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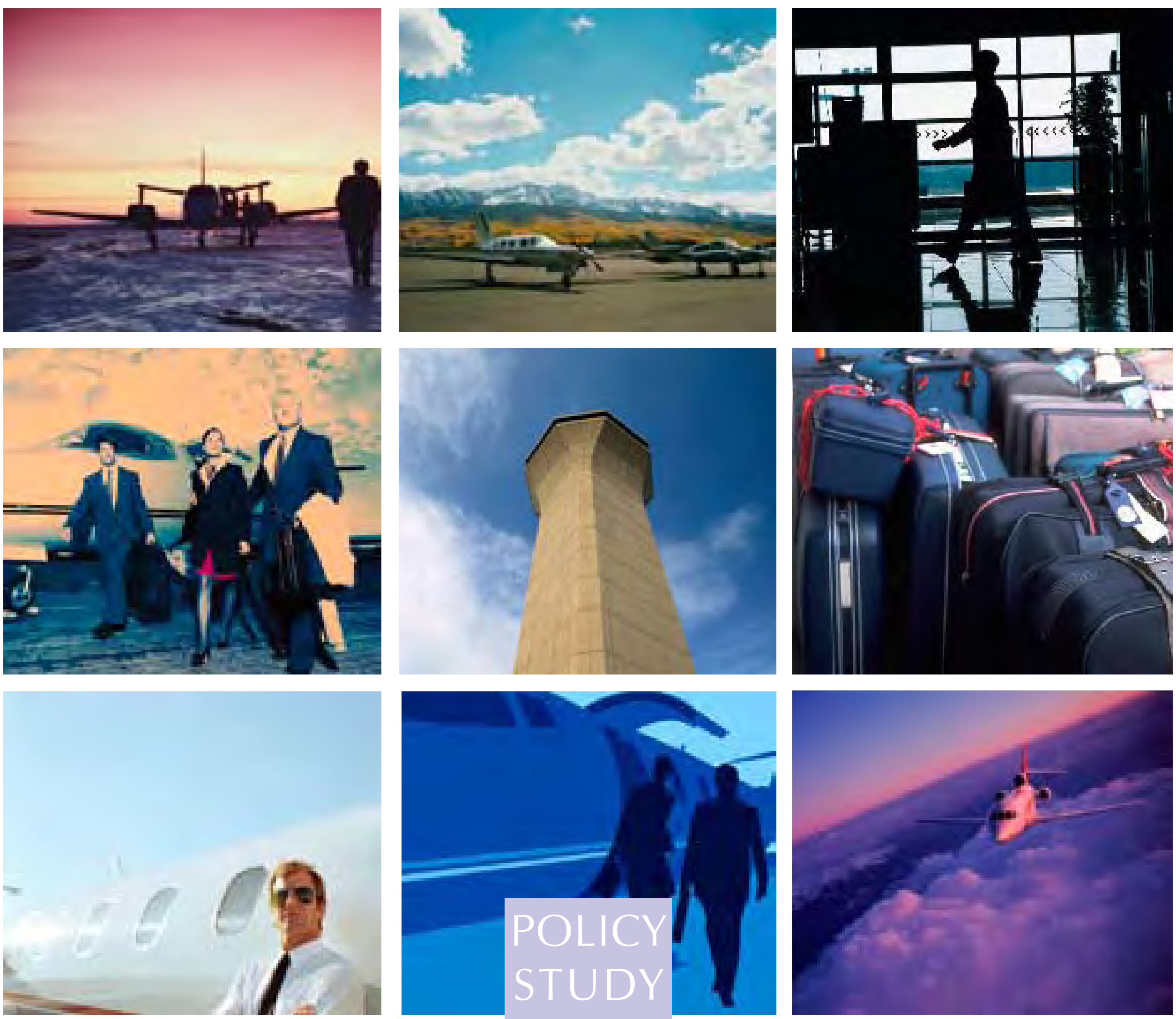
## Taking a Closer Look

By Robert W. Poole, Jr.



POLICY STUDY 347

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### Executive Summary

American business depends critically on air transportation, whether it involves employees and managers on commercial airlines, executives on business jets, or packages and cargo delivered via cargo plane. Yet the capacity of our aviation infrastructure is not keeping pace with the projected growth in flight activity over the next 20 years. Without fundamental change, the system will begin running out of capacity within this decade, and within 20 years untenable delays will make forced cutbacks in both airline and business jet operations inevitable.

Continued incremental improvements to today's air traffic control (ATC) system—essentially retaining the 20th-century model of separating planes by hand—cannot cope with projected aviation growth. Plans are under way for a completely new, "network-centric" approach that can double or triple the system's capacity and dramatically increase its productivity, thereby keeping its cost affordable. But three obstacles stand in the way of implementing that system:

- A lack of capital funding,
- High implementation risk due to the FAA's civil-service culture, and
- Political opposition to needed facility consolidation.

Removing ATC from the federal budget process and creating a user-oriented governance mechanism—known globally as ATC commercialization—can address all three impediments. Shifting from aviation taxes to direct user payments for ATC services is the *essential precondition*

for commercialization. It frees ATC from the federal budget process and other federal constraints, while providing a bondable revenue stream to facilitate needed modernization investment.

Business aviation trade groups such as the National Business Aviation Association (NBAA) and the National Air Transportation Association (NATA) are opposing ATC user fees, largely out of concern that they will greatly increase the cost of business aviation. This paper identifies what 15 different business jets currently pay in federal aviation taxes, and then estimates what each would pay, for the same annual flight activity, under several possible ATC fee regimes. This analysis led to three important findings.

The first finding is that under today's tax regime, the same business jet pays three entirely different amounts to receive exactly the same ATC services, depending on whether it is flown as a corporate-owned jet, a fractionally owned jet, or an air taxi/charter jet. *Charters and fractionals pay four to five times as much as corporate-owned jets for identical services.*

The second finding is that under some types of user-fee regimes (e.g., Canada's), many business jets would actually *pay less than they do today* in aviation taxes, especially fractionals and charters.

And the third finding is that the benefits of shifting from today's 20$^{th}$-century, manual-separation form of ATC to a network-centric system with ample capacity could easily offset the increase in costs due to a switch to ATC fees. For most corporate jets, if the new system saved as little as 3 to 5 percent of annual flight time (by reducing delays in holding patterns, providing direct routings and optimal altitudes, etc.), the operating cost savings from fewer flight hours would offset the small increase in cost per flight hour.

Thus, business leaders should look carefully at the case for ATC reform, of which the shift to ATC fees is merely the *means*, not the end. A 21$^{st}$-century ATC system, with ample capacity, will keep aviation as the vital business tool it became in the second half of the 20$^{th}$ century. The alternative is rationing of increasingly scarce airspace capacity, which would have major negative consequences for American companies and America's economy.

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**Part 1**

# Introduction: The Looming Aviation Infrastructure Crisis

American business depends critically on air commerce. Getting key people where they need to go, quickly and reliably, requires air transportation. Nearly all companies rely on commercial airlines for transporting many of their people, and a growing number—of all sizes—make use of business aviation, including corporate jets and turboprops, air taxi services, and participation in fractional-ownership programs.

All of aviation depends on having adequate infrastructure within which to operate. Aviation infrastructure consists of airports and the air traffic control (ATC) system. While the airports are mostly owned and operated by local governments, the ATC system is owned and operated by the Federal Aviation Administration (FAA). The FAA does overall planning and forecasting for all aviation infrastructure, and assists the expansion of airports via grants from the Airports Improvement Program (AIP).

In the summer of 2000, the aviation system experienced the worst delays thus far recorded, as flight activity peaked in the end stages of the late-1990s boom. The terrorist attacks in September 2001, and the economic recession of the early years of the new century, led to several years of decreased air travel activity. However, by 2005 passenger numbers and flight activity had returned to pre-9/11 levels, and aviation experts were predicting the return of serious summertime congestion and delays in 2006 and beyond.

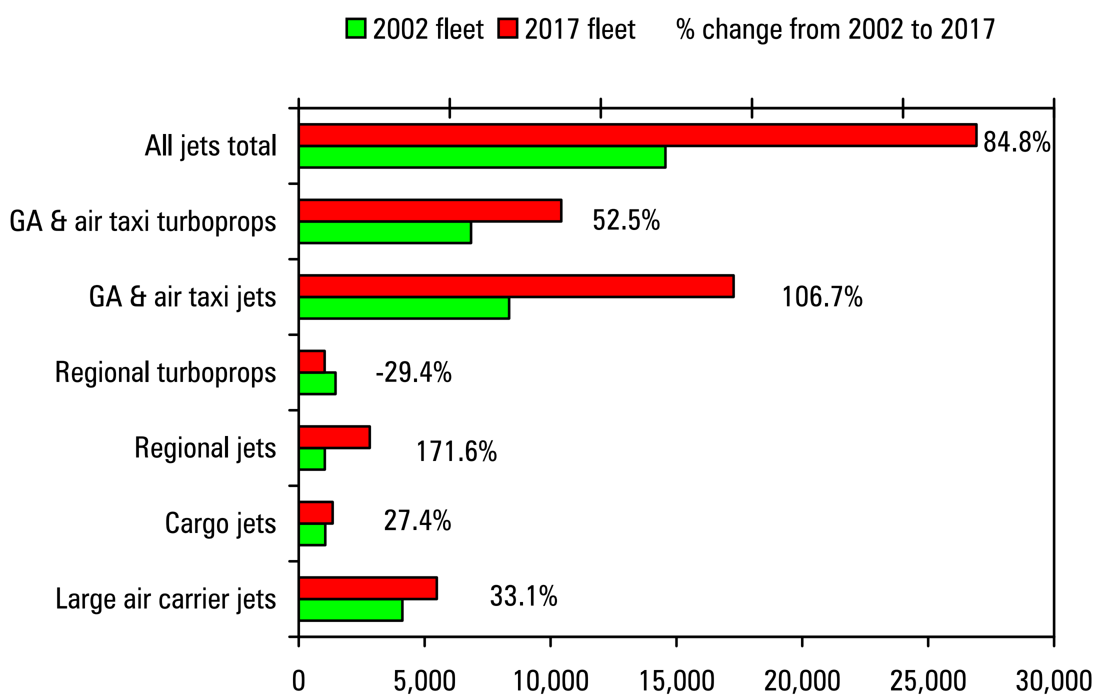
Exacerbating the trend is that today's (and tomorrow's) passengers are being carried in a larger number of somewhat smaller planes than was true in the 1990s. Among the factors driving this trend are the following:

- The increasing market share of low-cost carriers, whose planes are mostly single-aisle, narrow-body jets(e.g., 737s and A-320s);
- The replacement of mainline airliners (e.g., 737s or 757s) with regional jets on a growing number of routes, giving passengers greater frequencies for the same amount of seat capacity;
- The migration of some business travelers from commercial airlines to fractional providers and aircraft charter services, to avoid airport delays associated with increased airport security;

- The continued growth in corporate aviation, for the same reason; and
- The expected introduction of very light jets (VLJs) in potentially large volumes over the next decade or two, mostly serving business travelers.

Thus, U.S. aviation infrastructure faces the challenge of coping not only with ever-increasing passenger numbers, but also with an even faster rate of increase in the amount of flight activity needed to handle those numbers. Table 1 shows the latest FAA projection of the U.S. turbine-powered fleet between 2002 and 2017. As can be seen, the total jet fleet increases by 85 percent, with the number of regional jets up 172 percent and general aviation/air taxi jets up 107 percent by 2017.

**Figure 1: FAA Forecast of Turbine Fleet, 2002-2017**




Source: FAA 2006 Aviation Forecast

Against this backdrop of large projected aviation growth, the federal government has created an inter-agency group called the Joint Planning & Development Office (JPDO) to develop a blueprint for a new-technology approach to aviation infrastructure, dubbed the Next Generation Air Transportation System (NGATS). One of the JPDO's initial tasks was to assess the extent of future demand for air travel activity and compare it with a business-as-usual scenario of modest annual improvements in airport and ATC capacity.

In a white paper published in 2005, the JPDO created a baseline demand forecast for the national airspace system (NAS).[1] This initial baseline forecast, for 2014 and 2025, assumed a more or less unchanged fleet mix. On that basis, it forecast total system operations growing by 20 percent by 2014 and 40-50 percent by 2025. However, an alternative projection factoring in the shift to smaller aircraft and greater use of secondary airports in larger urban areas produced significantly higher flight activity.

Next, the white paper looked at projected increases in NAS capacity, based on the ongoing gradual modernization of the system, as set forth in the FAA's Operational Evolution Plan (OEP). Since that business-as-usual modernization adds only modest capacity to the system, when future performance is simulated, "the demand scenarios [from the baseline analysis] quickly outstrip current and anticipated NAS capacities . . . [A]t higher levels of demand, system delays quickly rise over the course of the simulated day to untenable levels." Figure 2 is taken from the JPDO white paper. It shows a typical daily (non-summer) delay pattern, hour by hour, in 2004 and compares that with situations in which demand is 1.2 times as much and 1.4 times as much (as in the baseline forecasts for 2014 and 2025). As can be seen, delays spill over into the next day even at demand that is just 1.2 times the 2004 level. The white paper sums up as follows:

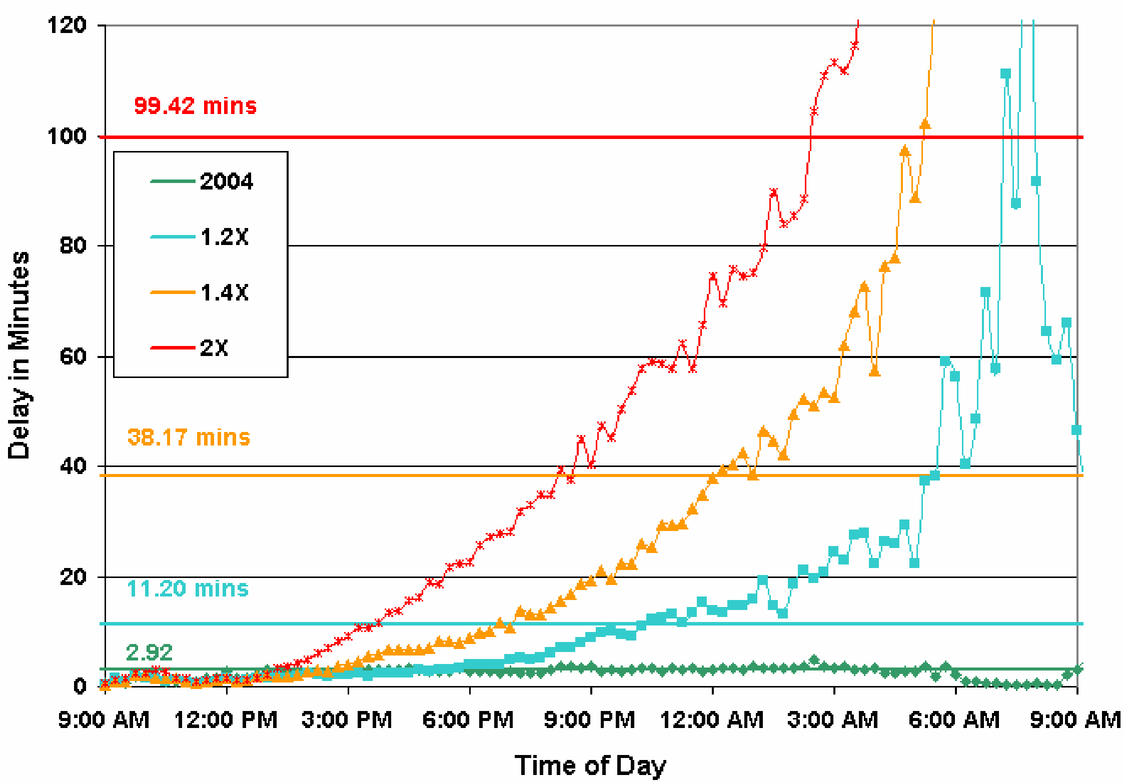
> *These extreme delays indicate that anticipated 'baseline' levels of current and future capacity will be inadequate for providing even minimally acceptable levels of service quality to NAS users. . . . The baseline futures that attempt to move the anticipated baseline demand scenarios through a system with anticipated baseline capacity result in untenable and unrealistic service quality.*

What if we don't expand NAS capacity more than the modest amount of the business-as-usual scenario? Since neither airlines nor business aviation can operate in a system with out-of-control delays, the alternative to greater capacity is to ration demand to fit the available capacity. As the white paper puts it, "When analysis reveals a mismatch between NAS demand and the ability of the NAS to accommodate that demand, it is necessary to have a procedure or algorithm for 'trimming' flights from the initial demand scenario until [the capacity] is able to serve 'trimmed' demand while meeting the agreed-upon service quality standard."

We have already seen the first such instance of rationing. In 2004 as demand exceeded capacity at busy hours at Chicago O'Hare, the FAA "persuaded" the two largest carriers, American and United, to cut back the number of flights during peak periods. In addition, business aviation operators were required to obtain one of a limited number of "reservations" to land or take off from O'Hare during those hours.

Rationing on a vastly larger scale would be required to avert the results depicted in Figure 2. Cutting out 30 to 40 percent of flight activity would mean major cuts in both airline service and business aviation. A basic principle of economics is that when the supply of a valued good or service is cut back but demand for it remains high, the price will go up. We can therefore expect an end to the past 25 years of aggressive airline competition leading to affordable airline fares for ordinary Americans. And we can also expect a sharp cutback in sales of business jets and turboprops, as their utility declines due to restrictions on their operations, and higher prices are charged for air-taxi and fractional air service.

**Figure 2: Projected Future Congestion**




NOTE: Excessive congestion even at 1.2x leads to some flights not completing by end of day. Airlines cannot operate at this level of delay.

The cost to the U.S. economy could be enormous. Thomas J. Donohue, president of the U.S. Chamber of Commerce, has said that unless we act soon to fundamentally address the aviation infrastructure capacity problem, the consequences could be "devastating."[2] Aviation accounts for $900 billion in economic activity per year, about 9 percent of our gross domestic product. Hence, "We must design an airport and air traffic control system with the capacity to safely and efficiently handle much greater volumes of traffic and cargo."

For business aviation, the nightmare scenario is what might happen if serious rationing is forced upon the system. If millions of airline passengers miss their connections or cannot afford to take their kids to the grandparents' house for Thanksgiving, their pressure on Congress to give priority to airline flights rather than "fat-cat, corporate jets" that are seen as clogging up the system could become intense. It seems likely that business aviation would lose significant political clout under such circumstances.

Part 2

# The Potential of a Next-Generation System

The JPDO is well along in fleshing out a technological and operational concept for what it calls the "Agile Air Traffic System," which is the ATC component of the overall Next Generation Air Transportation System.[3] Its basic premise is that the capacity of the system is not some kind of law of nature; rather, it is a function of both the technology employed and the operational concept used.

The purpose of air traffic control is to keep planes from running into each other—more technically, to provide safe separation between planes in all phases of flight (including on the ground). Before radar was used to separate aircraft, controllers on the ground used "procedural" separation methods (which are still used today over the oceans in some parts of the world): this means rules about how far apart planes must stay along a given flight path (in-trail separation) and between different altitudes. When planes and controllers can only approximately keep track of their latitude, longitude, and altitude, the rules call for huge separation margins, to allow for large errors. The introduction of radar over the land area of the United States in the 1950s and 1960s made it possible to reduce lateral and in-trail spacing, since controllers were able to determine approximately where each plane was. More recently (within the past few years), more precise altimeters have made it possible to reduce the vertical separation required at jets' cruising altitudes, thereby increasing the number of "flight levels" for the enroute portion of flights. The increasing availability of GPS units on aircraft (both airliners and business jets) means that pilots themselves have much more accurate information on where they are, though current ATC practices make very little use of this capability.

Although the accuracy of information about where planes are has increased over the last several decades, the fundamental concept of ATC is still the manual model developed prior to World War II. That is to say, every significant action by a pilot must receive the permission of an air traffic controller on the ground, who watches a display of traffic and tells the pilot what to do when. Even though a great deal of "intelligence" is built into most airliners' flight management system computers, pilots are not allowed to make use of it, unless the controller gives the OK. And although controllers' displays have for the most part been modernized, they have been given very few automation tools to predict conflicts or to manage large amounts of information in short periods of time. Thus, planes are still controlled largely "by hand," and because of the understandable limits on how much information a controller can work with at a time, the system must retain huge separation margins fore and aft, to the left and to the right, and above and below each plane, to ensure safe operations.

The premise of the next-generation system is that by obtaining and sharing precision information about planes in flight, we can automate many routine functions, sharing the separation responsibilities between control centers on the ground and cockpits in the air. Some have termed this model "network-centric" air traffic management (ATM) as opposed to the traditional human-centric air traffic control (ATC). If we have far more precise, real-time information about exactly where each plane is and where it is heading (its intention), finely grained information about weather conditions throughout the system, and knowledge of the extent and duration of the vortices that spin off a plane's wings and can cause hazards to following aircraft during landings and take-offs, we can fly planes much closer together, safely. And that means the capacity of the system can be doubled or tripled.

The network-centric model has the potential to hugely improve the quality of air service, both airline and non-airline. The major breakthrough is to let automation, on the ground and in the aircraft, perform routine functions and separate aircraft based on their own flight profiles. The controller's role changes; while automation manages the flights and monitors conformance with clearances and planned trajectories, the controller manages exceptions.

On the aircraft, synthetic vision techniques now in field testing will enable planes to land in low-visibility conditions that today frequently cut airport arrival rates in half. Other new technologies will provide "precision approaches" to thousands of smaller airports at far less cost than traditional instrument landing systems. More precise information about planes' positions and their tip vortices will make it possible to use closely spaced parallel runways simultaneously, and in some cases make possible the addition of a parallel runway without having to enlarge the physical land area of the airport.

Large cost savings should also be possible from shifting to the new model. One premise of the network-centric approach is that control of aircraft will be possible "from anywhere to anywhere." Historically, ATC facilities were located adjacent to the airspace they controlled—a tower had to be physically on the airport, a TRACON located within the regional airspace it controlled, likewise for the 21 enroute centers. But satellites, dispersed sensors, and high-speed datalinks mean that facilities can be located wherever it is cost-effective to do so, and they can be sized to do an economically efficient amount of work. Some tentative plans call for replacing the FAA's 21 centers and 171 TRACONs, most of them aging, with 35 new service hubs. Thousands of costly-to-maintain ground radars and other navigation aids will be able to be retired, too, once planes are equipped for network-centric operations.

While all the details are not yet finalized, experts from the federal agencies sponsoring the JPDO (especially NASA and the Departments of Defense and Transportation) agree that the network-centric model for ATM can double or triple the system's capacity, with the resulting operating cost being no more than (and perhaps less than) that of today's system. That is a stark contrast to the dismal vision of the congestion and rationing facing aviation if the business-as-usual approach is continued.

Part 3

# Impediments to the Next-Generation System

The vision of a net-centric ATM system outlined above faces several serious obstacles to implementation. Some are the normal kinds of resistance to change from those comfortable with the status quo. The air traffic controllers union, for example, has resisted early moves toward automation technologies and has made clear its preference to retain a human-centered ATC system over the next several decades. Also, some aircraft operators (including some airlines and many private pilots) are resistant to any mandates to install new onboard avionics equipment, even though full benefits for all system users (e.g., cost savings from being able to retire costly ground-based navigation aids) will only be realized once all planes in the system are properly equipped—and once the FAA has done its part, as well.

But there are three more-fundamental obstacles that are more serious threats: lack of funding, high modernization risks, and political constraints.

## A. Lack of Funding

As FAA Administrator Marion Blakey and DOT Secretary Norm Mineta have said repeatedly in 2005 and early 2006, the changes that have taken place in aviation over the past decade have devastated the FAA's funding base. The large majority of the agency's budget (nearly two-thirds of which is the ATC system) comes from aviation excise taxes. And the lion's share of that tax revenue comes from the 7.5 percent tax on the price of airline tickets (as well as on the hourly charges for charter and fractional-jet services). The long-term trends of declining ticket prices (due to increased market share for low-cost carriers) and increasing air traffic (due to carrying a given number of passengers in a larger number of planes) have put a very serious squeeze on ATC funding. The labor-intensive, human-centric ATC system consumes most of the available budget as payroll costs. Funding for capital investment ends up getting squeezed. In both fiscal 2005 and 2006, the FAA's budget for facilities and equipment was reduced by a half-billion dollars below the authorized levels.

Transitioning to the next-generation system will require major capital investment over the next two decades, to install new technologies and to replace numerous obsolescent facilities with a much smaller number of new ones. But the FAA's current capital-spending budget is focused on patching up the existing system, replacing antiquated display consoles with newer ones and replacing the host computer system. While necessary in the short term, these investments do little to add capacity to the system—but they are all that can be afforded under the current funding system. The FAA can barely keep its present systems functional, let alone expand to meet future demand with all-new facilities and systems.

Some, especially in the general aviation (GA) community, argue that the problem could be solved if Congress were to appropriate a larger amount of general federal revenue each year, such as 25 to 30 percent of the FAA's budget (instead of the current level of about 18-21 percent). But given the enormity of the federal budget deficit problem and the numerous other claims on general-fund monies, this alternative appears very unlikely to be adopted for a system that (unlike, say, social service programs or disaster relief) has the potential to raise revenue from its users. This is why Blakey and Mineta have called funding reform essential for ATC modernization.

## B. Technology Implementation Risk

The FAA has been attempting to modernize the National Airspace System, expanding its capacity and increasing its productivity, since the launch of a major effort called NAS Plan in 1982. During the nearly 25 years that have elapsed since then, there have been scores (if not hundreds) of reports from the Government Accountability Office and the DOT Office of Inspector General, faulting the agency for bad management resulting in projects being chronically late and seriously over-budget. In 2005 two OIG researchers presented an overview of this failed modernization experience, trying to assess what went wrong.[4] They concluded that modernization efforts did not reduce costs or increase productivity. And they found that "NAS modernization architecture and project designs have been consistently subverted by requirements growth, development delays, cost escalations, and inadequate benefits management. But all these things were symptomatic of the fact that FAA didn't think it needed to reduce operating costs."

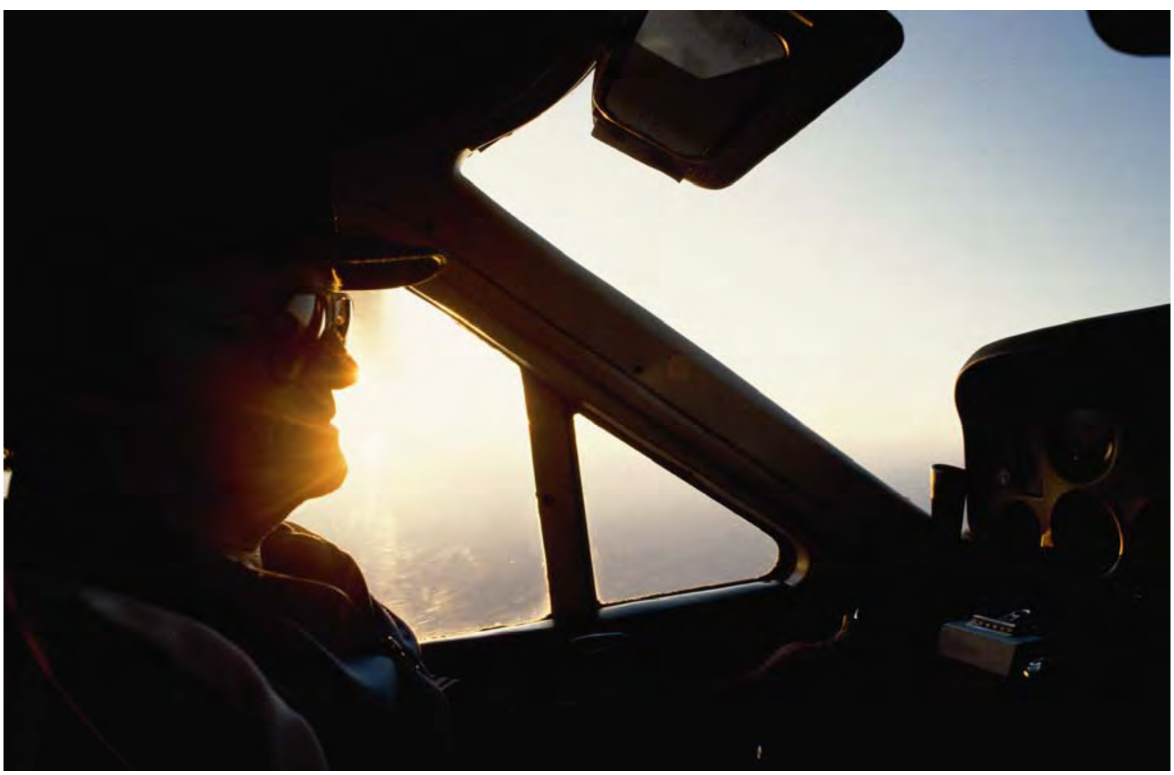
Thus, many observers are greatly concerned that the institutional culture of the FAA is poorly suited to anything as dramatic as the shift from human-centric ATC to network-centric ATM. In late 2004, the National Academy of Sciences convened an expert panel to assist the GAO in understanding the cultural and technical factors that have impeded previous ATC modernization efforts.[5] It found that "the key cultural factor impeding modernization has been resistance to change . . . [which is] characteristic of FAA personnel at all levels." And "the key technical factor affecting modernization . . . has been a shortfall in the technical expertise needed to design, develop, or manage complex air traffic systems."

The FAA is not designed to take risks, make investments, manage people to produce results, reward excellence, or punish incompetence. It is therefore not equipped to bring about fundamental reform of the ATC system. Thus, major institutional change is probably a prerequisite for implementation of the proposed network-centric ATM system.

## C. Political Constraints

The third impediment to implementing a fundamentally different approach is political. The network-centric model can deliver major cost savings, ultimately providing two to three times the ATC capacity with the same or fewer people, thanks to the changed paradigm that makes the operations dramatically less labor-intensive. But to realize these gains requires the relatively swift retirement of huge numbers of costly-to-maintain radars and other ground-based navaids and the consolidation of numerous ATC facilities. One current proposal would replace 21 enroute centers and 171 TRACONs with 35 air traffic service hubs, while redesigning all U.S. airspace.[6] Physical control towers located at each airport would gradually be phased out, with “virtual tower” functions built into the new super-hubs.

As with the closing of military bases, Congress has a history of resisting the closure and consolidation of ATC facilities. The original 1982 NAS Plan included plans for facility consolidation, which were quietly dropped after it became clear that getting them through Congress would be very difficult. The FAA’s recent success in outsourcing its Flight Service Station system (which involved consolidating from 58 to 20 facilities) came very close to being forbidden by Congress, with that prohibition ultimately being defeated thanks to a credible veto threat from the White House. Many observers expect that if facility consolidation of the magnitude being considered for the next-generation system were left to the annual appropriations process, it would likely suffer the same fate as the consolidations proposed in the NAS Plan.



Part 4

# An Institutional Alternative: ATC Commercialization

One approach to addressing all three of the impediments discussed above is to take the ATC system out of the federal budget process and make it a self-supporting entity, paid for directly by its customers (analogous to the Tennessee Valley Authority or the U.S. Postal Service). Variants of this approach have been recommended by a series of federal studies and commissions over the past 15 years, including:

- The Aviation Safety Commission in 1988;
- The National Commission to Ensure a Strong Competitive Airline Industry in 1993;
- The National Performance Review in 1993;
- The Secretary of Transportation's Executive Oversight Group in 1994;
- The National Civil Aviation Review Commission (Mineta Commission) in 1997.

This approach would address the *funding problem* by shifting from aviation excise taxes paid to the Treasury and appropriated annually by Congress to fees for ATC services paid directly by customers to the air navigation service provider (ANSP). Thus, the fees would grow in proportion to the growth of flight activity, rather than being tied to something much less relevant, such as the current airline fare level. Moreover, a predictable revenue stream (not subject to the federal budget process) would provide the basis for issuing long-term revenue bonds to fund modernization, such as the transition to the network-centric system.

The commercialization approach would address the *cultural and technical obstacles* by motivating the ANSP to attract and retain managers and engineers from the private sector skilled at implementing complex technology projects. And with a board of directors largely representing the ANSP's aviation customers, the modernization concept (the network-centric system) and individual projects would have to pass muster as delivering real value for the investment. That kind of vetting process is largely absent from today's FAA.

In addition, this approach would address the *political obstacles* (to retiring navaids and consolidating facilities) by Congress having delegated these contentious issues to a user-governed

ANSP. To be sure, getting Congress to vote for such delegation is no small challenge. But once accomplished, it would be difficult for Congress to intervene to micro-manage these changes, as this might threaten the ability of the ANSP to issue the bonds needed to fund the modernization.

That ATC commercialization can accomplish these things is not simply a plausible theory. Over the past 15 years, more than 40 countries have implemented some version of ATC commercialization, with organizational forms ranging from a not-for-profit, user-governed corporation (Canada) to numerous government corporations (e.g., Australia, Germany) to a self-supporting government department (France).

A major international study of the ATC commercialization experience was released in January 2006.[7] The study team did detailed research on 10 commercialized ANSPs spanning the range of organizational models, collecting both interview and quantitative (historical trend) data on each. A very brief summary of its principal findings is that commercialization had the following effects:

- On safety: either neutral or positive;
- On modernization: greatly improved;
- On service quality: improved;
- On costs: generally reduced, significantly in some cases;
- Financial stability: maintained;
- Public interest: most areas neutral or positive.

Thus, both theory and practice suggest that shifting to some version of commercialization would address all the principal impediments to implementing the network-centric model for ATC modernization. Users would see exactly what they will get for spending more, since those costs must be recovered in fees and charges. This kind of transparency is lacking in today’s FAA.

**Part 5**

# ATC User Fees and Commercialization

U.S. aviation stakeholders have recently been debating whether or not to shift from aviation excise taxes to direct fees for ATC services. Some have suggested finding some way to dedicate the revenue from one of the existing taxes to support some form of bonding for ATC projects. But such half-way measures would do nothing to address the other two impediments discussed above (the need to change the corporate culture and the need to overcome ongoing political obstacles). In this context, it is worth noting that the January 2006 report on international ATC commercialization considered "financial autonomy in its governance arrangements" as the *minimal prerequisite* for an ANSP to be considered commercialized.

Every one of the U.S. reports on reforming the ATC system cited in the previous section recommended a shift from tax funding to user-fee funding. Indeed, the 1997 Mineta Commission report went into great detail on the rationale for user fees. Among the reasons it cited were the following:

*To provide for a self-sufficient ATC operation, at a funding level driven by the needs and level of aviation activity.* This can only be ensured by removing ATC funding from the constraints of the federal budget process.

*To provide a reliable revenue stream against which long-term bonds for modernization can be issued.* As the Commission report put it, "Borrowing is not an option but a necessity for a capital-intensive enterprise, especially in technology transitions."

*To improve the productivity of the ATC system by better targeting investment to benefit system users.* The Commission report noted that "Revenue streams will serve as signals [to the ANSP] as to where improvement is needed or demand is not being met."

*To provide incentives for customers to equip their aircraft with important new technologies.* Both Nav Canada and Eurocontrol are giving discounts on enroute charges to planes equipped with controller-pilot datalink and ADS-B, two key enabling technologies for the network-centric system.

*To increase fairness in paying for air traffic control.* Under the current tax-based system, different types of users pay vastly different amounts for the same ATC services.

*To develop a customer-focused corporate culture.* The keynote of the reform that led to transforming the Canadian ATC system into Nav Canada was the slogan: "User pay means user say." There is no substitute for a true customer-provider payment nexus in focusing an organization's culture on meeting the real needs of its customers.

The commercialized ANSPs in other countries were created to overcome the kinds of obstacles discussed previously. And the international study noted above found that they are succeeding. Financial self-sufficiency and organizational separation (in most cases) from the government bureaucracy has led to significant organizational and managerial changes. Typically, a commercialized ANSP exists outside the government civil service system. It is governed by a board of directors, which can hire and fire the CEO, as in a normal business. The board approves the annual budget and the capital expenditure program. The ANSP is regulated for safety, at arms-length, by the equivalent of our FAA. And the fee structure is subject to some form of governmental oversight, to ensure that all aviation customers are dealt with fairly. This new form of governance *substitutes for* the kind of direct operational and budgetary oversight traditionally exercised by congressional committees over the FAA's ATC operations.

Part 6

# Estimating the ATC Charges for Business Aviation

Historically, the general aviation (GA) community has opposed any effort to replace aviation excise taxes with user fees. While many specific objections have been raised, the underlying concern is that replacing the traditional fuel tax with fees based on the cost of service and the amount used would increase the cost of flying, putting the viability of general aviation at risk.

Before proceeding with this discussion, we must first unpack the term “general aviation” into its component parts. In most of the world, the distinction is made between business aviation (which is nearly all turbine-powered, and makes extensive use of ATC services and controlled airspace) and recreational aviation (which is mostly piston-powered and flies mostly in non-controlled airspace). No one is proposing to impose user fees on recreational aviation, which is ably represented by the Aircraft Owners & Pilots Association (AOPA) and the Experimental Aircraft Association (EAA). That segment of the GA community is not relevant to this discussion.

The second key point is that there is not a single ATC user-fee proposal on the table; rather, there are a number of possibilities. The Air Transport Association in March 2006 unveiled its Smart Skies proposal, under which business aircraft would pay the same rates per departure and per hour enroute as any other aircraft in the system. Each plane in controlled airspace would pay the average cost of controlling all of them, making this a cost-based system, as called for by DOT and FAA leaders. (In the following discussion, we will refer to this type of approach as a “full-cost” fee.)

Most other countries follow general guidelines from the International Civil Aviation Organization. ICAO calls for using weight and distance as the key parameters on which to base ATC charges, typically suggesting that both be used for enroute charges and weight alone be used for terminal-area charges. This type of approach is less directly related to the cost of providing ATC services. The purpose of including aircraft weight (typically maximum take-off weight) in the formula is to provide a pragmatic adjustment for differences between large and small planes in willingness or ability to pay. Nav Canada’s system, familiar to many U.S. pilots, is an example. It should be noted that how weight enters the formula can make a big difference in how much it affects the result.[8]

As of this writing, the FAA's funding proposal has not been released, but we expect it will incorporate elements of both the "full-cost" and "weight-based" approaches.

To show how these different approaches to ATC fees would affect business aviation, we selected 15 business jets, from the Eclipse 500 on the smallest end of the spectrum to the Boeing BBJ (a modified 737) on the top end. Their basic parameters are shown in Table 1. We obtained data from the Conklin deDecker database to calculate what these planes pay now in aviation excise taxes, depending on how they are used. That database assumes that each plane is flown a standard 175,000 nautical miles (nm) per year, and the annual hours flown is derived from that, based on each plane's performance characteristics. The database also includes both the variable cost per hour to operate the plane and the annualized total cost per hour (assuming market depreciation).

**Table 1: Business Jets Used for Analysis**

| Category | Model | Seats | MTOW (lbs) | Range (nm) | Annual nm | Hours/ Year | Var cost/hr | Total cost/hr |
|---|---|---|---|---|---|---|---|---|
| VLJ | Eclipse 500 | 4 | 5,680 | 1,280 | 175,000 | 572 | $525 | $920 |
| Small | Learjet 35A | 6 | 18,300 | 1,930 | 175,000 | 408 | $1,786 | $2,835 |
| | Citation II | 7 | 14,100 | 1,220 | 175,000 | 526 | $1,399 | $2,230 |
| | Beechjet 400A | 7 | 16,100 | 1,180 | 175,000 | 425 | $1,500 | $2,666 |
| Medium | Learjet 60 | 6 | 23,500 | 2,186 | 175,000 | 411 | $1,710 | $3,639 |
| | Citation Sovereign | 9 | 30,000 | 2,643 | 175,000 | 429 | $1,760 | $3,905 |
| | Hawker 800 | 8 | 27,400 | 2,390 | 175,000 | 455 | $1,926 | $3,403 |
| Large | Challenger 600 | 9 | 41,250 | 2,800 | 175,000 | 433 | $3,320 | $5,139 |
| | Citation X | 8 | 35,700 | 2,890 | 175,000 | 372 | $2,483 | $5,697 |
| | Falcon 900C | 12 | 45,500 | 3,450 | 175,000 | 419 | $2,336 | $6,223 |
| | Gulfstream G-450 | 13 | 73,900 | 3,880 | 175,000 | 413 | $2,844 | $7,080 |
| Ultra | Global Express | 13 | 95,000 | 5,940 | 175,000 | 408 | $3,156 | $8,420 |
| | Gulfstream G-V | 13 | 90,500 | 6,250 | 175,000 | 403 | $3,193 | $7,915 |
| | Airbus Corp. Jet | 18 | 166,450 | 6,100 | 175,000 | 433 | $4,095 | $9,497 |
| | Boeing BBJ | 18 | 171,000 | 6,171 | 175,000 | 458 | $4,104 | $9,593 |

Source: The Aircraft Cost Evaluator, Conklin & deDecker, Fall 2005

The analysis that follows presents summary tables in the text, but the reader will find the complete tables, listing the results for all 15 business jets, in Appendix A.

In Table 2 we calculate what these planes pay in *current* aviation excise taxes, based either on the fuel used or the price paid by passengers. This depends on whether it is operated as a corporate-owned plane, flown as part of a fractional-ownership program, or chartered from an air-taxi company. The first pays only a fuel tax, at 21.8 cents/gallon. The second and third pay 7.5 percent of the hourly charge to use the plane, plus $3.20 per person per segment flown. For fractionals and charters, the amounts of tax differ because hourly charter rates are significantly higher than hourly fractional rates. Table 3 summarizes what the average plane in each size category pays in current aviation taxes, based on the assumed annual hours flown (and a standardized set of trips for the fractional and charter users).[9] As can be seen, *the same plane, flying the same number of miles and hours in the ATC system, pays dramatically different amounts* depending on who is operating it.

**Table 2: Current Aviation Taxes Paid by Business Jets (Annual)**

| Category | Corporate Fuel Tax | Fractional Tax | Charter Tax |
|---|---|---|---|
| Small | $20,564 | $54,919 | $74,064 |
| Medium | 24,330 | 67,986 | 111,686 |
| Large | 34,854 | 81,331 | 161,614 |
| Ultra | 59,328 | 117,020 | 306,684 |

Sources: Netjets, EJM, plus author calculations (based on details in Table A-1)

To compare the impact of possible ATC user fees with current aviation taxes, we have selected two different user-fee models: a full-cost model and a weight-distance model. The former represents a form of average-cost-based charging, while the latter is more typical of the pragmatic overseas approach. The full-cost model used here is based on the FAA's ETMS dataset for FY2004.[10] It is designed to recover the full $8.1 billion budget of the FAA's Air Traffic Organization, with terminal charges accounting for 55 percent of the total and enroute charges the other 45 percent (which are the cost shares produced by current ATO cost modeling). Enroute charging is based on great circle mileage between origin and destination, at a rate of $.4432/mile. For these calculations, we use the same simplified model of short trips (BOS-ORD) and long trips (LAX-IAD) used previously for the fractional and charter categories to estimate their annual excise tax payments. For the weight-based model, we used the current Nav Canada formula for trips equal in distance to BOS-ORD and SFO-IAD.

As can be seen in Table 3, because the smaller jets fly only shorter trips, they make many more departures per year to fly their standard 175,000 nm. Thus, their annual charge using the full-cost model is higher than that of the larger jets that fly a mix of longer and shorter trips. The weight-based system produces quite different results, with the annual total increasing with the size of the plane from an average of $45,000 for the Small category to $146,000 for the largest.

As can be seen, for *corporate-owned* jets, the annual cost of ATC fees is higher in every case than the current annual cost of the fuel tax. For *fractionals*, in most cases the weight-distance type fee would be less costly than the current aviation taxes. And in every case *charter users* would pay less under the weight-distance type fee than they currently pay in taxes. The full-cost-type fees would be less than current taxes for the higher-end jets in charter operations.[11]

**Table 3: Hypothetical ATC Fees vs. Current Aviation Taxes (Annual)**

| Category | Hypothetical Full-Cost Fee | Hypothetical Weight-Distance Fee | Current Corporate Fuel Tax | Current Fractional Tax | Current Charter Tax |
|---|---|---|---|---|---|
| Small | $149,124 | $45,280 | $20,564 | $54,919 | $74,064 |
| Medium | 116,876 | 51,499 | 24,330 | 67,986 | 111,686 |
| Large | 116,876 | 75,328 | 34,854 | 81,331 | 161,614 |
| Ultra | 116,876 | 146,400 | 59,328 | 117,020 | 306,684 |

Source: author calculations (based on detail in Table A-2)

Part 7

# The Impact of ATC Fees on Business Aviation

The answer to the question, "What impact would ATC user fees have on business aviation?" is clearly: It depends. Contrary to statements made by leaders of the National Business Aviation Association and the General Aviation Manufacturers Association, various categories of business aviation could pay more or less than they currently pay in aviation excise taxes depending on the formula selected for user fees,

The first point to keep in mind in thinking about this question is that "business aviation" is not a single entity. To be sure, all three main categories—corporate, fractional, and charter—are economic substitutes for one another to a certain degree, and hence competitors to a certain degree. Twenty-five years ago, the fractional market did not exist, and the charter market was much smaller than it is today. As of 2004, according to FAA figures, business jet fractional and charter categories constituted 7.3 percent of the flight activity in controlled airspace, nearly as much as the 8.3 percent flown by corporate jets. Yet we can see from Table 3 that the same jet flying the exact same number of flights per year would pay three very different amounts under the current tax regime. Apart from any comparisons with what airline aircraft pay, it is not clear why a business jet should pay three entirely different amounts to use the exact same ATC services depending on its ownership arrangements.

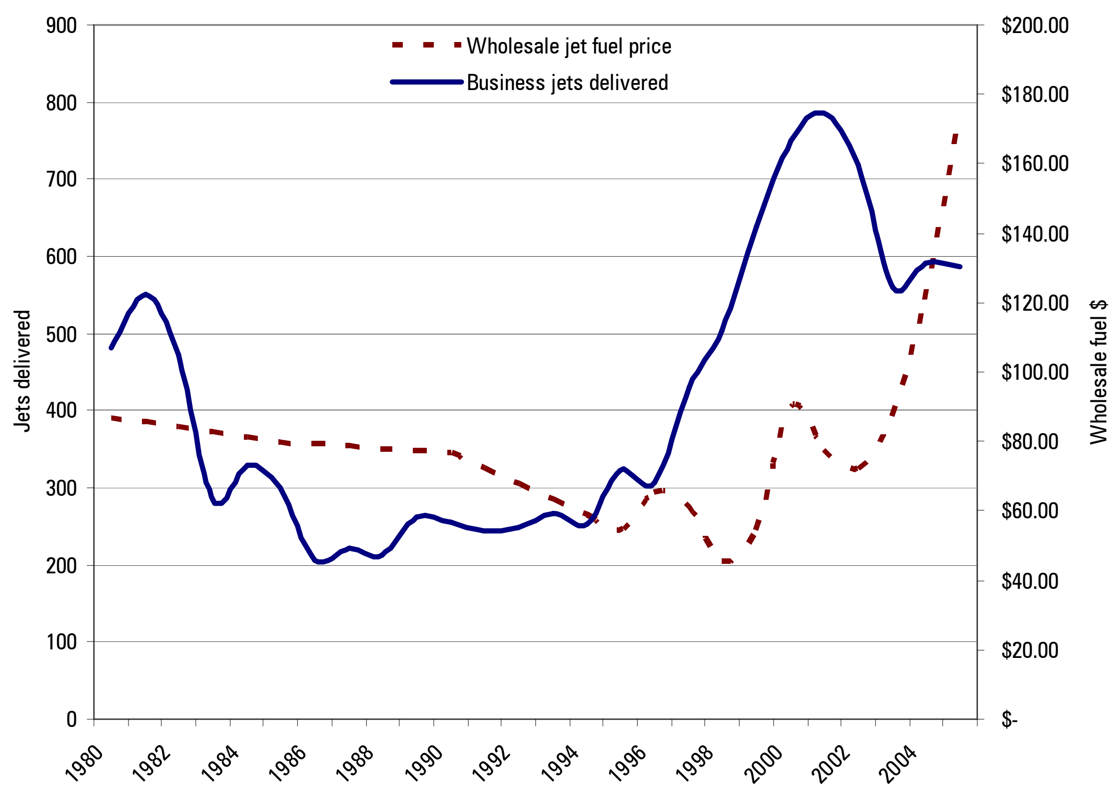
A major concern raised by NBAA and others is that a user-fee system would so increase the cost of business flying as to seriously damage the industry. This claim also deserves closer scrutiny. To do this, we have created Table 4, which compares the total hourly cost to own and operate a business jet with the hourly cost of fuel and the hourly impact of our two hypothetical user fees. Fuel cost has increased dramatically between 2000 and 2005. We compare the difference in the hourly cost of fuel—which the business aviation market has absorbed without serious impact—with the per-hour cost of the two possible user fees. For the full-cost-type fee, the amount of the fee is significantly less than the change in fuel cost, for all but the smallest jets. And for the weight-distance-type fee, the hourly cost is far less than the change in cost of fuel.

| Table 4: Cost Comparisons, per Flight Hour | | | | | |
|---|---|---|---|---|---|
| **Category** | **2005 Fuel Cost** | **2000 Fuel Cost** | **Difference** | **Full-Cost Fee** | **Weight-Distance Fee** |
| Small | $855 | $527 | $338 | $333 | $102 |
| Medium | 1044 | 643 | 401 | 271 | 119 |
| Large | 1580 | 974 | 606 | 286 | 184 |
| Ultra | 2561 | 1578 | 983 | 276 | 342 |

Source: author calculations (based on details in Table A-3)

Figure 3 shows the wholesale price of Jet-A fuel and annual sales of business jets for the past 25 years. During the 1980s and the first half of the 1990s, the fuel price trended slightly downward, while jet sales fell from a peak in 1981 and remained relatively flat until the mid-1990s. At that point they took off, peaking in 2001 while fuel prices began increasing. Jet sales fell about 25 percent in the post 9/11 recession, but have modestly recovered in 2004 and 2005, despite the soaring cost of fuel. That business aviation remains robust despite an increase of several hundred dollars per hour in operating cost since 2000 underscores the business case for these important planes. But it also calls into question the idea that another 5 percent increase in total hourly cost for corporate jets (as with a shift to user fees) would devastate the industry.

**Figure 3: Wholesale Jet Fuel Price vs. Business Jet Sales, 1980-2005**



Part 8

# Benefits to Business Aviation

The discussion in the previous section was intended to show that a user-fee system for ATC can be developed that would have only modest cost impacts on business aviation; indeed, if it were of the weight-distance type, it could end up reducing the cost for the nearly half of business aviation consisting of fractional and charter operators.

But is that sufficient reason for business aviation (or subsets thereof) to support such a change? If the only change to occur were the replacement of aviation excise taxes with ATC user fees, the answer is not necessarily yes. The case for shifting to fees for service as the new way of funding ATC rests on the arguments made earlier, in Parts 1 through 5. Specifically, the argument is that unless we find a way to double or triple the capacity of the ATC system, we are within a decade of rationing airspace capacity. Shifting to a funding and governance model based on direct payments for ATC services and bonding for needed capital expenditures is the most plausible way to overcome the obstacles to implementing the network-centric system that will provide the needed capacity.

Thus, business aviation should support the shift to user fees *if it is part of a comprehensive reform of ATC*, drawing on the lessons from Canada and other countries that have made this transition successfully. User fees are not the end goal: they are a critical means to the end goal. And that end goal is a network-centric air traffic management system that provides ample capacity for all of aviation.

That transition offers major benefits to business aviation. Whether corporate-owned, fractional, or air-taxi/charter, the operators would nearly always be able to “fly direct” using the cost-minimizing route of their choice. Precision approaches would be available at thousands of smaller airports, opening them up to all-weather operations by business jets of all types. Dispatchers of fractional and charter fleets would gain powerful tools for staging their fleets more efficiently, with a direct impact on the bottom line.

As noted previously, fractional and charter operators might well pay less under some forms of user fee than they pay today under the ticket tax and segment-fee system. So they could be made better off economically by the transition, even if they did not reap operational benefits of the kind just noted. The harder case is corporate-owned jets, which would pay more than today’s fuel tax under any likely user-fee scenario. But that is before we take account of the *value of the benefits* they would reap from a network-centric system.

One measure of those benefits is the value of time saved, thanks to avoidance of delays that would occur in an unreformed system. The data previously assembled make it easy to do a break-even calculation, to estimate the point at which the value of time savings from a better system offsets the increased cost per flight hour that the corporate jet would have to pay. The break-even equation is of the form:

**Value of time saved = (Hours saved) x (variable cost/flight hour)**
**Marginal cost of the change = (user fee/hr minus fuel tax/hour) x (annual flight hours)**

We use the data from the previous table to solve for the number of hours saved, H, at which these two are equal, using the weight-based version of the user fee. If the annual time savings are greater than H, the corporate jet operator experiences net operating cost savings, even after paying the user fee instead of the fuel tax.

**Table 5: Delay Reduction Needed for Net Cost Savings, Corporate-Owned Jets**

| Category | Flight Hours per Year | Variable Cost/hr. | Net Increase in ATC Cost/hr. | Breakeven Hours Saved | Breakeven Percent of Total |
|---|---|---|---|---|---|
| Small | 453 | $1562 | $56 | 15.7 | 3.5 |
| Medium | 432 | 1799 | 63 | 15.3 | 3.6 |
| Large | 409 | 2746 | 99 | 14.8 | 3.6 |
| Ultra | 426 | 3637 | 203 | 23.8 | 5.6 |

Source: author calculations (based on details in Table A-4)

As can be seen in Table 5, if the user-fee system is similar to that of Nav Canada, these corporate jets would experience net savings in annual operating cost if the network-centric system saved them as little as 3 to 5 percent in annual flight hours by reducing or eliminating indirect routings, diversions, holding patterns, etc.

This analysis does not include the value of time saved by senior corporate executives, which is another real benefit of operating in the next-generation system. The main rationale for business aviation is to make better use of key people’s time. But that benefit is seriously at risk if the ATC system is not transformed along the lines suggested here.

Part 9

# Summary and Conclusions

This paper has attempted to make the case that America's business leaders should support fundamental reform and modernization of the air traffic control system, in order to prevent its imminent breakdown and permit the timely doubling or tripling of its capacity. A key enabler in making this transition happen in a timely fashion is shifting the basis for funding from aviation excise taxes, paid to the Treasury and controlled by Congress, to a system in which fees are paid directly to the air traffic control provider for the services it delivers. The logic runs as follows:

- The ATC status quo of incremental improvements in the labor-intensive separation of aircraft by hand cannot cope with the large projected growth in jet aviation, a large portion of which consists of business aviation.
- A completely new, network-centric approach to air traffic management can provide the needed capacity growth, along with large productivity gains, keeping the cost affordable.
- But several major impediments—lack of funding, high implementation risk given the FAA's current culture, and political opposition to facility consolidation—make implementation of that system unlikely.
- Removing ATC from the federal budget process, and creating a user-oriented governance mechanism—known globally as ATC commercialization—can address all three impediments.
- Shifting from aviation taxes to direct payments to the ATC provider for services rendered (user fees) is the essential precondition for commercialization.

Our analysis has demonstrated that some forms of ATC user fee would have significantly less cost impact on most business jet operations than other forms. Indeed, for fractional and charter operations, a fee structured like that of Nav Canada could cost those users about one-third less per year than the current aviation excise tax structure. And even for business jets that are part of a corporate fleet, that type of ATC fee would be a break-even proposition, compared with today's fuel taxes, if the new network-centric ATC system reduced unnecessary flight hours by as little as 3 to 5 percent.

This analysis therefore suggests that America's business leadership should question the all-out opposition to any consideration of ATC user fees, as currently espoused by the leading business aviation trade groups: GAMA, NBAA, and NATA. Their position does not properly reflect the possible direct cost savings to fractional and air-taxi operators from weight-based forms of ATC fees, compared to the current aviation taxes paid by those users. And it does not reflect the longer-term gains to owners of corporate fleets from a modernized ATC system with double or triple the capacity of today's congested system.

Appendix A

# Data Tables

| Table A-1: Current Aviation Excise Taxes Paid by Business Jets | | | | | | |
|---|---|---|---|---|---|---|
| Model | Gals/hr | Fuel tax/yr | Fract rate / hr | Fract tax/yr | Charter rate / hr | Charter tax/yr |
| Eclipse 500 | 63 | $7,856 | $500* | $23,492 | $750* | $34,231 |
| Learjet 35A | 229 | $20,368 | $1,500 | $47,974 | $2,060 | $65,133 |
| Citation II | 181 | $20,755 | $1,400 | $57,317 | $1,854 | $75,251 |
| Beechjet 400A | 222 | $20,568 | $1,800 | $59,465 | $2,500 | $81,807 |
| Learjet 60 | 247 | $22,131 | $2,000 | $62,838 | $3,150 | $98,334 |
| Citation Sovereign | 267 | $24,970 | $2,150 | $70,374 | $3,938 | $127,980 |
| Hawker 800 | 261 | $25,889 | $2,038 | $70,745 | $3,150 | $108,743 |
| Challenger 600 | 352 | $33,227 | $2,300 | $75,898 | $4,620 | $151,341 |
| Citation X | 386 | $31,303 | $2,338 | $66,423 | $4,200 | $118,442 |
| Falcon 900C | 328 | $29,960 | $2,400 | $76,627 | $5,720 | $181,097 |
| Gulfstream G-450 | 499 | $44,927 | $3,394 | $106,375 | $6,270 | $195,578 |
| Global Express | 535 | $47,585 | $3,500 | $108,349 | $8,800 | $270,745 |
| Gulfstream G-V | 503 | $44,191 | $3,476 | $106,308 | $8,800 | $267,441 |
| Airbus Corp. Jet | 740 | $69,852 | $3,600 | $118,172 | $10,000 | $326,289 |
| Boeing BBJ | 758 | $75,682 | $3,900 | $135,250 | $10,500 | $362,262 |

*Author estimate; no rates yet available

| Table A-2: Hypothetical ATC Fees, vs. Current Aviation Taxes | | | | | |
|---|---|---|---|---|---|
| **Model** | **Hypothetical Full-Cost Fee/yr** | **Hypothetical Wt-Dist Fee/yr** | **Current Fuel Tax/yr** | **Current Fractional Tax/yr** | **Current Charter Tax/yr** |
| Eclipse 500 | $149,124 | $22,834* | $7,856 | $23,492 | $34,231 |
| Learjet 35A | $149,124 | $49,396 | $20,368 | $47,974 | $65,133 |
| Citation II | $149,124 | $41,474 | $20,755 | $57,317 | $75,251 |
| Beechjet 400A | $149,124 | $44,969 | $20,568 | $59,465 | $81,807 |
| Learjet 60 | $116,876 | $47,424 | $22,131 | $62,838 | $98,334 |
| Citation Sovereign | $116,876 | $55,104 | $24,970 | $70,374 | $127,980 |
| Hawker 800 | $116,876 | $51,968 | $25,889 | $70,745 | $108,743 |
| Challenger 600 | $116,876 | $67,712 | $33,227 | $75,898 | $151,341 |
| Citation X | $116,876 | $61,568 | $31,303 | $66,423 | $118,442 |
| Falcon 900C | $116,876 | $72,256 | $29,960 | $76,627 | $181,097 |
| Gulfstream G-450 | $116,876 | $99,776 | $44,927 | $106,375 | $195,578 |
| Global Express | $116,876 | $118,208 | $47,585 | $108,349 | $270,745 |
| Gulfstream G-V | $116,876 | $114,432 | $44,191 | $106,308 | $267,441 |
| Airbus Corp. Jet | $116,876 | $174,720 | $69,852 | $118,172 | $326,289 |
| Boeing BBJ | $116,876 | $178,240 | $75,682 | $135,250 | $362,262 |

Source: author calculations

*Author estimate; no rates yet available.

**Table A-3: Hourly Cost Comparisons**

| Model | Total Cost/hr. | 2005 Fuel Cost/hr | 2000 Fuel Cost/hr | Diff: '00-'05 | Full-Cost Fee/hr | Wt-Dist Fee/hr |
|---|---|---|---|---|---|---|
| Eclipse 500 | $920 | $255 | $157 | $98 | $261 | $40 |
| Learjet 35A | $2,835 | $930 | $573 | $357 | $365 | $121 |
| Citation II | $2,230 | $735 | $453 | $282 | $284 | $79 |
| Beechjet 400A | $2,666 | $901 | $555 | $346 | $351 | $106 |
| Learjet 60 | $3,639 | $998 | $615 | $383 | $284 | $115 |
| Citation Sovereign | $3,905 | $1,079 | $665 | $414 | $272 | $128 |
| Hawker 800 | $3,403 | $1,054 | $649 | $405 | $256 | $114 |
| Challenger 600 | $5,139 | $1,422 | $876 | $546 | $270 | $156 |
| Citation X | $5,697 | $1,559 | $960 | $599 | $314 | $166 |
| Falcon 900C | $6,223 | $1,325 | $816 | $509 | $279 | $172 |
| Gulfstream G-450 | $7,080 | $2,016 | $1,242 | $774 | $283 | $242 |
| Global Express | $8,420 | $2,161 | $1,331 | $830 | $287 | $290 |
| Gulfstream G-V | $7,915 | $2,032 | $1,252 | $780 | $290 | $284 |
| Airbus Corp. Jet | $9,497 | $2,990 | $1,842 | $1,148 | $270 | $404 |
| Boeing BBJ | $9,593 | $3,062 | $1,886 | $1,176 | $255 | $389 |

Sources: Conklin & deDecker, Aviation Research Group/U.S. Inc. (ARG/US), author calculations

| Table A-4: Delay Reduction Needed for Net Cost Savings, Corporate Jets* | | | | | |
|---|---|---|---|---|---|
| **Model** | **Hours/yr** | **$Var Cost per Flight hr** | **Net Increase in ATC Cost/hr** | **Break-even Hrs Saved** | **% Flight Hrs Saved** |
| Eclipse 500 | 572 | $525 | $26 | 29 | 5.0% |
| Learjet 35A | 408 | $1,786 | $71 | 16 | 4.0% |
| Citation II | 526 | $1,399 | $39 | 15 | 2.8% |
| Beechjet 400A | 425 | $1,500 | $57 | 16 | 3.8% |
| Learjet 60 | 411 | $1,710 | $62 | 15 | 3.6% |
| Citation Sovereign | 429 | $1,760 | $70 | 17 | 4.0% |
| Hawker 800 | 455 | $1,926 | $57 | 14 | 3.0% |
| Challenger 600 | 433 | $3,320 | $80 | 10 | 2.4% |
| Citation X | 372 | $2,483 | $81 | 12 | 3.3% |
| Falcon 900C | 419 | $2,336 | $101 | 18 | 4.3% |
| Gulfstream G-450 | 413 | $2,844 | $133 | 19 | 4.7% |
| Global Express | 408 | $3,156 | $173 | 22 | 5.5% |
| Gulfstream G-V | 403 | $3,193 | $174 | 22 | 5.5% |
| Airbus Corp. Jet | 433 | $4,095 | $242 | 26 | 5.9% |
| Boeing BBJ | 458 | $4,104 | $224 | 25 | 5.5% |

Source: author calculations

*Assuming a weight-distance charging formula similar to Nav Canada's

Appendix B

# Frequently Asked Questions about Business Jets and ATC User Fees

*1. Wouldn't switching from current aviation taxes to ATC user fees seriously harm business aviation?*

That depends on the user-fee formula and how the hourly cost of user fees compares to the hourly cost of current taxes. It is quite possible that the hourly cost for fractional and charter users would be lower than the current 7.5 percent tax plus segment fee. For example, under the user-fee formula used by Nav Canada, fractional and charter jets would pay less than they do under the current U.S. aviation tax structure. And even though corporate-owned jets would probably pay more under any likely user-fee formula, they would also benefit from the reduced delays that a next-generation ATC system would provide.

*2. Isn't the FAA's funding crisis exaggerated or non-existent?*

No, it's very real, based on fundamental changes in commercial aviation. An ever-larger number of passengers is being transported in smaller and smaller-size aircraft, thanks to airlines substituting narrow-bodies for wide-bodies, the replacement of narrow-bodies by regional jets, and the healthy growth of business aviation, including fractional ownership. These trends all mean more aircraft in the ATC system, increasing its workload and cost. But the primary funding source is based on a percentage of the ticket price, which continues to trend downward thanks to continued robust competition. The FAA Vice President for Finance, Gene Juba, has concluded that these structural changes require the agency to develop a funding mechanism based on ATC workload rather than ticket prices.

*3. Couldn't we solve the funding problem by increasing the fraction of FAA budget that comes from the general fund from the current 20 percent to 30 percent?*

First, in the context of large federal deficits as far as the eye can see, increasing general-fund support for any federal program is highly unlikely—especially if that program has identifiable users who can be charged for its services. Second, even if this could be done, it would do nothing to enable long-lived capital expenditures for the next-generation ATC system to be financed by issuing revenue bonds; doing that requires a reliable revenue stream that is not subject to the risks and uncertainties of annual appropriations. Third, creating a customer-provider relationship is the key to reforming the governance of the ATC system, so that cost control and a clear business case for each new investment become standard practice. The general fund should continue to support the FAA's vital air-safety functions, including the operations of the Flight Service Stations that assist general aviation pilots.

*4. The ATC system was designed for airline use. Since business aviation is a marginal user, why should it pay for services designed to serve airline needs?*

This may have been the case at one time, but today and in coming decades, business aviation is and will be a major user of ATC services, flying in the same controlled airspace and using the same TRACONs and Centers. In recognition of business aviation's key role in the ATC system, its major trade association (NBAA) shares space in the FAA's nationwide ATC command center on an equal basis with the airline trade association (ATA). Likewise, it should be fully represented on the board of directors of a reformed ATC provider, making the critical decisions on modernizing and managing the next-generation system.

*5. Europe charges fees to ATC users but has a much smaller business aviation sector than the United States. Doesn't this prove that ATC user fees are harmful to business aviation?*

Eurocontrol says that business aviation is "a prime contributor to the growth of air traffic on the continent," growing faster than all other instrument flight rules (IFR) traffic. *Aviation Week* reports that the rapid growth of business aviation is one of the factors behind the drive for a next-generation Europe-wide ATC system. Warren Buffett told shareholders in February 2006 that NetJets increased its European business by 37 percent in 2005. It seems clear that ATC fees are not holding back the growth of business aviation in Europe.

*6. Isn't business aviation better off if Congress continues to be the de-facto board of directors of the ATC system?*

ATC is a multi-billion dollar 24/7 high-tech service business. It needs to be governed by people highly knowledgeable about aviation, management, technology, and service businesses. Members of Congress are generalists, and are driven by political considerations, such as jobs in their districts, rather than what is in the long-term interest of aviation users: an ATC system that has plenty of capacity and that delivers greater value to its customers. Dozens of other countries have made ATC self-supporting from fees and charges, with a real board of directors empowered to act for the best interests of the ATC customers.

*7. Won't the airlines dominate any ATC system board of directors, giving short shrift to the interests and concerns of business aviation?*

A commercialized ATC system can only come about if Congress enacts enabling legislation. In doing so, Congress could spell out the requirements for a stakeholder board, balanced carefully to represent all segments of aviation. In 2001 Reason Foundation suggested one possible structure for such a board:

- 4 seats for airlines (legacy, low-cost, regional, cargo)
- 3 seats for general aviation (business, recreational, charter/fractional)
- 1 seat for airports
- 1 seat for employees
- 2 seats for the federal government (Defense, Transportation)
- 3 seats for the general public (air travelers)
- 1 seat for the CEO.

The first 11 of these would select the three general public members, and those 14 would hire the CEO, who would become the 15th board member. Clearly, governance can be structured to represent all sectors of aviation. A board structure along these lines has worked quite well at Nav Canada for the past 10 years.

*8. Wouldn't it be costly and cumbersome to collect ATC user fees?*

Since nearly all countries except the United States charge user fees for ATC services, it's easy to answer this question. In Europe, enroute charges are billed and collected by Eurocontrol. The annual cost of billing and collection is three-tenths of 1 percent of the amount billed. In Canada, the private, nonprofit Nav Canada's billing costs are about two-tenths of 1 percent. Billing would be based on standard parameters, such as great circle distance between origin and destination, flight time, or gross take-off weight—all factors already in electronic form as part of flight plans. Billing operations could potentially be contracted out to commercial service providers, rather than building up in-house expertise.

*9. What about high-end piston planes that fly in controlled airspace only some of the time?*

Nearly all current user-fee proposals call for no ATC fees for the vast majority of piston planes, which are used primarily for recreational flying and mostly under visual flight rules (VFR). These planes would continue to pay a fuel tax to help support the Airport Improvement Program from which they benefit. Nav Canada offers a workable approach for high-end piston planes that fly IFR some of the time. They pay a modest annual fee (on a sliding scale, based on aircraft weight) that gives them access to the IFR system.

*10. Aren't the overseas examples of ATC commercialization all in small or developing countries with much less air traffic than the United States? How can this be relevant to the much larger, more complex U.S. system?*

Nearly all advanced western countries have commercialized their ATC systems over the past 15 years—including Australia, Canada, France, Germany, Switzerland, the United Kingdom, the Benelux countries, and Scandinavia. What's relevant is not so much total air traffic but the complexity of that traffic. A recent international study examined pairs of terminal-area airspace centers with equivalent traffic density (e.g., Philadelphia and Frankfurt, Washington and Toronto, San Diego and Auckland), finding that the commercialized systems were more cost-effective, as measured by cost per aircraft movement. Obviously, with our larger overall system and larger business aviation sector, we must craft a solution that best fits our needs. But we are fortunate to be able to draw on what has worked best in dozens of other countries.

# About the Author

**Robert W. Poole, Jr.** is the director of transportation studies at Reason Foundation, a nonprofit public policy think tank. He is the author or co-author of a half-dozen previous policy studies on air traffic control reform, and produces the *ATC Reform News* electronic newsletter. He has testified on ATC issues before House and Senate aviation subcommittees and has advised various entities, including the DOT's Executive Oversight Committee, the Mineta Commission, and the White House National Economic Council on ATC reform issues. In 2000 he was a member of the Bush/Cheney task force on transportation policy and served on the subsequent transition team. He is a member of the GAO's National Aviation Studies Advisory Panel. He received his B.S. and M.S. in engineering from MIT.

# Other Related Reason Publications

Vaughn Cordle and Robert W. Poole, Jr., *Resolving the Crisis in Air Traffic Control Funding*, Reason Foundation Policy Study No. 332, May 2005, http://www.reason.org/ps332.pdf.

Robert W. Poole, Jr., *Why An Air Traffic Control Corporation Makes Sense*, Reason Foundation Policy Study No. 307, March 2003, http://www.reason.org/ps307.pdf

Robert W. Poole, Jr. and Viggo Butler, *How to Commercialize Air Traffic Control*, Reason Foundation Policy Study No. 278, February 2001, http://www.reason.org/ps278.pdf

Robert W. Poole, Jr. and Viggo Butler, *Reinventing Air Traffic Control: A New Blueprint for a Better System*, Reason Foundation Policy Study No. 206, May 1996, http://www.reason.org/ps206.html

# Endnotes

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1 "EAO White Paper: Baseline NAS Demand and Capacity Scenarios for Direct Effects Models," Evaluations and Analysis Office, Joint Planning & Development Office, Feb. 3, 2005.

2 Thomas J. Donohue, untitled speech, Wings Club, New York, NY, April 27, 2005 (www.uschamber.com/press/speeches/2005/050427tjd_wingsspeech.htm)

3 Doug Arbuckle, et al., "U.S. Vision for 2025 Air Transportation," *Journal of Air Traffic Control*, January-March 2006, p. 15.

4 Arthur A. Shantz and Matthew Hampton, "National Airspace System Capital Investments Have Not Reduced FAA Operating Costs," Transportation Research Forum, March 8, 2005; (www.trforum.org/forum/2005/schedule.php).

5 "National Airspace System: Experts' Views on Improving the U.S. Air Traffic Control Modernization Program," GAO-05-333SP, Washington, DC: Government Accountability Office, April 2005.

6 Michael J. Harrison, "Air Traffic Control Facility Consolidation Strategies," Proceedings of the 50$^{th}$ Annual Conference, Air Traffic Control Association, November 2005.

7 Glen McDougall, *Air Traffic Control Commercialization Policy: Has It Been Effective?* (Ottawa, Ontario: MBS Ottawa and George Mason University, Syracuse University, and McGill University) January 2006.

8 There does not appear to be any direct relationship between aircraft weight and the cost of providing ATC services to that aircraft. An important part of transportation economists' justification for user-fee funding is to induce users to pay the costs they impose on a system, whether that system be highways, airports, or airspace. Thus, a user fee system based on the underlying costs of the services provided would better align incentives for making the best use of the scarce resource of safely controlled airspace. Business aviation groups (such as NBAA) argue that business aviation is a marginal user of ATC resources, and hence that if there is a shift to a cost-based system, those planes should pay only marginal costs. There is legitimate debate on this question, though "marginal user" appears to be a better description of the past than of a future filled with fractional and VLJ air taxi flights.

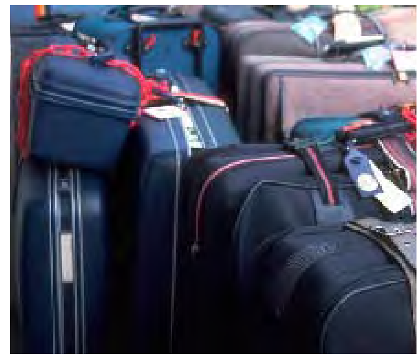
9 For planes in the Small category, we assumed that the annual 175,000 nautical miles are represented entirely by trips equivalent to Boston to Chicago (BOS to ORD). For the larger categories, with longer range, we assumed that half the trips are long (Washington, DC to San Francisco—IAD to SFO) and the other half are BOS-ORD, with the total again being 175,000 nm.

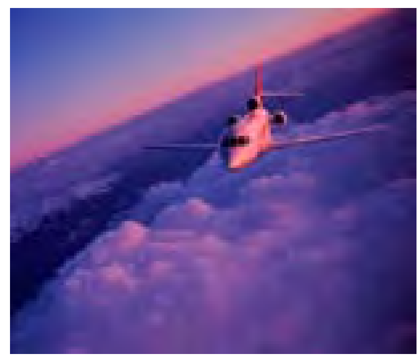
10 "Aviation Reauthorization Information," Washington, DC: Federal Aviation Administration, Sept. 2, 2005.

11 By using the Nav Canada formula for terminal and en-route charges, we do not mean to imply that their formula, if applied unchanged to the U.S. ATC system, would yield the needed total revenue. Applied to ATC transactions in Canada, it provides the full budget for that country's ATC system. Applied, unchanged, to U.S. aviation activity, it might provide more or less than the ATO's budget. Tailoring a version of the Nav Canada approach precisely to the U.S. system's revenue requirements was beyond the scope of this study.





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