



How Privatizing Air Traffic Control Could Affect Satellite Navigation's Role in Aviation

DEE ANN DIVIS



Dee Ann Divis has covered GNSS and the aerospace industry since the early 1990s, writing for *Jane's International Defense*

Review, the *Los Angeles Times*, *AeroSpace Daily* and other publications. She was the science and technology editor at United Press International for five years, leaving for a year to attend the Massachusetts Institute of Technology as a Knight Science Journalism Fellow.

The satellite-based NextGen program is in trouble — no question about it.

The Federal Aviation Administration (FAA) air traffic modernization effort will likely cost triple its original \$40-billion program budget and need an extra decade — until 2035 or beyond — to reach completion, according to 2014 testimony by Department of Transportation (DoT) Inspector General Calvin Scovel.

Part of the problem is the FAA's reliance on the Airport and Airway Trust Fund, a dedicated pool of money filled by ticket taxes and other largely travel-related fees that shrinks or swells with the economic tides.

"The funding for the FAA has cycles based on the taxes that are taken in," explained Jim Williams, who spent six years coordinating and integrating NextGen's engineering work as the program's director of engineering services. "So, any time there's a dip in the economy and there's less air travel, then there's less money available. That funding stream fluctuating up and down has made it very difficult to modernize the system."

To help address this situation, Republicans Bill Shuster of Pennsylvania and Frank LoBiondo of New Jersey — respectively the chairmen of the House Transportation and Infrastructure Committee and its Aviation Subcommittee — proposed in February to spin off and privatize the FAA's air traffic control activities. Organized as a nonprofit, the company would be able to charge fees to support itself and could use that steady income to secure long-term financing for modernization through the bond markets.

If ultimately approved, the change could fully support the halting shift away

from relying on radars for air traffic control (ATC) to relying on GPS — a change vital to increasing the air traffic system's overall capacity. But surprises could appear along the way — and not necessarily good ones — among elements lurking in the details, especially where navigation-related programs are concerned.

The AIRR Act

The Aviation Innovation, Reform, and Reauthorization Act of 2016 (bill HR 4441, also called the AIRR Act) which addresses a broad number of issues, won committee approval a week after being introduced and moved to the full House for consideration. That doesn't mean Shuster and LoBiondo had built consensus among their colleagues. Local vocal opposition, however, prompted the House leadership to table the bill not long after the committee gave it a thumbs up.

Opponents of the bill, who are largely concerned about broader, non-navigation issues, object to turning over tax-funded infrastructure, for free, to an airline-dominated operation whose pricing, service, and business practices would not be disciplined by competition or government oversight.

They are also worried that air travel prices would rise, out-of-the-way airports would be short-changed, and flying would become more risky if safety officials are no longer integrated into the organization. On the navigation side, concern has arisen that NextGen could be further delayed by a years-long transition to privatization and put at risk if the company should fall prey to business disruptions like those on 9/11. If lawmakers really want to help NextGen, they say, then Congress should provide the program steady, long-term funding.

Senators John Thune (R-South Dakota) and Bill Nelson (D-Florida), the chairman and ranking member of the Senate Committee on Commerce, Science, and Transportation, did sharpen the focus on NextGen when they introduced the Federal Aviation Administration Reauthorization Act of 2016 (S. 2658) in early March. The bill included no ATC privatization language but would mandate a

stack of new reports on NextGen progress.

That say-nothing approach, however, might be more about buying time to hammer out more fundamental change than stopping that change in its tracks.

Thune is interested in Schuster's proposal, said Bradley Edwards, the Senate Commerce Committee's policy director.

"I think there are benefits that we can't ignore as it relates to potentially changing and reforming government to improve the way the FAA can manage air traffic and deliver NextGen benefits," Edwards told a February 26 meeting of the American Bar Association's Forum on Air and Space Law.

"There've been stacks and stacks of reports that identify challenges that the FAA's had, and some of the challenges appear to be related to some structural issues," Edwards continued. "That said, Chairman Thune is listening to his colleagues. We think the best way to proceed at this point is to proceed, introduce a bill without it, and continue the conversation and see how things play out."

A Road Well Traveled Elsewhere

Privatization is not a new concept. Initially proposed in the United States in the 1980s, it has already been implemented in a number of other countries, including the United Kingdom. Australia has a government-owned corporation called Airservices Australia while Nav Canada serves America's northern neighbor and is credited with saving the foundering Canadian Automated Air-Traffic System.

Nav Canada is now partnering with Iridium to launch a global plane-tracking service called Aireon that will give air traffic controllers real-time data on planes flying anywhere in the world — preventing the sort of tragic search seen two years ago when Malaysia Airlines Flight 370 disappeared while en route from Kuala Lumpur to Beijing.

Privatized operators have a proven track record for safety and better service, argued Nancy Graham, a former FAA official who served for eight years as the director of the Air Navigation Bureau of the International Civil Aviation Organization (ICAO) before retiring in 2015.

"There's never been any degradation in safety, and there's only been better services as a result," Graham told *Inside GNSS*.

Graham, the principal in the recently launched Graham Aerospace International, prefers a 'corporatized' approach, akin to that in Australia, where the ATC firm operates like a business but is wholly owned by the government.

"As corporatization has come into air traffic management," she asserted, "costs have gone down, cooperation has gone up, transparency has gone up, and the ability for these organizations to manage themselves in a businesslike manner has provided them untold benefits."

Among those benefits, she told *Inside GNSS*, is the ability to implement new technologies faster — both new technologies that use the airspace such as commercial drones, and technologies that improve ATC operations such as automatic dependent surveillance-broadcast (ADS-B). An ADS-B equipped plane sends out its GPS-determined location to air traffic control and to those nearby aircraft that equipped to receive the signal. The technology, which must be adopted by the vast majority of planes operating in the United States by 2020, is also the basis for the Aireon system.

"Look at ADS-B," Graham said. "Are we the first implementers of ADS-B? No."

U.S. innovation is severely hampered by its current ATC system, said Graham, who rose over a 16-years FAA career to become regional director for the Asia Pacific region before departing for ICAO.

"When companies doing research and development look at the implementation opportunities, they don't go to the U.S. anymore; it's just too complicated," she added. "It's too difficult to work with them under the regulatory scheme that they have. They go elsewhere to look at opportunities for prototyping new technologies. That's a shame."

Putting a private firm at the helm would enable the type of management and investment practices necessary for a successful service provider, said Graham.

"The fact is, to run a 24-hour system 365 days a year, you have to continue to plow money into technology that takes

you to a smarter future," Graham said. "You have to be competitive in terms of providing services, in what is, without question, one of the busiest air spaces in the world. And that has to be a continuous stream, just like any business has to have a continuous stream of research and implementation. That never stops."

Graham and Williams, who were the only ones approached by *Inside GNSS* willing to talk on the record about the controversial proposal, believe that a private organization would be quite capable of funding and managing the \$120-billion NextGen program.

"Look at the power industry," said Williams, "the nuclear power plants, and hydroelectric dams and coal-fired power plants. Those are all privately owned and operated and the infrastructure that provides power is all privatized — the rail lines are all private. There's massive infrastructure around this country involving all kinds of technology and control."

The major advantage, said Graham, is that a private sector ATC provider could make business decisions and not politically driven choices.

"The politics need to be separate from the business and right now it's all mixed up," she said. "It is very difficult for people that work in the FAA to actually do their job in a businesslike manner when they are really hamstrung with an awful lot of procedures that wouldn't be necessary in a businesslike environment."

Budget Gauntlets

Williams said he believes that stabilizing funding would be the biggest advantage of taking ATC private. Not only does the amount of the money available from the trust fund vary, as noted earlier, but it also has to be approved through a budget process that is infamous for delays.

It took seven years and 23 short-term extensions before the FAA reauthorization bill passed in 2012, and that bill extended the FAA's operations for just three years — to September 30, 2015. Congress is now working on a new reauthorization and is already nearing the end of its first new extension. As of press time, an effort to stretch the FAA's autho-

rization past its current March 31 expiry date had been passed by the House. The Senate Commerce Committee approved the reauthorization bill itself on March 16.

The trust fund money, which makes up an average of 60 percent of the FAA's budget, works its way through this tortured process while the rest of the funding is handled through regular appropriations channels — which are hardly known for their smooth operation.

In fact, the House Freedom Caucus made up of conservative Republicans voted March 14 to oppose the budget deal worked out in October by outgoing speaker John Boehner. That agreement would have put the government on an even keel until after the November elections. The move by the caucus puts the overall budget process in jeopardy, raising the prospect of yet another spending showdown a month before the fall election.

Operating with these kinds of uncertainties was “brutal, said Williams, who

is now a principal in the Public Policy and Regulation practice at the Dentons law firm.

“It’s the appropriations that are really killer,” he told *Inside GNSS*, with the funding fluctuations making it almost impossible to plan long-term modernization. Over one five-year period, he said, he saw the FAA’s capital budget run as high as \$3.3 billion and as low as \$2.4 billion.

“It takes about \$2 billion a year just to keep the system where it is,” Williams said. “Anything over \$2 billion is what’s necessary to modernize the system. So, you can tell that the modernization budget fluctuated wildly during that timeframe.”

That uncertainty, however, was not as bad as the government shutdowns, including the one that lasted six weeks, which, he said, “was just devastating.”

“The federal employees eventually got paid,” he said, “but you can’t pay a federal contract when there was no work performed. So, those thousands of con-

tractors who support the FAA who were sent home because their services weren’t needed during the shutdown — they didn’t get paid.”

Important skills were lost, he said, when some frustrated contractors ditched their FAA-related work for other jobs. Re-activating suspended contracts also wound up costing the agency extra money.

However, Williams said, “the real ripples were due to the brutal sequester budgets.” Those mandated reductions triggered all kinds of restrictions and planning for cuts that ultimately didn’t come. It slowed down contracts, said Williams, and paused FAA spending in a way that was hard to recover from. “It was very disruptive.”

A private-sector operator would be able to sell bonds to smooth out the highs and lows, privatization supporters insist. Williams suggested that business-focused managers also might be better positioned

3 constellation simulator



- Recreate real world conditions
- GPS, GLONASS, Galileo, BeiDou, QZSS and SBAS
- One touch record/replay of RF signals
- Signal simulation software available
- Free library of worldwide recordings and simulations

www.labsat.co.uk

NavtechGPS brings you
the smallest commercially available ...

Dual Antenna GPS-Aided INS



The VN-300



Ideal for UAVs, UAS, camera/platform
stabilization, guided munitions, robotics, more

- ◆ Very small: 45 x 44 x 11 mm, weighing 30 grams
- ◆ MEMS 3-axis sensors for heading, roll or pitch
- ◆ GPS compassing techniques for accurate heading in static conditions
- ◆ Aerospace-grade Kalman filter algorithm at rates up to 400 Hz

Contact us about integrating the VN-300 into your next project,
and ask us about the VN-300 development kit.

Your **ONE** source for GNSS
products and solutions

NavtechGPS

+1-703-256-8900 • 800-628-0885
www.NavtechGPS.com



Mark Your Calendars!

FALL GNSS COURSES ANNOUNCED



November 14 – 18, 2016 ♦ Washington, DC Area

- ◆ 541: Using Advanced GPS/GNSS Signals and Systems. *Instructor: Dr. John Betz.* Achieve proficiency, not merely familiarity, on the essential aspects of using GPS/GNSS signals, and drill deep into the signals of other systems (4 days). *Presented with Betz's new book.*
- ◆ 556: Inertial Systems, Kalman Filtering, and GPS/INS Integration. *Instructors: Dr. Alan Pue and Mr. Michael Vaujin.* Immerse yourself in the fundamentals and practical implementations that fuse GPS receiver measurements with strapdown inertial navigation in this 5-day course.
- ◆ 346: GPS/GNSS Operations for Engineers and Technical Professionals. *Instructor: Dr. Chris Hegarty.* A comprehensive introduction to GPS/GNSS system concepts, design and operation, plus an introduction to DPGS and Kalman filtering (4 days).

See our website for details, or contact Carolyn McDonald
at cmcdonald@navtechgps.com



NavtechGPS

+1-703-256-8900 • 800-628-0885
www.NavtechGPS.com

WASHINGTON VIEW

to raise money for critical gaps that government has had difficulty funding — such as addressing cybersecurity issues.

“The funding for specific cybersecurity efforts was always hard to come by,” he said, “because it wasn’t a program per se. I think that a privatized company, a privatized air traffic control system would have to invest in that. In some ways it might even improve the cybersecurity system because it could be given its appropriate level of funding.”

What about WAAS?

By all accounts it would take a long time to work through the creation of a new, private ATC operator. The future of the GNSS-related activities now handled by the FAA would depend, said Williams, on how those responsibilities were divided up and, especially, on where the monies now flowing into the trust fund wound up.

Those negotiations could be tricky, suggested Williams. Who, for example, should pay for the Wide Area Augmentation System? “That [WAAS] has become pretty much a public utility that is paid for largely out of the trust fund,” he said. “It’s a lot of money. I don’t remember the exact number but it’s in the order of hundreds of millions not tens of millions — and that’s an annual cost that goes to pay for the monitoring, the signal in space, and the satellite costs as well.”

Eventually, the United States will have to replace the WAAS satellites to keep its GPS differential corrections and integrity monitoring service going.

“It’s kind of like the Department of Defense has created a public utility with the GPS system,” Williams said. “They’re sort of carrying the weight for the world. Everybody’s using it. The same thing with the FAA and the Wide Area Augmentation System. That’s what helps your GPS to be so accurate and helps make GPS more available.

Even so, because the key function of WAAS is to support aviation, he said, “the assumption would be that the corporation would be required to pay for that,” though he speculated that that might change. “I’d think over time they would be looking to find ways to cost share that because it’s not just an air traffic control service — it’s an everybody service.”

Untangling FAA Navigation Responsibilities

Williams said it could be very complex to untangle some of the FAA’s other navigation-related responsibilities.

He felt that the legacy FAA likely would remain the one responsible for supporting international efforts to integrate aviation-related satellite navigation systems and the work the agency now does with the National Telecommunications and Information Agency (NTIA) to manage and coordinate spectrum usage.

Williams, who led the FAA Team during negotiations in the 1990s to create a second civil GPS frequency, said it is also unclear how a new private organization would fit into such an effort in the future — like adding a new capability to the constellation or enhancing monitoring done through the ground control system. As things now stand, the Department of Trans-

portation, of which the FAA is a part, can bring up issues at the National Executive Committee for Space-Based Positioning, Navigation, and Timing (PNT), which it co-chairs with the Department of Defense.

“The FAA funded [work on the second civil signal] out of their tax dollars,” he said. “Would that be an aviation obligation or would the privatized air traffic control system say, ‘No that’s more of the transportation responsibility writ large,’ and try to get the federal government to continue to pay for that?”

The responsibility for funding future research would also have to be resolved, he said. Congressman LoBiondo has made it clear that the FAA’s William J. Hughes Technical Center, which happens to be located in his district, would stay under the government umbrella.

Williams pointed out, however, that a good deal of the money that supports the work advancing the state-of-the-art for air traffic control comes out of the trust fund and from the air traffic organization. “So, funding would be a question going forward,” he said.

The solution also needs to ensure that the portion of the FAA that stays within the government will be given enough money to be able to perform the safety oversight essential to keeping a private sector operator on track, said Graham.

“The regulator still needs to be properly funded to regulate the air traffic organization, she said. “Some of the concerns are, if you peel out what is essentially the financial engine of the organization, that the FAA won’t get proper funding to do its proper regulations, not just in the US but also around the world. So [the deal] has to include some thinking about a properly structured and funded regulator that’s left in the wake of that separation.”


Making Privatization Work

Despite the debate over privatization, and the issues raised by Williams and Graham about the details, there does appear to be general consensus on one point — something needs to be done because NextGen has to succeed.

“What’s the alternative?” said Graham. “It has to happen if we are going to continue to have the [economic contribution] that we expect aviation to produce over time.”

Graham suggested that the FAA has already bought into the idea of eventual privatization. “The organization was restructured sometime back to be ready for and prepared for that split,” she said, “It’s totally doable [and] can be structured in such a way that all of the stakeholders get what they need from the system.”

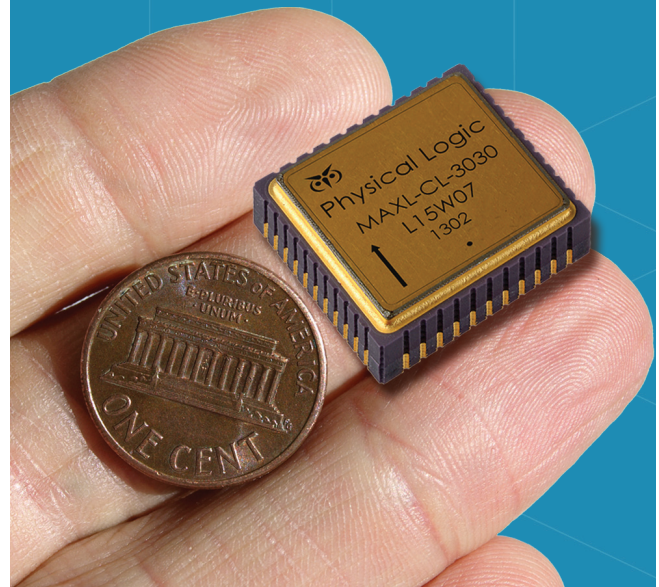
Williams agrees that air traffic control will be run commercially eventually — but not for a very long while.

“It’s going to be really hard to resolve because of all the money involved and all the complexities and the various constituencies,” he told *Inside GNSS*. “I would not hazard a guess as to how long that could be — is it 5 years or 20? Who knows? But the bottom line is that the examples are all out there and it does seem to work to privatize the air traffic control services. In my mind, it’s just a matter of time until it goes private.” 



*Used to do it with
macro electro-mechanical
accelerometers?*

*Do exactly the same with
advanced MEMS technology*



If you need an accelerometer that is small in size but big on performance, check out our family of advanced open and closed loop MEMS accelerometers.

Our newest closed loop MEMS accelerometer offers results you’d expect from a traditional macro electro-mechanical accelerometer for Navigation-Grade with a 30g sensing range.

To witness the biggest leap in accelerometer technology:

- Visit our booth #108 at IEEE/ION PLANS
- Attend Session A6 on April 14th, starting 14:30

info@physical-logic.com www.physical-logic.com