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COMMITTEE ON COMMERCE, SCIENCE, & TRANSPORTATION

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NEXTGEN AIR TRANSPORTATION SYSTEM

NextGen Must Be a National Priority

We know that our nation's air traffic control system is incapable of meeting the growing demand for air transportation and is in need of a true transformation. Incremental change in today's world of satellites and computer power is simply unacceptable. Government and industry stakeholders have developed and demonstrated new operational capabilities, enabled by new technologies, that could keep airport and airspace capacity ahead of demand. Yet, as a nation, we have been unable to implement these changes fast enough to eliminate system inefficiencies and the resulting congestion and delays. None of us can sit on our hands and wait for someone to provide 'the answers', as it is incumbent on all of us to work together to transform our aviation system. Whatever the obstacle – process, laws, regulations, funding – each must be attacked immediately. This Subcommittee will confront this issue head on as you craft the next FAA authorization bill—and we urge you to develop proposals that will truly drive the kind of ATC system that we know can be built and installed today. Waiting until 2025, as some plans call for, is simply not acceptable to everyone who flies, and every person connected with the aviation industry.

The benefits of change are clear – in terms of economic and environmental benefits and the impact on travelers. It is time that we make the implementation of the Next Generation Air Transportation System (NextGen) a national priority and provide the necessary leadership, commitment, and resources to make it a reality.

Specifically, we recommend:

- Establishing clear and strong leadership, including a fully responsible and accountable NextGen Implementation Office.

- Accelerating the wide-scale deployment of available capabilities including Automatic Dependent Surveillance – Broadcast (ADS-B), Required Navigation Performance (RNP), Continuous Descent Arrivals (CDA), and the Ground-Based Augmentation System (GBAS).

NextGen is a Key Element of the U.S. Transportation Infrastructure

There has been a great deal of discussion recently on the urgent need to revitalize our nation's infrastructure. Much of that attention has been focused on our roads and bridges, rail networks, and telecommunications – critical components, to be sure. Aviation's contribution to our infrastructure is just as important, however, and air traffic management is a foundational element of that infrastructure.

Airports are the most visible component of the aviation infrastructure. Revitalization of airports via new or upgraded terminal buildings, taxiways, and runways provides tangible evidence of congestion relief. The rest of the infrastructure – the 'highways in the sky', with the 'on-ramps' and 'off-ramps' that connect our nation's airports – is less easily visualized and yet key to the efficient operation of the air transportation system. Adding 'lanes' to these 'highways' and more efficient 'on-ramps' and 'off-ramps' doesn't involve pouring concrete, but rather requires implementing advanced, yet existing, technologies, including: space-based navigation, digital communications, automation and advanced displays supporting air traffic controller and pilot decision-making. This virtual infrastructure, implemented via software and electronics instead of concrete and steel, demands equal attention as a national priority.

NextGen is a Strong Engine for the U.S. Economy

Aviation's impact on the U.S. economy cannot be understated. The FAA estimates that civil aviation contributes 11 million jobs and $1.2 trillion in economic activity, amounting to 5.6% of the U.S. Gross Domestic Product (GDP)[1]. On the other hand, the Congressional Joint Economic Committee calculates that the cost of air traffic delays to the U.S. economy in 2007 was $41 billion[2]. To put this in perspective, rough estimates of the total cost of implementing the NextGen system have been on the order of $50 billion – a little more than one year's cost of the delays NextGen can and should eliminate.

Aviation is also a strong contributor to the U.S. balance of trade. In 2007, aerospace contributed $61 billion in net exports[3], the top industry performer. This strong economic driver is a result of America's historical leadership in aviation – leadership that has existed since the advent of flight. NextGen provides us with an opportunity to maintain that leadership by developing, demonstrating, and implementing the technologies, standards, and procedures that will transform the world's air traffic systems. Alternatively, if we choose to not act aggressively, we stand to be eclipsed as other regions, including Europe, Australia, and China, move to deploy new systems to meet their growing air transportation needs. We are positioned to be a global leader in air traffic management modernization, but if we do not act, we will relinquish that position.

NextGen Will Have a Positive Environmental Impact

Our aging air traffic system also has a significant impact on energy use and the environment. The aviation industry continues to make great strides in improving the efficiency of aircraft operations. Over the past 30 years, airlines have more than doubled their average fuel economy[4]. The industry continues to invest in more efficient airframes, engines, and systems, with a laser focus on reducing operating costs and achieving carbon-neutral industry growth.

At the same time, the air traffic system in which we are required to operate creates inefficiencies that are estimated to be between 10 and 15 percent. For the airlines alone, this inefficiency resulted in more than 10 million metric tons of carbon dioxide emitted unnecessarily in 2008. This is equivalent to the annual emissions from the electrical use of more than 1.2 million U.S. households. This does not have to be the case; these emissions are preventable.

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[1] The Economic Impact of Civil Aviation on the Economy, FAA, October 2008
[2] Your Flight Has Been Delayed Again – Flight Delays Cost Passengers, Airlines, and the U.S. Economy Billions, Joint Economic Committee Majority Staff, Chairman – Senator Charles E. Schumer, Vice Chairman – Representative Carolyn B. Maloney, May 2008
[3] The Economic Impact of Civil Aviation on the Economy, FAA, October 2008
[4] Measured in Revenue Passenger Miles per Gallon of Fuel – Air Transport Association, http://www.airlines.org/economics/energy/fuel+efficiency.htm

Technologies and Procedures can be Deployed to Save Fuel and Reduce Emissions

Required Navigation Performance, Continuous Descent Arrivals, and Ground-Based Augmentation Systems are three technologies that have been shown to provide significant environmental benefits. Operational use of these capabilities should be accelerated.

Required Navigation Performance and Continuous Descent Arrivals are Key Technologies

Performance-based navigation using Required Navigation Performance (RNP) and Area Navigation (RNAV) relies on Global Positioning System (GPS) and inertial navigation technology to allow aircraft to fly accurate paths independent of classical ground-based navigation infrastructure. This enables flight paths between cities that are more direct, with fewer miles flown, and approach and departure procedures that are shorter and involve little, if any, intervention from air traffic controllers. The result is significant decreases in distance and time flown.

Practical, 'real world' demonstrations of RNP's effectiveness abound:

- Australia's Qantas Airlines, for example, has its fleet of Boeing 737s flying more than 100 RNP procedures each day. These procedures in Brisbane alone cut approximately 15 miles and more than 1,600 pounds of CO_2 emissions on every approach.

- Southwest Airlines recently operated a Boeing 737 demonstration roundtrip between Dallas Love Field and Houston Hobby using RNP procedures, yielding 904 lb. of carbon dioxide savings, part of its $175 million program to implement RNP fleet-wide.

- Since 2005, Alaska Airlines, an early RNP pioneer, has documented 5,300 flights that avoided diversions by using RNP procedures. In 2008, these 'saves' resulted in cost savings of $8 million.

Another procedural improvement that relies on the use of RNP is Continuous Descent Arrivals (CDA). These procedures couple the *lateral* accuracy provided by RNP with the *vertical* accuracy provided by the aircraft's Flight Management System (FMS) and flight controls. The flight path is coordinated with air traffic control via data link communications. The resulting descent is flown from cruise altitude to final approach with few, if any, level segments and the engines operating continuously at or near idle power.

- UPS uses these procedures at Louisville, with reported savings of between 250 and 465 pounds of fuel (37-69 gallons, 780-1456 pounds of CO_2) per arrival.

- SAS Airlines have flown more than 1300 Continuous Descent Arrivals to Arlanda, Sweden, with average fuel savings of 410 pounds of fuel (60 gallons, 1279 pounds CO_2) per arrival.

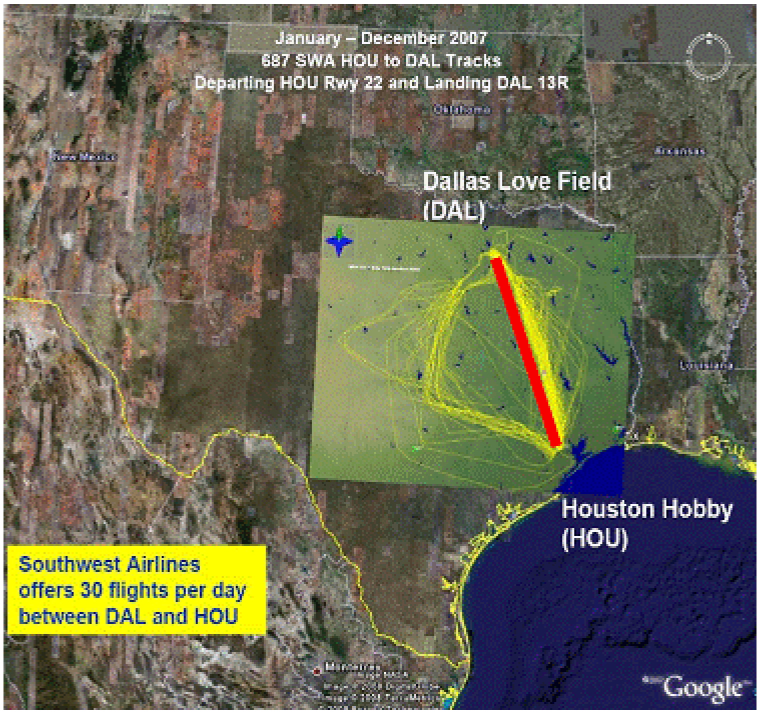

Figure 1 - Southwest Airlines operations between Dallas and Houston (Yellow – Non-RNP ground tracks; Red – RNP direct route)

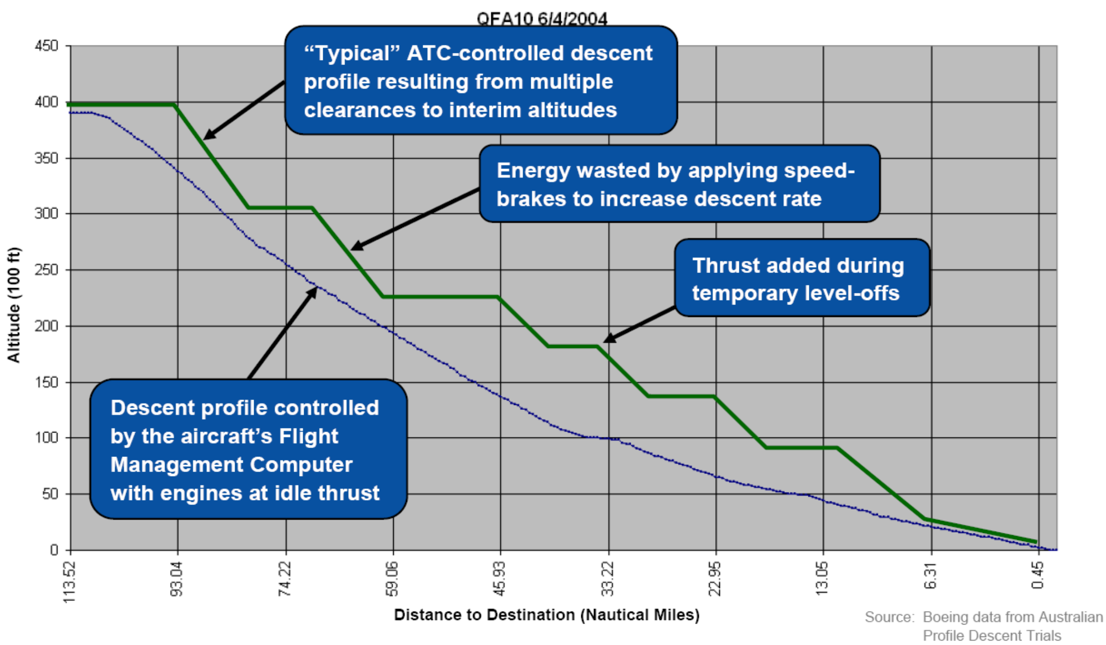

Figure 2 - CDA versus a classical ATC 'step down' descent profile

Combining the benefits of RNP and CDA over the entire flight magnifies the benefits. This has been demonstrated in trials on both trans-Atlantic and trans-Pacific routes. In the Pacific, the Asia and South Pacific Initiative to Reduce Emissions (ASPIRE) has sponsored several flights between Australia/New Zealand and the U.S. An Air New Zealand Boeing 777 flying from Auckland to San Francisco shaved five minutes off the flight and saved 1200 gallons of fuel, producing 11.5 metric tons less CO_2.

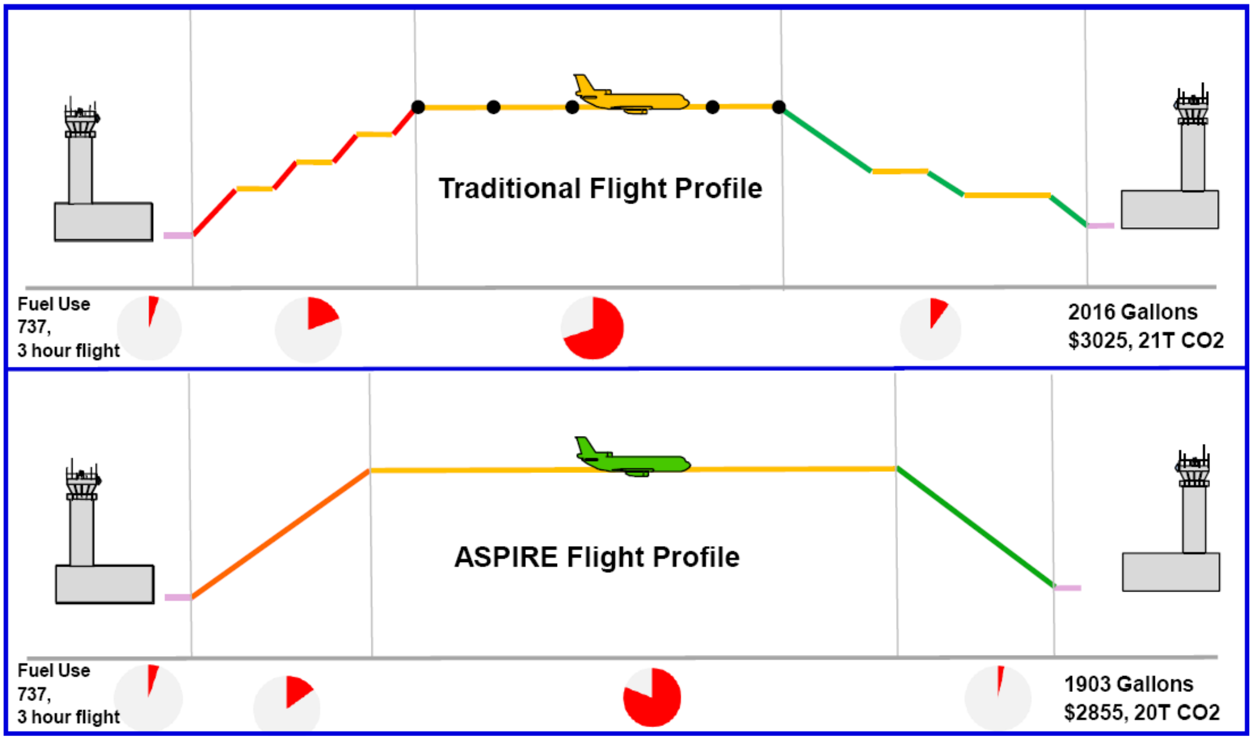

Figure 3 - ASPIRE Versus a Traditional Flight Profile

Ground-Based Augmentation System Reduces Costly Diversions

The GPS Ground-Based Augmentation System (GBAS) is the next-generation precision landing system technology, a 21st century alternative to the 1950s-era Instrument Landing System (ILS) currently in operation. GBAS technology utilizes a ground system installed at an airport to identify and correct small errors in GPS satellite signals and transmits this information to arriving and departing aircraft. This high-integrity, extremely precise positioning data is coupled with GBAS-provided approach paths and aircraft avionics to guide the aircraft to the runway in low visibility conditions.

Due to limitations with current ILS equipment, airports routinely lose capacity as visibility decreases. Fifteen of our top U.S. airports experience greater than 25 percent reduced capacity when ceilings are below 200 feet[5]. In these situations, aircraft are often forced to wait in holding patterns – burning extra fuel or even worse, diverted to alternate airports. GBAS technology

[5] Airport Capacity Benchmark Report 2004, FAA

provides precision approach capability to all runway ends, maximizing airport capacity in all visibility conditions and minimizing delays and diversions – ultimately saving fuel and reducing emissions – while also contributing to a safer operating environment.

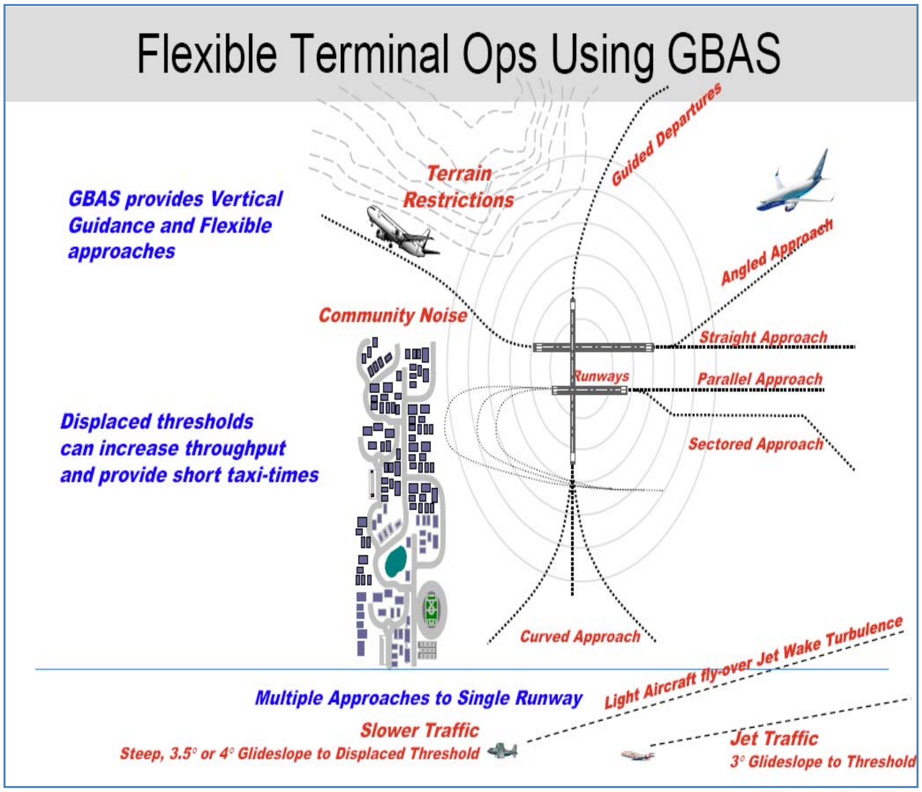

Figure 4 - GBAS provides many benefits in the airport terminal area

The Need to Establish a NextGen Implementation Office

In the last FAA reauthorization bill, Vision 100 – Century of Aviation Reauthorization Act of 2003, Congress created the Joint Planning and Development Office (JPDO) to coordinate across government and industry stakeholders, establish a NextGen vision and operational concept, and develop an integrated plan for its deployment. JPDO has since successfully achieved these objectives.

It is now time to implement NextGen. And for this, we need to rethink the organizational approach.

NextGen is a multifaceted system requiring the functional integration of many different subprograms and developments, which will require significant investment over many years. For a project of this complexity and scope, it is critical that overall planning and execution responsibility be centralized. The current structure, which spreads the decision-making for program requirements, timing and investment priorities across numerous organizations, has resulted in inefficiencies, confusion, and delays that we simply can no longer afford.

We need a single NextGen Implementation Office with strong leadership, directly responsible and accountable for the successful deployment of the NextGen Air Transportation System. This Office must:

- turn the JPDO's Integrated Plan into a detailed Implementation Plan;
- establish the year-over-year investment required;
- be provided with the resources necessary to get the job done;
- directly manage the FAA's NextGen programs;
- identify clear and agreed-to metrics that track performance to NextGen goals, and
- be held accountable for achieving results.

It is especially important to ensure the primary metrics used to measure NextGen results reflect air transportation system performance and not implementation activity. For example:

- Rather than measuring the number of new runways built, we should be measuring the operations per hour on our existing runways.
- Rather than measuring the on-time arrival rate associated with continually increasing 'block times', we should be measuring the average gate-to-gate times and fuel burned between key city pairs.
- Rather than measuring the numbers of procedures (e.g., RNP, LPV) published by FAA, we should be measuring the number of operations using these advanced procedures and the average distance flown and fuel burned in key terminal areas.

As with the JPDO, it is expected that this office will reside within FAA. However, it must have sufficient visibility to accomplish its critical mission, including coordination of the important NextGen contributions from partner agencies and industry and the alignment of NextGen development and deployment with the international community.

Accelerate Deployment of Off-the-Shelf Capabilities to Improve Near-Term Performance

At the same time that this office is being set up, we need to accelerate the deployment of capabilities that are fully available today and that we know will be an important part of the evolving NextGen system. These capabilities include Automatic Dependent Surveillance – Broadcast (ADS-B), Required Navigation Performance (RNP), Continuous Descent Arrivals (CDA), and the Ground-Based Augmentation System (GBAS).

Automatic Dependent Surveillance – Broadcast (ADS-B) is the next-generation surveillance technology that will augment and decrease dependence on our aging and costly radar infrastructure. ADS-B uses GPS-based aircraft position information, broadcast from aircraft via data link to a ground network and other aircraft for use by controllers and other pilots. The first step in ADS-B deployment is getting the information from the aircraft to the ground – commonly referred to as 'ADS-B OUT'. Australia is using ADS-B for routine surveillance across much of their airspace today. Over 60% of the international flights operating to and from Australia are already equipped with the ADS-B OUT capability and are benefiting from ADS-B surveillance services in airspace covering over 50% of the Australian continent. Australia's civil aviation regulator has also issued a rule requiring ADS-B capability for all aircraft operating above 29,000 feet by 2013. Similarly, Europe has published a proposed rule for all aircraft to have ADS-B OUT capability by 2015. In addition, Canada is actively deploying ADS-B today to control aircraft operating over Hudson Bay.

The FAA is well on its way to deploying the nationwide infrastructure needed to receive the ADS-B information and integrate it with controller displays. A ground network and associated service is expected to be fully deployed by 2013.

ADS-B avionics are well-defined by industry standards and available for most aircraft today. However, there is very little incentive for aircraft operators to equip their fleets now since the primary benefit of ADS-B OUT is to the FAA in the form of reduced costs from decommissioning a large number of the secondary surveillance radars. Unfortunately, the FAA's proposed rule for airborne equipage will not be fully effective until 2020, deferring FAA's cost savings.

Rather than wait until 2020 for FAA savings to kick in, the requirement for ADS-B OUT capability in the U.S. should be accelerated to at least align with Europe's 2015 requirement. Additionally, to ensure that overall cost-benefit can be established, the FAA should be provided with the funding needed to equip the necessary aircraft with ADS-B OUT capability. This would greatly accelerate the benefits to the FAA, while jumpstarting a key NextGen enabler. With a fully-deployed ADS-B OUT capability, the business case for user investments in the second step, 'ADS-B IN' will be stronger and far easier to make. This capability is the key to capacity and safety improvements needed in the future.

Another technology that is ready for implementation now is **_Required Navigation Performance (RNP)_.** As discussed earlier, RNP provides the ability to fly precise and repeatable paths, enabling shorter and more effective arrival and departure procedures. For example, during a 12-month period, more than 8,000 RNP approaches at Brisbane saved 34 Qantas 737-800s a total of 4,200 minutes of flying, 65,000 gallons of fuel and 621 metric tons of CO_2 emissions. Average delays at the airport were reduced by 30 seconds for all arriving aircraft, which benefit from the fact that the RNP 737-800s are shaving between 10 and 23 nautical miles off their approach path to the runway, compared with an existing visual approach[6]. Effective fuel-saving procedures are essential to motivate aircraft operators to invest in these upgrades.

[6] Aviation Week and Space Technology, April 28, 2008, page 56.

To be clear, RNP technology exists and is being used *today*. In Australia, there have been in excess of 31,000 RNP approaches and departures flown to-date[7]. We simply need to accelerate the development of RNP procedures. While the FAA has been developing RNP procedures for several years, they remain the exception rather than the norm. One mechanism for acceleration is to enlist the support of third-party procedure developers. There are already several qualified sources for this service and they could be effectively employed to augment the existing FAA resources.

Continuous Descent Arrival (CDA) is another capability that can be exploited more rapidly. Many aircraft are already equipped with the basic systems needed to execute CDA procedures. With the significant cost savings resulting from CDAs, other operators will be strongly motivated to invest in upgrades if they could routinely use these procedures. As described earlier, numerous trials, including SAS (Sweden), UPS (Louisville, KY) and ASPIRE (Pacific Rim to Los Angeles/San Francisco), have demonstrated the procedure's benefits. Routine use of CDAs will require some modification to airspace structures, as well as providing tools and training to air traffic controllers. The solution is well-understood; the issue at hand is dedicating the resources needed to put this capability to use in routine operations at more airports across the U.S.

One final technology that should be accelerated is *Ground-Based Augmentation Systems (GBAS)*. FAA approval for the initial version of the GBAS ground station is anticipated by May of this year. Ground stations are already deployed in Sydney, Australia; Bremen, Germany; Malaga, Spain; Guam; Seattle and Moses Lake, Washington; and Memphis, Tennessee. Newark, New Jersey and Minneapolis, Minnesota are planning ground station deployments in 2009. Boeing 737s and Airbus A380s are already coming off the production line with the necessary avionics to support GBAS. Boeing's 787 and 747-8 will be equipped for GBAS as well, and plans are in place for upgrades to most production Boeing and Airbus aircraft.

The FAA has been very supportive of this technology, and it is now time to accelerate the installation of GBAS systems at our nation's largest airports. As with other NextGen technologies, a clear business case for aircraft upgrades cannot be made without the availability of, or at least a strong commitment to, the installation of GBAS ground stations and supporting operational procedures.

Airspace Restructuring Around Airports is Essential

Finally, it is important to keep in mind that none of these NextGen capabilities can be successfully deployed, nor the benefits fully achieved, without restructuring the routes aircraft fly as they arrive and depart from our nation's airports. Using RNP, CDA, and GBAS, these new routes are often more community-friendly, creating less noise and emissions. For example, Figure 5 shows the flight paths for RNP (green) and Non-RNP (red) aircraft approaching Brisbane runway 01 via the 'River' noise abatement procedure.

[7] Airservices Australia

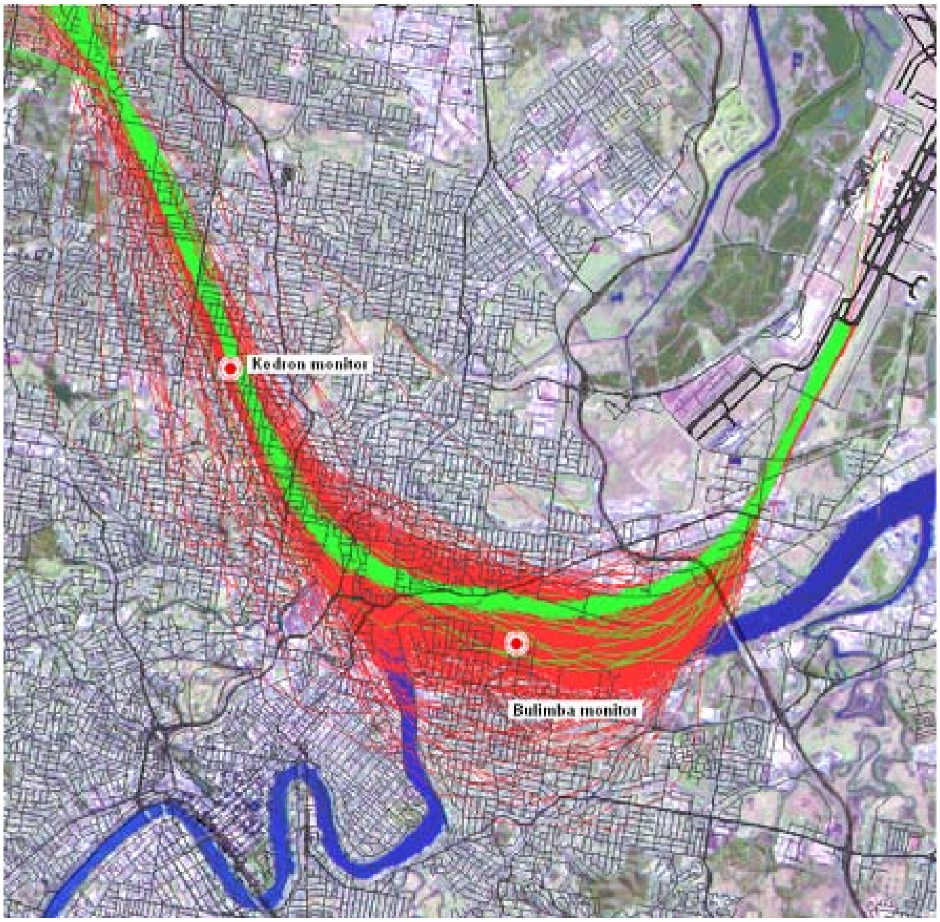

Figure 5 - Example of the RNP 'River' approach to Brisbane runway 01 - 03/08

The RNP approach allows tracking at lower altitudes over non-residential areas such as, in this case, the Brisbane River and industrial areas. With RNP (green), the precision to stick to the river and not 'creep' over neighboring residential areas is quite clear.

While it is understandable that local communities have strong interests in where these virtual 'off-ramps' and 'on-ramps' are located, it also needs to be clearly understood that these changes are needed to achieve the broader community benefits of overall reduced noise and emissions. An example of this dynamic is the on-going effort to reduce congestion in the New York terminal airspace. Four of our nation's most delay-prone airports are located within this airspace and effects from these delays routinely ripple throughout the U.S. Efforts to provide congestion relief via airspace redesign to take advantage of new capabilities and procedures has been in work for over a decade, delayed in part by opposition from local community groups. The support and leadership of Congress is absolutely critical in developing the community consensus needed to aggressively deploy NextGen capabilities.

We Must Accelerate NextGen Implementation

The NextGen Air Transportation System is needed to fuel our economic growth, lower energy use, and protect our environment. We must make it a national priority and provide the structure, leadership, and resources needed to be successful. We need not wait for 2025 to see results, and in fact, we must not. Improvements are needed today and solutions are on the shelf waiting to be deployed.

We offer the following recommendations:

1) Establish and fund a fully responsible and accountable NextGen Implementation Office in 2009.

2) Accelerate the requirement for ADS-B OUT capability to 2015 and provide the funding needed to satisfy the cost-benefit analysis.

3) Install GBAS technology in the top 20 most congested US airports by 2011 and top 50 most congested airports by 2013.

4) Set and measure an RNP adoption target beginning in 2009 with a 20% year-over-year increase until 90% of commercial flights are using RNP procedures, including Continuous Descent Arrivals.

Our shared vision for NextGen is clear. The aviation industry now looks to the Congress and FAA for the focused leadership required to implement this much-needed advance in our transportation infrastructure.