation Department and FAA to be sure safety and noise are not impacted before regulating aviation's emissions.

Local governments have a say in the conduct of aviation business too. While federal oversight emphasizes CO<sub>2</sub> and NO<sub>x</sub> levels, local governments care much more about noise, particulate matter and water pollution—issues that affect their constituents most directly.

There's also a layer of politics among global entities – the International Civil Aviation Organization vs. the UN Framework Convention on Climate Change or UNFCCC. Will final authority over international aviation emissions remain under ICAO or will it become part of the UN's post-Kyoto framework? That's a question yet to be settled. But, until that's decided, the industry and ICAO are still working hard to keep global civil aviation as fuel efficient as possible. Back in April, ICAO issued a call for member States to actively implement PBN Resolution A36-23, which says that “States and planning and implementation regional groups (PIRGs) should complete a PBN implementation plan by 2009 to achieve implementation of RNAV and RNP operations (where required) for en route and terminal areas according to established timelines and intermediate milestones.”

As ICAO President Roberto Kobeh recently said, “Performance-based Navigation is vital to helping us fulfill our mission today and in the future.”

Meanwhile, 2009 is a crucial year in the international effort to address climate change. A series of UNFCCC preparatory meetings have taken place throughout the year, all geared toward reaching a global agreement at the United Nations Climate Change Conference in Copenhagen this December.

But there's a great deal more to successful implementation of emissions-saving technologies and procedures than federal support and international mandates. The local angle has to be considered as well.

This brings us back to Performance Based Navigation. PBN, as part of the total NextGen transformation, will save fuel and reduce CO<sub>2</sub> emissions, passing substantial benefits to local communities. And it's already happening. For instance, in Atlanta, RNAV Standard Instrument Departures have achieved fuel savings due to reduced departure delays of more than 2.5 minutes per flight. Annual fuel savings are estimated at \$34 million, with cumulative savings of \$105 million from 2006 through 2008. At Dallas Fort-Worth, NextGen improvements have increased capacity by 11 to 20 operations per hour, with cumulative savings estimated at \$30 million from 2005 through 2008. Finally, since the implementation of two RNAV arrivals at Phoenix in 2006, significant benefits have been noted: 38 percent reduction in the time aircraft remain in level flight; user benefit savings estimated at \$2 million annually; and reductions in carbon dioxide

emissions estimated at 2500 metric tons annually. Those are substantial benefits to those areas that have begun implementation of PBN.

Reduced fuel burn and direct routes with fewer delays have environmental and economic benefits that reach way beyond just those who ride on, or ship merchandise on aircraft. Using FAA's economic and employment models, industry experts estimate NextGen will produce \$12.2 billion in economic benefits by 2012 and more than 150,000 jobs. These are real savings – both in terms of fuel efficiency, reduced CO2 emissions and economic benefits not only to the traveling public, but to society at large.

So, when do we expect these improvements will be made on a nationwide basis, bringing the benefits to a wide-flung collection of communities? We don't know the exact date because the FAA is still working on the rule that will mandate ADS-B avionics, but the implementation plan is pointing to 2020. Many believe that date may move up since the Administration is big on NextGen acceleration and other parts of the world, like Europe, appear to be on a faster track than the U.S. Whether equipage is mandated in 2020, or 2015, however, the fact remains operators are not likely going to be in a financial position to meet the mandate, nor should they have to without Federal assistance. In fact, without substantial incentives or outright grants to help operators handle the multi-billion dollar burden to equip, we are likely to have a sustained period when ADS-B ground stations are up and running, but the other half of the puzzle – the “airborne infrastructure,” if you will – will not be in place. This situation could mean billions of dollars of delayed economic benefits and hundreds of millions of tons of CO2 entering the atmosphere unnecessarily.

In the words of one aviation expert, “If there is a disconnect between what the airspace user is capable of doing and what the provider is capable of doing, NextGen is a Ferrari that never gets out of first gear ... It does no one any good for the service provider to build an advanced data communications infrastructure if there are no operators equipped to take advantage of it.” Anyone know who said that? FAA Deputy Associate Administrator for Aviation Safety, John Hickey. Clearly FAA is aware of what needs to be done.

However, there is a big difference between awareness and effective implementation. I have another quote for you (no, I'm not giving a quiz afterwards): “... another year has passed and the Performance Based Navigation program is tangled in a bureaucracy that allows the competing interests of different offices to muddle the program. The end result is that the effort to develop performance based navigation is left with no clear direction or coherent set of priorities.” Who knows where that quote came from? Senate Report 111-069 on the 2010 appropriations bill for THUD and related agencies. Congress gets it, but they need a brick wall – political pressure they cannot get around that will force them to act. And the public and the aviation industry need a burning platform from which to push congress against that wall.

A two-year overdue FAA Reauthorization Bill should be the brick wall. The seventh extension of FAA's authority was passed recently and the U.S. taxpayer and the aviation industry should not suffer an eighth. So how does this industry galvanize the public and the policy makers? How do we ignite our burning platform? Partly by remembering that old saw that all politics is local. Local airports, local aerospace companies, local governments. There are the local environmental benefits—PBN approaches are quieter, more environmentally friendly. The economic benefits to localities can be a powerful inducement as well. More efficient routing means more throughput for the airport, which increases revenues both for the airport and the locale. More throughput means more revenue for airports (more passengers paying Passenger Facility Charges, buying airport products, paying parking fees and so on ...) which creates jobs which means more tax revenue for local governments. More throughput also means more commercial air service which can be used to attract more businesses to headquarter in your city. It really is stimulus in action.

On the other hand, airports that don't embrace PBN and its benefits will not be competitive and viable in the future. Face it, you don't want to be the town made popular in a trivia question: "What was the name of the airport that used to be in...."

The follow-on, of course, is that as the airport goes, so goes the community ...

It's critical in all of this to remind policymakers that "aviation is not evil." We have a better track record on fuel efficiency improvements than any other mode of transportation. Aviation's track record on the environment is remarkably good. Aircraft entering the fleet today are 70 percent more fuel-efficient than those built 40 years ago on a per-seat-mile basis. In fact, the Boeing 787 will be more fuel efficient, on a per-passenger-mile basis, than all but the most fuel-efficient hybrid cars.

What's good for aviation in terms of the bottom line is good for the economy, good for the environment, and good for the community.

And that brings me to my conclusion: convincing policymakers to accelerate PBN implementation is going to take a lot of work at the local level.

Today's economic crisis will make ATM funding decisions extremely difficult unless PBN implementation is tied directly to improved environmental performance. Public aviation agencies and policy experts need to exchange data on the real economic and environmental benefits already achieved through existing PBN projects. And local communities have to be encouraged to speak up on their own behalf. After all, the benefits aren't just accruing to airlines—they're mainly going to ordinary folks on the street.

Thank you for listening to me today! I'd be happy to take any questions.