



# Time for Reform:

## Delivering Modern Air Traffic Control

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## About Eno and the Aviation Working Group

The Eno Center for Transportation is an independent, nonpartisan think tank that promotes policy innovation and leads professional development in the transportation industry. As part of its mission, Eno seeks continuous improvement in transportation and its public and private leadership in order to improve the system's mobility, safety, and sustainability.

The Aviation Working Group is an advisory group on all matters related to aviation policy and practice. The group is made up of diverse experts and stakeholders. It provides Eno with insights, knowledge, feedback, and guidance on how to continue to lead the world in aviation safety, modernization, and innovation. The group is co-chaired by former Secretary of Transportation Jim Burnley and former Senator Byron Dorgan.

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## Preface to the 2017 Edition

In 2015, the Eno Center for Transportation released the final report from the NextGen Working Group (now, the Aviation Working Group). This report highlighted the challenges with the way the nation's air traffic control system is governed and funded and called for significant changes. It specifically recommended taking air traffic control out of the Federal Aviation Administration in favor of either a government corporation or an independent, non-profit organization. The report also proposed a new funding structure that relies on direct payments to the air traffic control provider, rather than the current mix of taxes and general funds.

The political uncertainty and the instability in the federal budget, coupled with demonstrated success of other forms of governance abroad provides impetus for such reforms. In 2016, a bill to spin off air traffic control provision into a new independent non-profit entity was introduced in the House of Representatives. Though it was not enacted, a wide range of stakeholders continues to push for reform that is long overdue.

Without significant changes, the American air traffic control system will not be able to cope with expected traffic growth, new complexities in the global air space, or critical upgrades. Given the importance of aviation to the U.S. economy this is a topic that cannot be ignored for much longer.

With that in mind, this version of the report includes new developments that have occurred since the initial release, as well as an overall update of facts and figures. There is also a revised section outlining new policy proposals and practical ideas, as well as an overview of developments in other countries.

There is still time to act and pursue a better air traffic control system for our nation. Eno is glad to be able to once again contribute to that discussion.



**Robert Puentes**  
President and CEO



**James H. Burnley**  
Former U.S. Secretary of Transportation



**Byron Dorgan**  
Former U.S. Senator

# Executive Summary

Between 2013 and 2015, the Eno Center for Transportation brought together key stakeholders to understand how best to hasten modernization of the nation's air traffic control (ATC) system. The Next Generation Air Transportation System (NextGen) Working Group (now the Aviation Working Group) quickly concluded that only governance and funding reform of the existing federal structures could accelerate the implementation timeline.

Since the 1980s, there have been several attempts to modernize the ATC. However, the Federal Aviation Administration (FAA) has proved unable to expediently implement these plans or update the numerous systems that comprise ATC. This has catalyzed calls for the internal reorganization of FAA and prompted many proposals to reform ATC governance and funding. The most substantial was the introduction of a performance-based ATC organization, the Air Traffic Organization (ATO), which was created as an arm of FAA in 2000. However, while governance was reformed, funding for the system remained unchanged and continues to rely on a mix of taxes on aviation, augmented by the General Fund.

The budget sequester and government shutdown in 2013 revived the discussion. This interest culminated in 2016 with the introduction of a bill in the House of Representatives to spin off ATC provision into a new independent non-profit entity. Though that legislation was not enacted, stakeholders continue to push for ATC reform and it is expected that in 2017 new efforts will be put forward.

While in the United States the ATC system is operated by the federal government and funded through direct and indirect taxation, many other developed countries have already departed from this model. For example, Australia, Germany, and New Zealand created government corporations to provide ATC services. An independent non-profit user co-operative functions in Canada, a reformed government agency in France, and a public-private partnership in the United Kingdom. None of these countries rely on taxation for their operations; instead fees charged to airspace users fund them.

There are concerns within the United States that non-governmental ATC provision could lead to increased costs to the airspace users, poor service, or unsafe operations. Yet the international experience demonstrates that commercialized providers can keep costs in check, upgrade their systems, and improve safety. Some key factors that are essential to the success of these systems include reliable, independent sources of revenue, independent, but accountable, management, and stakeholder involvement.

There are several options for ATC reform in the United States. The federal government could, for example, only change only how the system is funded. They could also overhaul governance by establishing a new government corporation or an independent non-profit. A more radical change would be to allow a fully private for-profit company.

Based on a thorough review of previous efforts for reform, the Eno Working Group determined that neither maintaining the status quo governance structure with funding reform nor the complete

privatization of ATC are likely to be successful. On the other hand, a government corporation and an independent non-profit organization both have the potential to offer strong benefits. Therefore, Eno proposes that the United States adopt a new governance and funding model for ATC provision that is either a *government corporation* or a *non-profit independent entity*.

The proposed organization would be free from both federal procurement and personnel rules. This would facilitate modernization. Providing airspace stakeholders an opportunity to be represented on its governing board would ensure that the system would be run based on the interest of its users. This would create a more efficient ATC system with the potential to continue the growth of the national aviation system, promote economic growth and increased mobility, while maintaining the high standards of safety that the system enjoys today. The current funding system would be replaced with direct payments to the ATC provider.

The rest of the FAA would be able to focus on its core mission as the aviation safety overseer. FAA would regulate the system and administer grants in a manner similar to the other USDOT administrations. Congress and the federal government would continue to play a substantial role in promoting the growth of the aviation system and assuring that strong safety oversight remains intact.

This arrangement would promote faster modernization of the ATC system, leading to more fuel saved and less congestion. Implementation of NextGen would also increase the reliability of the system, leading to faster and more efficient travel for passengers and cargo. It would also allow the aviation system to grow to meet the demands of the global economy.

After 30 years of attempted reforms, there is now an opportunity to move forward and reform ATC into a system more ready to tackle the challenges of the future.

## 1. Introduction

The United States' aviation system is part of the lifeblood of our economy, moving people and goods around the nation and the globe. The modern American economy literally could not function without it. Yet today the aviation network is facing challenges brought on by rising demand, limited airport capacity, and aging navigation technology.

In response, the Federal Aviation Administration (FAA) developed the Next Generation Air Transportation System (NextGen) in an effort to modernize the nation's air traffic control (ATC) system. Once fully implemented, ATC in the U.S. will become a satellite-based system, and will become safer and more efficient than the one in place today. This modernization effort is needed in order to facilitate economic growth, increase mobility, and allow the nation to keep pace with our international competitors.

However, NextGen implementation is delayed due to unstable federal funding and the inherent challenges that federal bureaucracies have in deploying multi-billion dollar projects like this one. Like other federal agencies, the FAA is subject to federal procurement rules that create additional problems when it comes to managing large scale projects such as NextGen. The inability of

federal agencies to issue bonds or any other form of long-term financing further exacerbates these challenges.

The FAA also has responsibility for other important activities beyond ATC services. These include overseeing the safety of U.S. airspace and certifying and regulating aviation products and people.<sup>1</sup> The agency is also working to facilitate the introduction of new users, like unmanned aircraft systems and commercial space transport, into the national aviation system. Airports also fall under the FAA's regulatory oversight in regard to safety, development, and funding.

The Eno Center for Transportation formed a high-level Working Group consisting of key stakeholders, policymakers, academics, and other experts to understand how to best accelerate modernization and to analyze the institutional barriers that have contributed to NextGen's delayed implementation. The initiative aimed to define an institutional and funding structure best suited to effectively and efficiently implement NextGen and its accompanying benefits.

The next section explores ATC governance, its history, and attempts to reorganize since its inclusion into the United States Department of Transportation (USDOT) in 1967. Following that is a detailed analysis of the international experience of corporatized or otherwise reformed ATC systems.

Based on domestic and international experiences, four possible reform options are outlined.

## 2. U.S. Air Traffic Control Overview

Since the 1970s attempts to reform ATC governance were challenged by a lack of consensus between stakeholders and policy makers. Yet in recent years, political and financial instability of the U.S. budget and the demonstrated success of other forms of governance abroad has revealed an opportune environment for pragmatic, innovative change.

### 2.1 History and Current ATC Governance

The federal involvement with aviation began in 1926 with the Air Commerce Act. As it evolved, the federal role ultimately encompassed the economic regulation of airlines, safety oversight over the entire aviation industry, and the provision of air traffic control.<sup>2</sup> This section provides an overview of the most important waypoints of the history of U.S. ATC governance. A more detailed account can be found in Appendix A.

In the beginning of aviation there was no formal ATC. Pilots had to be aware of their surroundings and separate themselves from other traffic. In the 1920s, technologies like radio communications and ground beacons helped make flying safer. However, after a series of accidents the federal government took over the provision of ATC services between airports in 1936. In 1941, in preparation for the war effort, the federal government also took over ATC at airports. After the exponential growth of air traffic following World War II, along with a serious concern over safety, the 1950s brought the introduction of radar and the creation of the Federal Aviation Agency. In

the following decade, with the creation of the USDOT, FAA became a modal agency of this larger administration. This is the basic structure that exists today.

Since the 1980s, there have been several attempts to modernize ATC with the most notable change being the creation of the Air Traffic Organization (ATO) in 2000.<sup>3</sup> Since then, the agency has been working to implement its latest iteration of modernization: the Next Generation Air Transportation System (NGATS), later re-branded as NextGen.<sup>4</sup>

Currently, FAA is the largest department of USDOT with over 46,000 employees. FAA's Administrator is appointed to a five-year term and reports directly to the Secretary of Transportation. Within FAA there are two primary functions: air traffic control and everything else (including certification, safety regulation, airport oversight, and grant programs). FAA is headquartered in Washington, D.C., its Technical Center is in Atlantic City, and its Aeronautical Center (which includes controller training at the FAA Academy) is in Oklahoma City. FAA also has nine regional offices and hundreds of staffed operational facilities. It is a devolved administration with most day-to-day operations occurring at the regional offices and numerous staffed facilities.<sup>5</sup>

The ATO is the largest arm of the FAA with about 75% of its employees. ATO was in part founded on the principles of separating ATC from the regulatory arms of FAA, and introducing more business-like performance standards. ATO has a separate management and organizational structure from the greater FAA. The ATO Chief Operating Officer shares leadership among seven vice presidents.<sup>6</sup> There are two primary service units within ATO: air traffic services, responsible for en-route and terminal air traffic control, and technical operations, responsible for infrastructure management and maintenance.<sup>7</sup>

The primary role of ATO is to provide "safe and efficient air navigation services to 30.2 million square miles of airspace."<sup>8</sup> To do this, the United States' domestic and oceanic airspace is divided into 24 flight information regions. Each region is home to an air route traffic control center (ARTCC) whose function is to separate aircraft along their flight routes. ATO also operates ATC around 120 towers at airports across the nation, with the rest operated by the military or by private firms under the Contract Tower Program in around 250 small airports.<sup>9</sup>

ATO has the responsibility for approving an aircraft's flight plan, directing its flight through the various airspace sectors along its route, and responding to requests from pilots for route changes. The three main components of air traffic control infrastructure are communications, navigation, and surveillance. NextGen is intended to modernize all three.

Depending on the type of aircraft, general aviation (GA) planes have the option of flying in "uncontrolled" airspace, in which they are responsible for visual self-separation from other planes, or filing a flight plan to fly for the same controlled airspace used by airlines. Privately contracted, but FAA regulated, Flight Service Stations (FSSs) exist to assist private pilots with both options, enabling them to get weather briefings and to file flight plans.<sup>10</sup>

In recent years there has been some progress towards air traffic facility consolidation in order to reduce costs and improve services. Terminal Radar Approach Control Facilities (TRACONS) in

very large urban areas (such as metropolitan Washington, D.C. and both southern and northern California) have been the primary successes in consolidation thus far, but other efforts have failed and the FAA has since abandoned most of its plans to consolidate facilities.<sup>11</sup>

After the formation of the ATO in the early 2000s, the focus of FAA had been on delivering NextGen with less attention given to governance. This changed with the budget sequestration and federal government shutdown in 2013. In 2016, a proposal to spin-off the ATO into an independent nonprofit entity was introduced in the House of Representatives but did not make it into law. The current FAA reauthorization extension expires in September 2017, and key stakeholders have expressed a strong desire for funding and governance reform to be a key part of the deliberations over a new law.

## 2.2 History of FAA Funding

Through its almost 80-year history of formalized, federal level governance, ATC has frequently been underfunded and policy makers have struggled to define a long-term, sustainable structure.

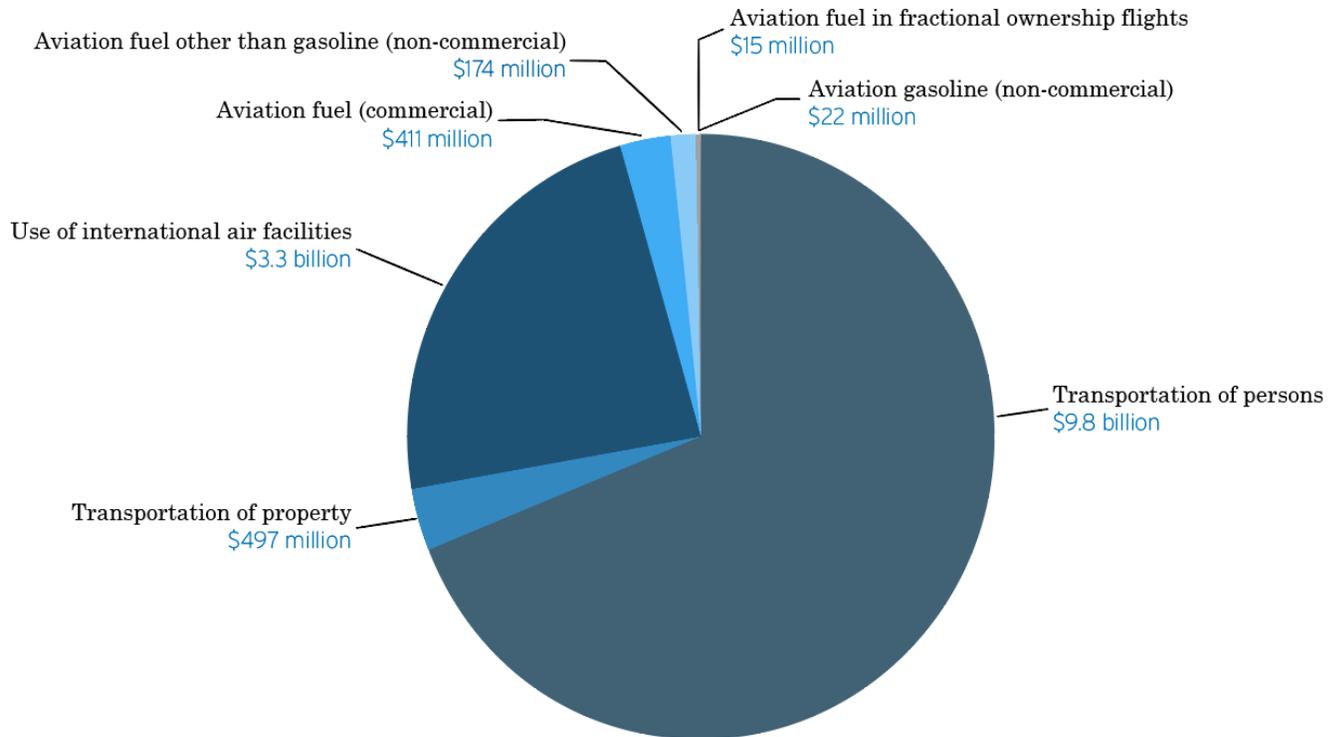
The government's General Fund supported ATC infrastructure and operation for the first few decades of federal involvement. This always led to concerns about sustainability and underinvestment in the system. These issues culminated in the late 1960s, with air traffic increasing and lack of financial resources to fund the necessary expansion of capacity throughout the system. A law in 1970 established the Airport and Airway Trust Fund (AATF) and authorized the dedication of aviation user fees, including fuel taxes and ticket taxes for a period of ten years.<sup>12</sup>

From the outset, there was contention about whether the AATF should be used as a capital account or if it should be used for both operational and capital expenditures. This ambiguity was not resolved until 1982, when the Airport and Airway Improvement Act was passed, reauthorizing the collection of aviation taxes dedicated to the AATF. This and subsequent laws allowed the AATF to pay at least a portion of FAA's Operations account.<sup>13</sup>

Presently, the AATF is the primary source of funding for the FAA.<sup>14</sup> The AATF receives its revenues from a range of indexed excise taxes (rates as of 2017):

1. Domestic Passenger Ticket Tax: 7.5% of ticket price.
2. Domestic Flight Segment Tax: \$4.00 per passenger segment (indexed to inflation).
3. Passenger Ticket Tax for Rural Airports: 7.5% of ticket price, flight segment fee does not apply.
4. International Arrival and Departure Tax: \$17.50 (indexed to inflation).
5. Flights between continental U.S. and Alaska or Hawaii: \$8.70 international facilities tax plus applicable domestic tax rate (indexed).
6. Frequent Flyer Tax: 7.5% of value of miles.
7. Domestic Cargo Mail: 6.25% of amount paid for the transportation of property by air.
8. General Aviation Fuel Tax: Aviation gasoline, \$0.193 per gallon; jet fuel, \$0.218 per gallon; 14.1 cents per gallon surcharge on fuel for aircraft used in fractional ownership program.
9. Commercial Fuel Tax: \$0.043 per gallon.

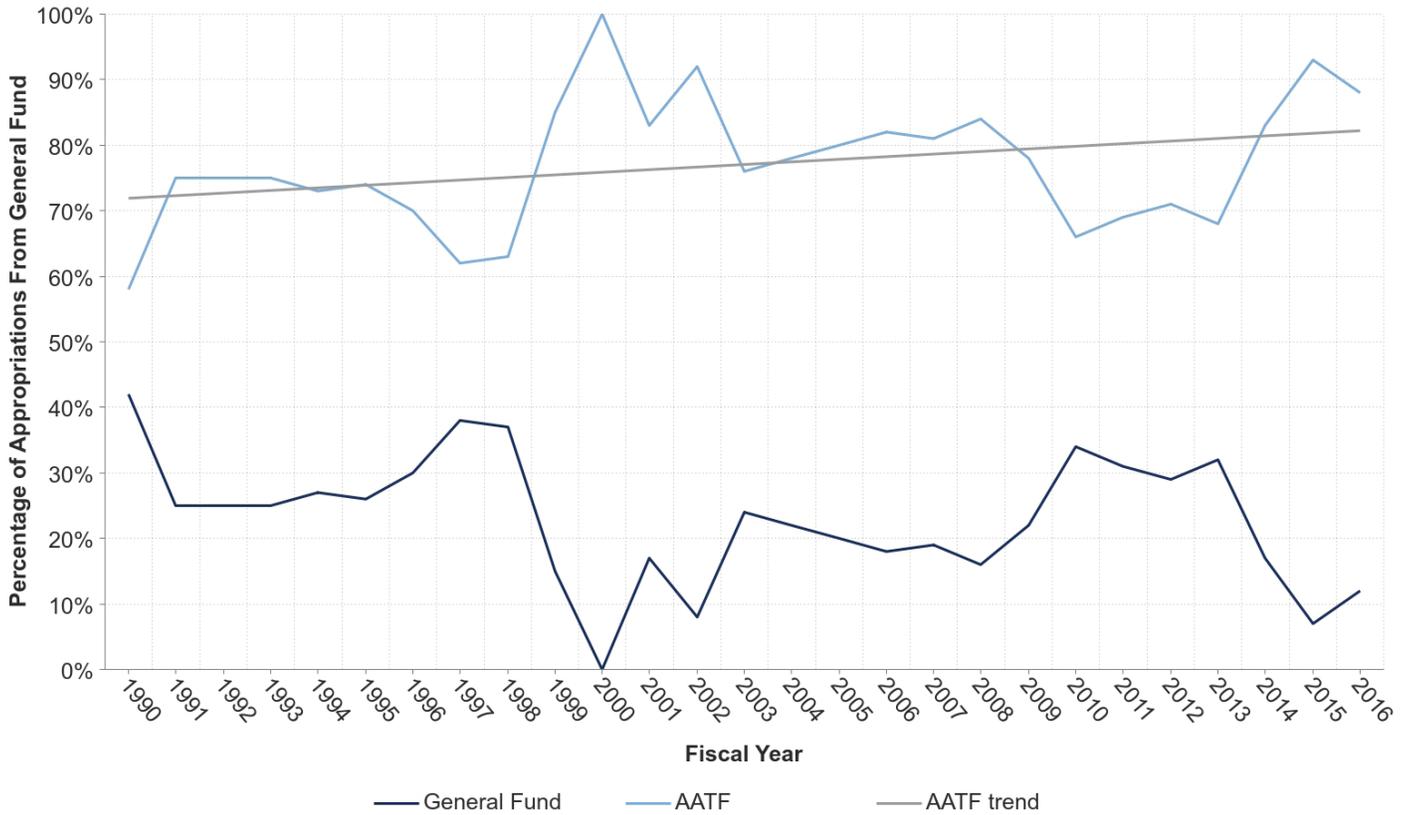
**Figure 1: AATF revenues for FY2015**



Source: Federal Aviation Administration, “AATF Fact Sheet,” 2016. Note: “Transportation of persons” includes domestic passenger ticket tax, domestic flight segment fee, rural airports ticket tax, and frequent flyer tax; “Transportation of property” includes the cargo and mail tax; “Use of international air facilities” includes international arrival/departure tax and Alaska/Hawaii tax.

Historically, the AATF brought in considerably more revenue than it has expended. However, since 2001, the uncommitted balance of the AATF has been sharply decreasing.<sup>15</sup> The 2000 Aviation Investment Reform Act of the 21<sup>st</sup> Century (AIR-21) changed the way that Congress appropriated money from the AATF to be based on the forecasted level of revenue and interest from the AATF in each specific year. This allowed for the fund to invest the excess balance in the system, and as revenues were projected to increase, it was thought that the AATF would provide more annual funding. However due to events such as the September 11, 2001 terrorist attacks, the projections were not confirmed and Congress appropriated more money from the AATF than annual revenues, effectively drawing on the balance of the fund.<sup>16</sup>

**Figure 2: General Fund and AATF contributions to FAA budget (1990-2016)**



Source: Federal Aviation Administration, 2016 and other years.

Therefore, in order to maintain funding levels, contributions from the General Fund had to increase (see Figure 2). With the budget sequestration of 2013, resources from the General Fund decreased, and the relative contribution of the AATF increased in both 2014 and 2015. In 2016, the General Fund contribution increased, but it was still at around half the average value from 1990-2016.

The AATF supports four accounts, all administered by the FAA (Table 1).<sup>17</sup>

**Table 1: Airport and Airway Trust Fund Accounts**

| ACCOUNT                                       | DESCRIPTION   | FUNDS NEXTGEN?            |
|---|---|---------------------------|
| <b>Operations</b>                             | Funds ATC operations and FAA aviation safety regulation.  | Partially                 |
| <b>Facilities and Equipment (F&amp;E)</b>     | Funds the acquisition and maintenance of staffed ATC facilities, numerous ground-based navigation aids, as well as engineering and development for air traffic system technologies. | Primary source of funding |
| <b>Airport Improvement Program (AIP)</b>      | Funds grants-in-aid for projects including runways, rehabilitation, and noise mitigation.   | No                        |
| <b>Research, Engineering, and Development</b> | Funds R&D aimed at improving aviation safety, mitigating environmental impact, and improving efficiency.  | Partially                 |

Operations is also the largest account, receiving more than 60% of FAA appropriations. Of the Operations account, more than 50% of the funding is from the General Fund.<sup>18</sup> From a budget of around \$15.8 billion for FY2013, approximately \$11.2 billion was dedicated to ATC, \$3.2 billion to the AIP, and the remaining funds support the rest of FAA’s functions.<sup>19</sup>

## 2.3 Role of Stakeholders and Decision Makers

From policymakers, to industry, to workers, a range of aviation stakeholders has contributed to proposals to reform governance and funding.

### 2.3.1 Congress

Currently Congress must authorize all the funding for the FAA and ATC provision. In the U.S. House of Representatives, power is shared between the Committee on Transportation and Infrastructure (T&I), the Committee on Ways and Means, and the Committee on Appropriations. In the U.S. Senate, the Committee on Commerce, Science, and Transportation, the Committee on Finance, and the Committee on Appropriations share jurisdiction. As with other trust funds, there are battles between the authorizers and the appropriators about what can be spent and who pays for what.

Congress has frequently debated the federal government’s role in ATC. One example of congressional support for maintaining ATC within the federal government is 2003’s Air Traffic Control System Integrity Act. This bill was introduced after President George W. Bush removed language in the Executive Order that created the ATO declaring ATC as an inherently governmental function. This 2003 bill would have prohibited the Secretary of Transportation from

authorizing the corporatization of ATC or outsourcing of control towers or Flight Service Stations. However, the bill died in Committee.<sup>20</sup>

In general, members of Congress seem to prefer to endorse spending that has a direct benefit for their districts. For example, a congressman from a district that is home to GA airports may be more interested in updating the outdated infrastructure at his or her hometown airport rather than investing in a modernized air traffic control system that would bring the greatest benefits in more congested airspace. Within the limited budget, Congress has tended to champion airport grants over increased funding for ATC.

Beyond controlling the taxes that fund the FAA and its different accounts, Congress also has the ability to impose other taxes on air travel. An example of a tax levied on airline passengers that is not dedicated to the AATF are the taxes imposed by the Transportation Security Administration (TSA) to partially fund its operations. This includes the September 11 Security Fee imposed on passengers and the Aviation Security Infrastructure Fee imposed on airlines.<sup>21</sup> Although traditionally used to directly fund the TSA, starting in FY2014, portions of the September 11 Security Fee are now deposited in the General Fund and are used for deficit reduction.<sup>22</sup>

## 2.3.2 Commercial Airlines

Commercial airlines' key interest is ensuring a funding structure that is fair to their industry, does not discourage passengers or goods from flying or being shipped by air, and helps to encourage the growth of their business. They also want the ability to use the most cost-effective technology to provide safe services to their customers at the lowest cost possible.

In public statements, Airlines for America (A4A), the airlines' largest lobbying group, supported House T&I proposals for reform in the structure and funding of the ATC system.<sup>23</sup> In a hearing before Congress, A4A's chairman stated that "transformation, not renovation, is required".<sup>24</sup> Their preferred solution is a non-profit model like NAV CANADA, with stakeholder-driven governance that "would deliver the greatest benefits for a reformed ATC entity because such a structure would continue to put safety first, while driving value for all stakeholders".<sup>25</sup> The International Air Transport Association (IATA) endorsed the A4A position on behalf of its 250 international airline members.<sup>26</sup>

## 2.3.3 General Aviation and Business Aviation

Revenue streams to fund GA and business aviation are different than commercial airlines because they do not transport ticketed passengers. Historically, these interests have opposed the introduction of user fees such as per flight fees or landing fees as cost-prohibitive. This is because pilots and businesses would not have the ability to spread these fees out over a large group of people (such as is possible in commercial aviation). This sector of the industry currently pays into the AATF through excise taxes on aviation gasoline and jet fuel, a system that has been found by government watchdogs to be flawed.<sup>27</sup>

In 2011, the Obama administration unveiled a proposal that included a \$100 per flight fee that would apply to commercial aviation, and both GA jets and turboprops if the flight occurred in controlled airspace. GA campaigned against this fee and suggested it was a slippery slope to an ATC system funded wholly through dedicated user fees.<sup>28</sup> In 2012, the National Air Transport Association noted “the costs associated with user fees far outweigh any benefit to deficit reduction”.<sup>29</sup> The administration’s proposal was ultimately rejected, as was a similar Senate proposal.

## 2.3.4 Labor

To understand the role of labor in ATC, it is necessary to first understand the history of labor in the industry. Aviation labor in the United States organized in 1968 with the formation of the Professional Air Traffic Controllers Organization (PATCO). The union highlighted challenging working conditions that were exacerbated by the increasing congestion of the national airspace. Flight service station professionals organized in 1972 with the National Association of Air Traffic Specialists.<sup>30</sup>

After a number of labor actions during the 1970s, PATCO went on strike on August 3, 1981. This strike was deemed illegal by President Reagan and the courts and resulted in the firing of over 11,400 air traffic controllers. To help rebuild the system in the face of a workforce down to around 4,200 controllers, the FAA began the Contract Tower Program, with five towers in “low activity” areas.<sup>31</sup> This program was initially limited to a few remote regions but has since expanded to over 250 non-radar towers, consisting of roughly half the airport towers operating nationwide.<sup>32</sup> According to the USDOT’s Office of the Inspector General (OIG), contract towers are “cost-effective,” averaging \$537,000 to operate compared to \$2.025 million for an FAA tower.<sup>33</sup>

In 1987 the National Air Traffic Controllers Association (NATCA) was certified six years after the decertification of PATCO. NATCA is affiliated with the American Federation of Labor and Congress of Industrial Organizations (AFL-CIO) and currently serves as the exclusive representative for the air traffic controller bargaining unit with the FAA. It represents more than 18,000 FAA employees.<sup>34</sup>

As discussed earlier, the budget sequester and government shutdown put FAA employees in a particularly precarious situation. In response to mandatory sequester-related budget cuts, air traffic controllers were furloughed, like most federal employees. However, after a week, Congress passed the Reducing Flight Delays Act of 2013 to provide the Administrator with financial flexibility to end the furloughs.<sup>35</sup> Sequester-related cuts halted all air traffic controller hiring from March 2013 until January 2014. The government shutdown affected many FAA programs and employees, although air traffic controllers were exempt from furloughs, as their jobs were deemed essential.<sup>36</sup> Following the government’s reopening, NATCA issued a statement urging the government to establish a stable funding mechanism:

*“In order to grow, modernize, and help power the U.S. economy, aviation cannot be subjected to repeated budget crises. Sequestration, the shutdown, and the uncertainty they have wrought have disrupted flight schedules, peeled away layers*

*of safety redundancies and threatened our ability to maintain fully staffed and trained workforces.”<sup>37</sup>*

In the past few years, NATCA’s focus has been on providing a stable, predictable funding stream for the National Airspace System. Since 2015, NATCA has shown willingness to discuss potential structural changes, as long as those changes: protect the employees’ employment relationship including their rights and benefits; ensure that safety and efficiency remain the top priorities; maintain diversity of the system; ensure a smooth transition; and lead to a mission driven, not-for-profit, model.<sup>38</sup> This resulted in NATCA’s support for Aviation Innovation, Reform, and Reauthorization (AIRR) Act<sup>39</sup> in 2016.<sup>40</sup> As will be discussed later, this is not the first time labor has been supportive of reform.

## 2.3.5 Airports

There are over 3,300 airports included in the National Plan of Integrated Airport Systems. These facilities include 380 primary airports (hub and non-hub airports) and nearly 3,000 nonprimary airports (GA, reliever, and nonprimary commercial service airports). FAA’s Office of Airports provides oversight and services related to safety, security, capacity, project funding, and environmental compliance.

The official position of Airports Council International – North America (ACI-NA), the trade association for commercial airports in North America, is that “NextGen begins and ends with airports”.<sup>41</sup> Indeed, research demonstrates that delays often begin at airports due to limited capacity and continually increasing demand. ATC modernization has the potential to decrease delays and allow airports to use their limited capacity more effectively. Recognizing the benefits to airports, ACI-NA has advocated for “airport involvement in NextGen planning and implementation” and a “stable and predictable funding system to ensure sufficient capital resources are available”.<sup>42</sup>

As reform proposals are considered, airports are concerned with keeping the fundamental structure of the federal AIP program intact. Airport groups want to maintain a sufficient and stable revenue stream to support capital projects at large and small airports and want airports to continue to receive revenue from a dedicated airport trust fund, rather than the less predictable General Fund.<sup>43</sup> During the last FAA re-authorization, the focus of airport representatives was the proposed increase of the Passenger Facility Charge (PFC).<sup>44</sup>

## 2.4 Previous Attempts at U.S. ATC Governance Reform

The creation of the ATO was the result of a long discussion that began in the 1970s. Since this time, and through each attempt to reform the system, there have been discussions about possible FAA reorganization. However, there has not been consensus on what reform should entail, and although it has been suggested several times, a separately managed and funded organization was never created. This section explores these attempts and discusses the barriers that have existed to separating ATC provision from the FAA.

## 2.4.1 The 1970s and the Reagan Administration

PATCO, the decertified air traffic controllers' union, was the first to propose ATC corporatization. A 1974 report called for ATC to be operated by a government corporation, not the FAA.<sup>45</sup> Under this proposal, which had many similarities to later proposals, governance would be the responsibility of a board with stakeholder representation, as well as consumers and environmentalists. The corporation would have the responsibility to set taxes to fund the AATF which, in turn, would fund the corporation. The report led to the introduction of two bills but neither left the House Public Works and Transportation Committee.<sup>46</sup>

In 1981 the Reagan administration aimed to reduce the size and scope of the government and ATC was among the functions under scrutiny.<sup>47</sup> While the contracting out of towers in 1982 was a step towards a more privately controlled system, greater reforms were sought.<sup>48</sup> The concept of privatization was revisited in 1983 but there were concerns due to the fact that the proposed model had not been tried before so reform did not occur.<sup>49</sup>

In 1985 an Air Transport Association (ATA, now Airlines for America) report examined what a government corporation for ATC would look like and suggested that there may be benefits associated with a “business-like” approach.<sup>50</sup> The following year, the National Academy of Public Administration (NAPA) and Apogee Research Inc. each independently released reports that did the same (the former was commissioned by ATA).<sup>51</sup> The release of this set of reports demonstrated the airlines' skepticism that the ATC's governance system in existence would properly foster modernization.

In 1987, the Reagan administration established the “President's Commission on Privatization “to review the appropriate division of responsibilities between the federal government and the private sector”.<sup>52</sup> ATC was among the responsibilities that the Commission evaluated. The Commission held a series of hearings to examine the potential of privatizing ATC, featuring testimonies from the General Accounting Office (now the Government Accountability Office, GAO) that stated that while challenges exist within FAA, “[the GAO did] do not believe that structural deficiencies in the current system prevent their solution”.<sup>53</sup> Two former FAA Administrators also separately stated their concerns with the potential of privatization.<sup>54</sup>

Meanwhile, in 1986 Congress passed the Aviation Safety Commission Act, which established the Aviation Safety Commission to assess how the FAA may most effectively perform its responsibilities and increase aviation safety.<sup>55</sup> The Commission's 1988 report recommended that, “FAA be transferred from [US]DOT and be established as a user-funded authority”.<sup>56</sup> In the same year USDOT released a report which evaluated organizational restructuring options.<sup>57</sup>

The Aviation Safety Commission was mostly created to undo the consolidation of FAA into USDOT that had occurred 20 years prior. The merger was still fresh in the memories of many who believed the organization suffered from this amalgamation. USDOT acknowledged that there were challenges within the current FAA structure, namely in terms of procurement and safety, but felt that separating FAA from the DOT would be a mistake and would lead to a lack of accountability and have potential detrimental impacts on safety.<sup>58</sup>

The view that the separation of USDOT and FAA would be harmful was also supported by a 1988 Office of Technology Assessment (OTA) report that stated, “FAA’s functions cannot be separated into regulator and operating (ATC) components without diminishing the effectiveness of the entire system. Furthermore, without more emphasis on system safety at the very top, FAA agency-wide problems that have hampered the organization’s capabilities are likely to continue”.<sup>59</sup>

## 2.4.2 The Early 1990s and the Air Traffic Control Corporation Study

The 1990s brought new attempts to reform ATC that eventually materialized in the reorganization that created the ATO. This followed a long series of reports and studies and the introduction of concrete legislation in Congress to corporatize the system.

In 1991, a Transportation Research Board report suggested that only a public corporation:

*“Would provide the authority and discretion needed to improve operational performance without severing links between regulatory and operational functions, which may compromise safety.”<sup>60</sup>*

Additional reports were released in the early 1990s, but the main push towards reform came from two different, government-related, sources: the Commission to Ensure a Strong Competitive Airline Industry, headed by former Virginia Governor Gerald Baliles and the National Performance Review (NPR) from the White House.<sup>61</sup>

The Baliles Commission was created in 1993 to develop policy recommendations that could improve the aviation industry. Beyond ATC, it also made recommendations about GA manufacturers and bankruptcy laws for airlines. While it was not an initial goal of the Baliles Commission to suggest the restructuring of the FAA, the analysis of the aviation industry by the commission concluded that governance reform would be necessary to improve the system.<sup>62</sup> Among the Commission’s recommendations was the creation of a new entity within USDOT to operate ATC.

Simultaneously, the NPR—an initiative to streamline governmental duties created by President Bill Clinton in 1993—also suggested corporatization. At its official unveiling, President Clinton announced,

*“Our goal is to make the entire federal government less expensive and more efficient, and to change the culture of our national bureaucracy away from complacency and entitlement towards initiative and empowerment.”<sup>63</sup>*

The primary aim of this review was not to promote privatization but to revisit how the government functioned. Among its recommendations, it stated: “we should restructure the ATC into a government-owned corporation, supported by user fees and governed by a board of directors that represents the system’s customers”.<sup>64</sup>

With these two reports in hand, Transportation Secretary Federico Peña established the Executive Oversight Committee to study how ATC could be restructured. Their 1994 report evaluated the challenges that ATC was facing and examined potential approaches to improving the system, ultimately recommending the creation of a United States Air Traffic Services Corporation (USATS).<sup>65</sup> (See Appendix B for a discussion of government corporations in the United States.) This proposal highlighted the need for change to allow the FAA to keep up with rapidly advancing technology, including the use of satellite-based navigation systems, and to change procurement procedures that were increasing costs and delaying deployment of new technologies. Additionally, the difficult budgetary situation of the federal government was noted as a catalyst for change. These themes still resonate today.

The report proposed the creation of a government corporation to provide ATC services. This corporation was to be a not-for-profit financially self-sufficient businesslike enterprise, with no reliance on appropriated funds. Funding would have come from user fees charged to commercial airspace users. These users, along with the corporation employees, would have been represented on the governing board, having a direct voice in decision making. To help modernization efforts, this new entity would not only have been freed from procurement procedures that the FAA was subjected to, but it would also have had the ability to borrow money on capital markets, up to a limit of \$15 billion. The FAA would have continued to exist as the safety regulator of the aviation system.<sup>66</sup> The proposal would have created a system in the United States much in line with what has subsequently been implemented in many peer nations. In fact, it was modeled after Airways New Zealand, discussed later.

Following the release of the USATS proposal, a hearing was held before the Senate Appropriations Committee. Witnesses included representatives from Professional Airways System Specialists (PASS), NATCA, National Business Aircraft Association (NBAA), Aircraft Owners and Pilots Association (AOPA), National Association of Air Traffic Specialists, and Controllers United. In this hearing both PASS and NATCA supported the USATS proposal; NBAA and AOPA opposed it.<sup>67</sup>

From the perspective of PASS, USATS would allow ATC to behave more like a business leading to a more flexible system. NATCA was also supportive of the proposal, which was similar to a 1992 initiative of its own. From NATCA's perspective, the change to a government corporation would allow more flexible labor arrangements and a procurement system that was free from federal procedures and regulations. They were not supportive of any proposals to create a private or non-governmental entity to manage ATC, which they viewed as an "inherently governmental" function. NATCA also believed that user fees should not replace the funding mechanism in existence.<sup>68</sup>

NBAA was in favor of institutional reform because of the influence of politics on the budget, but had doubts that a "corporate structure will be effective in confronting these problems". NBAA was willing to pay for their "fair share of the costs of the system," but had concerns that the breakup of the FAA would lead to inefficiencies and price increases for everyone. Safety was their final concern, with worries about how a monopolistic provider of ATC would be regulated by the FAA.

Representing the GA community, the witness from AOPA voiced reservations that user fees would be "both an economic and safety concern" and that the "Administration's assurance of no user fees imposed on general aviation might not survive the legislative process". Concerns about governance

were also raised, with fears that airlines and unions would dominate the USATS governing board. Finally, AOPA also suggested that Congress and the administration would lose regulatory and policy oversight.<sup>69</sup>

In 1995, Representative Norman Mineta introduced the *United States Air Traffic Service Corporation Act* to “provide for the transfer of operating responsibility for air traffic services currently provided by the Federal Aviation Administration on behalf of the United States to a separate corporate entity”.<sup>70</sup> This proposed corporation would charge user fees to the airlines, have budget autonomy from Congress, have permission to issue revenue bonds, and would be subjected to distinct procurement procedures from the rest of the federal government. Lacking support from the airlines, GA, and many members of Congress, this bill died in committee.<sup>71</sup>

### 2.4.3 The Mineta Commission and the Bush Years

Following the failed USATS proposal, Congress passed, in 1995 and 1996, a number of laws that included provisions to make FAA’s personnel and procurement rules more flexible. However, implementation was largely similar to the personnel and procurement systems that existed for the rest of government.

A recent OIG report found that the “FAA has not leveraged these personnel reform flexibilities”, with many of these rules still mimicking federal rules.<sup>72</sup> The report argues that this is due to the bargaining agreements with the unions and the only real difference from FAA’s personnel rules and the federal government’s is the level of compensation.<sup>73</sup>

The procurement reforms directed the FAA to develop an acquisition management system to meet its unique needs. According to the OIG report, the FAA claims that this improved the delivery of the technologies and capabilities on newer acquisitions. Indeed, from 2004 through 2012, FAA acquisitions were 1% under budget and 11% behind schedule compared to 38% over budget and 25% behind schedule prior to 2004.<sup>74</sup> However, the procurement processes at the FAA are still plagued with problems, with unresolved requirements and made with incomplete information, software development problems, ineffective contract management, and unreliable cost and schedule requirements.

In 1996, an FAA re-authorization established the National Civil Aviation Review Commission chaired by then-former Representative Norman Mineta and tasked with performing an independent assessment of FAA funding and safety oversight. The Mineta Commission’s report was released on September 10, 1997. It was critical of the existing funding mechanism based on excise taxes and appropriations from Congress, stating that federal budget rules were “crippling” and “inappropriate” and were a hindrance to capital investments that were needed to modernize the system. From a governance perspective, it concluded that the system had “too many cooks” (e.g., FAA, USDOT, White House, Congress) making accountability and authority “too diffused to run a 24 hour-a-day, high technology, rapidly changing operating system for a major commercial industry”.<sup>75</sup>

Although the report did not suggest the corporatization of the system, it recommended “broad and sweeping changes in the ways the FAA was managed.” Specifically, the Commission called for:

1. User fees and spending to be directly linked and shielded from discretionary budget caps.
2. ATC to be a performance-based organization.
3. FAA to be able to employ innovative financing.
4. A cost based revenue stream to support the air traffic system.
5. Operating costs to be controlled in order to allow increased capital investment.
6. Airport capital needs to be met by continuing the AIP at an annual minimum expenditure of \$2 billion.

After Canada corporatized their system in 1996 as a non-profit user co-op some U.S. stakeholders, including airlines, voiced their support for a similar model.<sup>76</sup> Labor unions, on the other hand, were still opposed to taking ATC out of the government’s hands. This view prevailed and the movement of FAA and ATC to a more performance-based organization was believed to be the best achievable alternative in political terms.<sup>77</sup>

On December 7, 2000, President Clinton signed an Executive Order creating the ATO.<sup>78</sup> This followed the 2000 law, *Air Investment Reform Act of the 21<sup>st</sup> Century* (AIR-21), which mandated that a Chief Operating Officer be appointed as part of the efforts to reform FAA. The COO eventually became the head of the ATO. With continued opposition from GA, the proposal did not include any provisions to allow the ATO to charge user fees or to issue bonds, gutting two key recommendations from the Mineta Commission. In addition, the EO noted that the provision of air traffic services was an “inherently governmental function”, a definition that had already been mentioned by NATCA’s representative in the 1994 hearing discussing USATS.<sup>79</sup>

Although the events of September 11, 2001 delayed its implementation, the ATO was fully operational by February 2004. Approximately 36,000 FAA employees moved to the new organization. This was the last time that significant changes in ATC governance were enacted.<sup>80</sup>

On April 10, 2003, House T&I Committee chair Representative Jim Oberstar demonstrated his opposition to the privatization of ATC based on safety and security concerns in the aftermath of the September 11 attacks.<sup>81</sup> The bill garnered 18 cosponsors but ultimately died. It was revived a couple of weeks later as an amendment to the Senate version of the FAA reauthorization act.<sup>82</sup> However, with veto threats from the White House, the conference committee did not include the provision in the final version of the bill, and the 2003 FAA reauthorization act did not include it.

The George W. Bush administration proposed to remove the ATO from the FAA and create a new modal administration within USDOT. This would separate the provision of ATC from its regulation, thus removing the inherent conflict of interest that having the FAA performing both functions creates. Although not considered a perfect solution, it was seen as a first step towards a new, better suited, form of governance. But due to competing priorities, the administration ultimately dropped this idea.<sup>83</sup>

One reform achieved during this period was the contracting out of the Flight Service Stations (FSSs). These facilities provide private pilots free weather information along with other services,

and also allow the pilots to file flight plans in case any problems occur with the flight. Citing rising costs and a need for modernization, in 2005 FAA transferred 58 facilities and 1,900 personnel to Lockheed Martin. With a cost of \$1.8 billion for the 10-year contract (plus a 42-month extension in 2015), the FAA estimated the agency would save \$2.2 billion.<sup>84</sup>

By 2009, the focus of ATC reform was to move toward a user-fee system “to create a direct relationship between revenue collected and services received”.<sup>85</sup> Like in the USATS proposal from the previous decade, only commercial airlines would pay these user fees, and GA would continue to pay fuel taxes, which would be increased and would now fund the AIP. The proposal also included demand and congestion pricing at airports. Proposed at a time when fuel prices were skyrocketing and delays were becoming headline news, the focus of attention shifted, and this proposal was also not enacted.<sup>86</sup>

## 2.4.4 The Aviation Innovation, Reform, and Reauthorization Act of 2016

While the 2012 FAA Reauthorization had an expiration of September 2015, at the time congressional attention on transportation was focused on passing a new highway bill.<sup>87</sup> As such, Congress passed a short-term six-month extension on FAA’s programs moving the deadline to March 2016.<sup>88</sup>

In 2016, the House T&I Committee’s Chairman Bill Shuster introduced a proposal, the AIRR Act, to spin-off ATC provision to a private non-profit entity, the ATC Corporation.<sup>89</sup> This entity would be modeled after NAV CANADA, the non-profit entity running Canadian ATC since 1996. The bill was approved by the T&I Committee on partisan lines but was never reported out of committee.

Shuster proposed the ATC Corporation as a federally chartered, not-for-profit corporation, incorporated in a state of its choosing. The corporation would take over operational control of ATC on October 1, 2019, and would be the sole provider from then on unless it chooses to delegate certain functions, much like the FAA does with the contract tower program.

The corporation would not be a department or agency of the U.S. government, and would not be subject to title 31, U.S. Code, where most statutes relating to the federal budget are codified. This would essentially remove it from the federal budget process. The federal government would not be liable for any actions or debt of the corporation. In times of war the president may transfer ATC operations to the Department of Defense.

Governance would be composed of a Board of Directors and a Board of Advisors. The Board of Directors would have the following structure.

1. The CEO;
2. Two directors appointed by the Secretary of Transportation;
3. Four directors nominated by the “principal organization representing mainline air carriers” (i.e., Airlines for America);

4. Two directors nominated by the “principal organization representing noncommercial owner and recreational operators of general aviation aircraft” (i.e., Aircraft Owners and Pilots Association);
5. One director nominated by the “principle organization representing owners, operators and users of general aviation aircraft used exclusively in furtherance of business enterprises” (i.e., National Business Aviation Association);
6. One director nominated by the “principal organization representing aerospace manufacturers” (i.e., Aerospace Industries Association);
7. One director nominated by the “principal organization engaged in collective bargaining on behalf of air traffic controllers employed by the Corporation” (i.e., National Air Traffic Controllers Association);
8. One director nominated by the “certified collective bargaining representatives of airline pilots with the appointment of representing organization rotating every 3 years.” (i.e., Air Line Pilots Association).

The directors would be elected for three-year terms, their fiduciary duty would be to the corporation, and they could not be members of any level of government or work for the corporation or any of the customers, bargaining agents, or suppliers of the corporation. In other words, the directors nominated by the airlines cannot work for an airline and the directors nominated by the air traffic controllers’ union cannot be an active air traffic controller.

The Board of Advisors would consist of operators and manufacturers of unmanned aircraft systems, airports, other labor organizations, and small communities. It would also include representation from the Department of Defense (DoD).<sup>90</sup> DoD is a crucial player in ATC, as it controls 16% of U.S. airspace and employs 8,000 air traffic controllers in over 150 airports (including some with commercial traffic) and en-route facilities.<sup>91</sup> The relationship between DoD and the FAA is based on a series of memorandums of understanding.<sup>92</sup> Like with all contracts and agreements that are in place today between the FAA and other entities, it is expected that these agreements would carry over to the new provider and be replaced or adjusted as necessary. Ultimately, the government and DoD would have the right to take over the system in cases of war or other national security concerns.

International experience shows how this could work. Australia is integrating its civilian and military airspaces and Belgium is examining the issue.<sup>93</sup> In Germany, now all airspace is jointly managed.<sup>94</sup> All of these countries have corporatized ATC systems, albeit in the form of (considerably independent) government corporations. Additionally, in Europe, EUROCONTROL, the European Union-agency that oversees European ATC safety, has an office dedicated to the coordination between military and civilian use of airspace.<sup>95</sup>

Funding for the corporation would come from charges and fees imposed on its users excluding the armed forces, piston engine aircraft, noncommercial operations of turbine engine aircraft, and air taxis in remote locations. This basically leaves commercial passenger and cargo airlines as the only payees, assuaging the concerns of the GA community that they would have been forced to pay per-flight transactions in a corporatized system.

User fees would be set according to International Civil Aviation Organization (ICAO) standards, as virtually every other developed nation already has done (and the U.S. already does as well for overflights, i.e., flights that cross U.S. airspace but do not depart or land from a U.S. airport). The Board of Directors would approve the fees in a “form and manner accessible to the public and aircraft operators,” and there is the right to appeal to the Secretary of Transportation and, ultimately, to the courts. Although nothing is explicitly said regarding funding (given that the bill notes that any debt assumed by the corporation is not guaranteed by the federal government) it is assumed that the corporation would be able to go to capital markets and issue debt.<sup>96</sup>

All facilities needed to operate ATC in the U.S. would be transferred, free of charge, to the corporation. If the corporation decides to sell any of these facilities, it must use the proceeds to improve air navigation facilities or other capital assets.

FAA would retain safety oversight over ATC operations. Before the date of transfer the Secretary of Transportation would establish performance-based regulations and minimum safety standards. All data regarding safety that the FAA makes publicly available would also have to be made available by the corporation. This institutional arrangement, with the ATC Corporation providing air traffic control and the FAA being the safety overseer would also align the U.S. with ICAO recommendations on the need for the separation of the two functions

With consultation with the Secretary of Transportation and certified labor organizations, employees would be transferred from the FAA to the corporation. It would also be possible for an employee who is transferred to the corporation to be transferred back to the FAA in the 180 days after the corporation starts working, retaining all benefits as a federal employee. The corporation employees and incumbent unions would have collective bargaining rights and the provision of the U.S. Code that forbid them to strike would extend to the corporation. Employees transferred to the corporation would have the choice to keep their retirement and health care benefits in the civil service system, or participate in the corporation’s programs.

## 2.5 NextGen and ATC Modernization in the U.S. - Current Status

NextGen deployment has been progressing steadily, under the new scaled-back objectives that the FAA has been implementing in the last few years. This moved NextGen deployment from a “big bang” approach where most of the new systems would come online simultaneously, to a more staggered approach where smaller systems come online when they are ready. However, according to USDOT’s OIG, this new approach has led “to unclear and inconsistent reporting on overall program costs, schedules, and benefit”.<sup>97</sup>

In recent years more airports have been equipped with DataComm, a technology that allows text-based communication between controllers and pilots, thus reducing risks of misunderstood vocal instructions.<sup>98</sup> Also for airports, more satellite-based departure and arrival procedures are being used.<sup>99</sup> The FAA also launched a rebate program (up to \$500) to help GA pilots equip their aircraft with NextGen equipment capable of using satellite-based signals.<sup>100</sup>

But a few examples show how the FAA, embedded in a governmental bureaucracy, struggles to deploy new technologies. One of those examples is the case of the new towers at San Francisco and Las Vegas international airports. These new, multi-million dollar towers had to be remodeled even before they opened because they were designed taking into account the use of *electronic* flight strips.<sup>101</sup> These flight strips are used by controllers to write down information about the flights they are controlling. But since the FAA still has not replaced the *paper* flight strips it uses to control flights, equipment to print and places to hang paper strips were needed. The FAA has had multiple projects to test electronic flight strips (the latest in Phoenix), but they all failed to move on from the prototype stage. (The exception is the oceanic airspace over the Pacific and the Atlantic, where the FAA has been a pioneer in the use of electronic flight strips for over a decade.<sup>102</sup>) In July 2016, the FAA signed a \$344 million contract with Lockheed Martin to finally equip all of its airport facilities with electronic flight strips.<sup>103</sup> Implementation will take place from 2020 through 2028.<sup>104</sup>

Besides these anecdotal accounts, government watchdogs keep criticizing the FAA for its failures in delivering NextGen. In a report released in late 2016, USDOT's OIG painted a dire picture of the status of NextGen deployment concluding that the FAA has not "fully identified the *total* [emphasis in the original] costs, planned segments, their capabilities, or schedules" of the key NextGen programs.<sup>105</sup> Also, the FAA has not completed the requirements for some of these key programs, and keeping key investment decisions on track remains a challenge for the agency. The aforementioned breakdown of these projects into smaller segments, while allowing the agency to better manage the projects, has the drawback of limiting FAA's ability to accurately and consistently measure the progress of a program. This also means that the programs do not have an end in sight: as more technologies become available, the program is restructured to include them, and segments are readjusted. This make accountability more difficult, both in terms of overall program costs, and in assessing the realization of benefits.

In terms of the benefits that these programs will bring, the FAA has not updated the expected benefits since the last time the OIG looked at the issue in 2012. This is despite increasing costs and delayed deployment for all the initiatives, except for DataComm, whose deployment is now anticipated several years ahead of schedule (the other key programs studied have been delayed on average five years). FAA has also failed to quantify benefits for some of the programs, and has also not disclosed when benefits will start to be delivered. As a result, NextGen does not deliver benefits because users are not equipped, and users do not equip because NextGen does not deliver them benefits.

Finally, the OIG states that is hard to determine how "transformational" these programs will be, as in the beginning they mostly provide incremental improvements, and in the long run expected benefits have not been determined yet. Additionally, most of the NextGen programs are now simple infrastructure programs to bring the system up-to-date with current technologies, but, unlike what was initially envisioned for NextGen, will not fundamentally change the way air traffic is managed.

## 2.6 Lessons Learned from Previous ATC Reform Efforts

The last reform effort in U.S. ATC took place in 2000 with the creation of the ATO. In 2016, USDOT's OIG reported on its achievements. While the transition to the ATO was a step towards reform, the changes appear to be mostly cosmetic without any real impacts in terms of improved outcomes for the system.

OIG noted that the FAA implemented some systems intended to operate more like a business, including a cost accounting system, but it does not regularly analyze the operational and cost data generated by these systems, rendering them irrelevant to reduce costs or improve productivity. The FAA also failed to establish baseline metrics or quantifiable goals for the initiatives it creates to reduce costs or improve productivity.<sup>106</sup> The report also found the large-scale facility consolidation initiatives have failed to deliver because costs exceed estimates and operational efficiencies were not achieved.<sup>107</sup>

In addition to the shortcomings of the ATO, more than a decade since NextGen was introduced, many implementation challenges remain.<sup>108</sup> The dependence on appropriations from Congress, the effects of the 2013 budget sequester (with another one possible in 2017) the federal government shutdown in the same year (with a few near-shutdowns since then), and the lack of a funding structure that allows for more efficient ways of implementing major capital projects like NextGen has led to a situation where stakeholders continue to be vocal in their support for institutional reform.

## 3. International Case Studies

Following World War II, most ATC systems around the world were directly provided by national level governmental agencies and funded by taxes on aviation activities and government appropriations from general funds. The current U.S. ATC system fits this mold.

However, since the 1980s, multiple countries have updated their ATC governance into corporatized structures. All of these systems charge user fees and are able to access capital markets for system investment. This section explores how and why some of these countries have attempted reform, what these systems evolved into, and what lessons can be drawn out to be applied to the United States.

### 3.1 Canada

As Canadian air traffic grew in the 1980s and 1990s, stakeholders (including the unions) discussed the possibility of a corporatized ATC entity. The Canadian government became involved in the discussion, and Transport Canada, the ministry responsible for transportation issues and the operator of the system at the time, established a team to study potential reform alternatives. This consultation process concluded that a move to a more corporatized form of governance would bring easier procurement procedures, access to capital markets, and more stable funding compared to the governmental system that existed at the time. It also concluded the airspace users should play a role in the governance of a new organization to provide ATC services.<sup>109</sup>

This process culminated in 1996 with the creation of NAV CANADA, a non-governmental and non-profit ATC provider. This made Canada the first country with an ATC provider that the government did not own or control. With NAV CANADA's creation, the government received CAD\$1.5 billion (USD\$1.15 billion), which was financed by a CAD\$3 billion (USD\$2.3 billion) loan assembled from a consortium of banks.<sup>110</sup>

While NAV CANADA took over control from Transport Canada in a seamless process, some non-operational transitions issue existed. One of these issues resulted from differences in the new corporate culture at NAV CANADA, which as an independent company was different from the government institution it replaced. Negotiated retirements and layoffs, along with the ability for some employees to return to the public sector, helped ameliorate this problem. Employees also demanded salary increases after going a number of years without them under Transport Canada. In fact, one of the reasons unions were in support of the move to a non-profit model was because their salaries had been frozen. The good financial situation of NAV CANADA allowed for deals to be reached with the unions, and the relationship between management and labor is normalized today and in many ways innovative, as demonstrated by the recent agreements to address pension sustainability issues.<sup>111</sup>

NAV CANADA is governed by a 15-member board. Four members are nominated by commercial airlines, three by government, two by NAV CANADA unions, and one by general aviation. These ten members then appoint the other four members. These four are appointed internally with the

hope that they will be able to act independently from stakeholders. The Chief Executive Officer is nominated by the rest of the board.<sup>112</sup> The board structure aims to ensure that the views of all major stakeholders in the industry are represented without allowing any interest to dominate. Additionally, these board members cannot currently work or have any financial relationship with the groups that nominate them and have a fiduciary duty to NAV CANADA.<sup>113</sup>

In addition to a new board structure, the creation of NAV CANADA led to changes in funding. Prior to becoming a non-profit organization, ATC was funded by a passenger ticket tax, and funding gaps were filled by appropriations from the federal budget (similar to the system in the United States). To create a funding system that included full-cost recovery, 18 months after NAV CANADA started to operate the existing tax system was ended and a new system of user fees was implemented. By 1999, funding came exclusively from those user fees, and no more government monies were transferred to the corporation. This new set of user fees included a provision requiring flights that crossed over Canadian airspace to pay to use NAV CANADA's ATC services, a market that was previously untapped.<sup>114</sup>

There is no active economic regulation by the government on user fees (Transport Canada regulates safety) and the board can set new fee structures without governmental approval. In order to restructure the user fees, however, a consultation process with users is required. NAV CANADA is able to bypass governmental approval because it functions as a user cooperative, with key stakeholders represented on its board. Additionally, there is a provision that allows changes to be appealed to the government after implementation, which has been used twice.<sup>115</sup> NAV CANADA also has a "rainy day" rate stabilization fund to provide a financial cushion in the case of an economic or traffic downturn.<sup>116</sup> The goal is to keep at least 7.5% of revenues in this fund. The fund was depleted after 9/11 due to a drop in air traffic, but it has since rebounded and at the end of 2015, it had CAD\$98 million (USD\$75 million) and was within its target range.<sup>117</sup>

In 2016, Canada announced that user fees would be reduced by an average of 7.6%. After one year, half of that reduction will expire and the permanent reduction will be 3.9%. This reduction is due to better-than-expected revenues from 2015 to 2016. For commercial airlines, the reduction is expected to translate in CAD\$100 million (USD\$75 million) savings per year. With these new levels, user fees in Canada in 2017 are only be 1.5% higher in nominal terms than in 1999, the first year in which NAV CANADA became completely self-funded.<sup>118</sup>

Also in 2016, on its 20<sup>th</sup> anniversary (November 1), NAV CANADA announced a major infrastructure investment program running through 2019, with an increase of capital expenditures of 30%. This program will invest in new technologies, as well as in the expansion, refurbishment, and replacement of some of the company's key facilities. Over the first 20 years, NAV CANADA spent more than CAD\$2 billion (USD\$1.5 billion) on new technologies and facilities.<sup>119</sup>

Besides providing ATC services, NAV CANADA's commercial arm, NAVCANatm, develops technological solutions, both for its own use or to sell to other ATC providers worldwide. The profits from these commercial activities are used to fund NAV CANADA itself, helping it charge lower user fees to users of Canadian airspace.

NAV CANADA is also the majority owner of Aireon LLC, a Virginia-based company that aims to deliver satellite-based location services worldwide.<sup>120</sup> This technology will allow unprecedented global coverage over areas, like the oceans and the poles, that have never had radar-like coverage before. For example, over the North Atlantic, the most congested oceanic airspace, Aireon technology will allow air traffic controllers to direct airplanes to fly much closer together than today (15 nautical miles of lateral separation, compared to at least 30 today), allowing more aircraft to take more efficient routes, saving time and fuel, and reducing emissions.<sup>121</sup>

Since 2015, more and more ATC systems across the world have signaled their intention to use Aireon services. Besides the initial investors, Canada, Denmark, Italy, and Ireland, a number of other systems have signed agreements with Aireon.<sup>122</sup> These include Australia, Curaçao, Iceland, Myanmar, New Zealand, Portugal, Russia, Singapore, South Africa, and the United Kingdom.<sup>123</sup> The case of South Africa assumes particular importance. The agreement between Aireon and ATNS, the South African ATC provider, will eventually extend to not only that country, but to the other 14 countries of the Southern African Development Community.<sup>124</sup> By using space-based satellite navigation these, and other, developing nations will be able, for the first time, to offer radar-like navigation across their entire territory, as the ground infrastructure needed to deploy radar throughout an entire nation was cost-prohibitive for these developing nations.

## 3.2 Australia

Airservices Australia is responsible for the airspace above 11% of the Earth's surface. Efforts to restructure ATC governance in Australia began in 1988 with the creation of the Civil Aviation Authority, a government-owned corporation that provided and regulated ATC services.<sup>125</sup> In 1990, Australian domestic airline passenger services were deregulated, ending the duopoly of the two existent airlines, and leading to increased traffic that was challenging to accommodate.<sup>126</sup>

Following deregulation, a new set of reforms on aviation infrastructure was implemented. These included a 1994 program to privatize airports and the split of the Civil Aviation Authority in 1995 to create a government-owned corporatized ATC provider, Airservices Australia. Safety regulation remained under government control with the Civil Aviation Safety Authority.<sup>127</sup>

Airservices Australia's governance consists of a nine-person board whose members are appointed for renewable five-year terms by the Minister of Transport. This board, which may include Airservices Australia employees, appoints a Chief Executive Officer. The board is required to present an annual report of operations to the Minister of Transport.<sup>128</sup>

Airservices Australia charges user fees for the facilities and services it provides. The charges are subject to the Minister's approval, except when services are provided under a contract between Airservices Australia and a client. For contracted services, Airservices Australia is able to negotiate freely with their customers. For its longer-term financing needs, Airservices Australia can borrow money from the government or can access commercial capital markets. The operating profits it generates are either reinvested in the company or paid to the government as dividends.<sup>129</sup>

The first few years of operation of Airservices Australia were complicated as it faced a number of crises that included the bankruptcy of one of Australia's biggest airlines and an economic downturn. To cope with this, a restructuring program began in 1997 that allowed the company to reduce costs by 20% in real terms between 1997 and 2001. In 2001, Airservices Australia achieved profitability for the first time and launched a modernization program to upgrade its systems, using many of the same technologies, including the move to satellite-based navigation with a 2017 mandate for all aircraft, which are also part of the NextGen initiative in the United States.<sup>130</sup>

What happened to Airservices Australia after corporatization is common: a complicated transition period where major changes have to be made to adjust to the new, more independent reality. Dependence on revenues from air traffic can result in challenges with transition when recessions impact the ATC provider's financial bottom line. This also happened in Canada and the UK.

Recently, there have been calls to privatize the system in a manner similar to Canada. More specifically, the Australian Aviation Associations Forum, a trade association for the GA interests, and the Aircraft Owners and Pilots Association of Australia, a group that represents private pilots, have proposed that Airservices Australia should be sold by the government (with half of the proceedings reinvested back into the system) and transformed into a private non-profit like NAV CANADA.<sup>131</sup>

### 3.3 New Zealand

New Zealand handles a small amount of air traffic but provides services for a geographically large portion of land and sea: roughly three times the size of U.S. continental airspace.<sup>132</sup>

Following a difficult economic and fiscal environment in the late 1980s, New Zealand's national government launched a program to restructure different sectors of the economy, including ATC and other transportation activities. As part of that effort, a number of state-owned enterprises were created. These were for-profit organizations operating in a commercially oriented manner, even though the government maintained full ownership.<sup>133</sup>

New Zealand was the first country to implement ATC corporatization, creating Airways New Zealand in 1987. It is governed by a Board of Directors appointed by the Minister of Finance and the Minister of State-Owned Enterprises. To avoid conflicts of interest, the Minister of Transport was not included in this arrangement and retained the role of safety regulator. Airways New Zealand aimed to ensure profitability and to provide services that are in its commercial interest. Service not in its commercial interest has to be contracted out.<sup>134</sup>

The board has between two and nine members, and currently operates with seven members. After nomination, members are expected to work with independence and the commercial interest of the company in mind. Before the beginning of each fiscal year, a corporate plan (which includes accounting information, performance targets, and a corporate strategy) must be produced.

Airways New Zealand has a system where all airspace users, including GA, pay to use the system. GA is relatively small in New Zealand, with less than 5,000 aircraft compared to about 14,000

in Australia, and 205,000 in the United States.<sup>135</sup> The Commerce Commission of New Zealand has the power to impose price control regulation if it determines the user charges are unfair, and airspace users can appeal any changes to the user fees imposed. Airways New Zealand also has the authority to issue bonds for its long-term capital needs.<sup>136</sup>

Like other state-owned enterprises in the country, Airways New Zealand's commercial goals include the pursuit of profits, which are then reinvested in the system or returned to its government shareholders.<sup>137</sup> Between 2006 and 2013, Airways New Zealand accumulated around NZD\$66 million (USD\$54 million, both figures in nominal values) in profits, paying NZD\$35 million (USD\$29 million) to the government in the form of dividends.<sup>138</sup>

Airways New Zealand paved the way for other experiments with corporatization across the world based on the inability of a governmental ATC system to provide efficient, modern services. New Zealand was also one of the first to separate provision from safety regulation, which became relatively standard in the following decades and became an official recommendation of the ICAO in the early 2000s.<sup>139</sup>

## 3.4 France

France's current incarnation of ATC governance was born in 2005 and is part of the Directorate General for Civil Aviation, through the Ministry of Ecology, Sustainable Development, and Energy.<sup>140</sup> Operating ATC and regulating safety was identified as a potential conflict of interest and ICAO recommended that these functions be separated.<sup>141</sup> This separation was also a requirement of the Single European Sky framework: an initiative established by the European Commission and EUROCONTROL, the European Union-agency that oversees European ATC safety. In 2002 France's *Cour des Comptes* (court of accounts) also recommended the separation of safety regulation and operational functions to improve accountability.<sup>142</sup>

Provision for ATC is now the responsibility of *Direction des Services de la Navigation Aérienne* (DSNA), while safety and economic regulation is under the purview of the Directorate for Air Transport.<sup>143</sup> Being public agencies, the *Cour des Comptes* has maintained its role of oversight of the entire system.<sup>144</sup>

In keeping with European regulation, DSNA charges user fees that are regulated by the Directorate for Air Transport and by the Ministers responsible for Finance and Transport.<sup>145</sup> The system has had access to the financial markets since 1985 and all borrowing by DSNA remains part of the French national public debt.<sup>146</sup>

The French system is a hybrid system, containing aspects of both corporatization and central government control. This governance structure is similar to the proposals made during the Bush administration in the early 2000s.

## 3.5 Germany

ATC reform in Germany began in 1992 with a constitutional amendment that allowed ATC to be operated under private law. Prior to that, a federal government agency operated and regulated ATC. Delays and costs had become a concern for airlines (which, together with labor unions, lobbied for change), and technological innovation and modernization was lacking.<sup>147</sup> These challenges helped to catalyze action. The German ATC provider, Deutsche Flugsicherung GmbH (DFS), was created in 1993 as a fully government-owned corporation.

DFS has a 12-member supervisory board. Six members are appointed by the federal government: the chairman, one appointee from the Ministry of Finance, and two each from the Ministry of Transport and the Ministry of Defense. The six remaining members represent the employees. These include the spokesman of the executive employees, the chairman of the staff council, three air traffic controllers, and a union representative.<sup>148</sup>

DFS is self-funded and does not receive any federal subsidies. It charges user fees according to European regulation and by the Federal Supervisory for Air Navigation Services.<sup>149</sup> Although operating under private law, governmental regulation mandates that DFS reinvests any surplus revenue back into the corporation, making the company in essence a non-profit. DFS can finance itself in capital markets, and its debt is rated by accredited financial companies and is not guaranteed by the German government.<sup>150</sup>

Following corporatization, a major consolidation program was enacted that aimed to cut costs. The consolidation included merging the functions of three upper-airspace centers (which control traffic between airports) into one, five lower-airspace centers (which control traffic around airports) into three, and seventeen service stations (which provide services to GA pilots) into one.<sup>151</sup> This restructuring process and other cost-cutting measures allowed user fees to remain flat for the first 12 years of operation, while traffic increased by 175%.<sup>152</sup> Because of a shortfall in pension funding, in 2015 DFS raised en-route fees by 14%.<sup>153</sup>

In 2004, German Chancellor Gerhard Schröder developed a plan to sell up to 74.9% of the company to private investors. The proposal was approved by the federal Parliament in 2006. However, President Horst Köhler opposed the sale on constitutional grounds and did not sign the legislation.<sup>154</sup> DFS remains a 100% government-owned corporation to this day. Currently, DFS controls both civil and military traffic, operating around 20 facilities, employing 5,500 staff and 1,700 air traffic controllers.<sup>155</sup>

## 3.6 United Kingdom

The United Kingdom is the only country that provides ATC service through a public-private partnership (P3). Attempts to reform began in the 1980s when the government under Prime Minister Margaret Thatcher began mandating that the UK ATC system fully recover its costs through its own revenues. At the time, the ATC system was operated and self-regulated by the Civil Aviation Authority, under which the National Air Traffic Service (NATS) was responsible

for providing ATC services. Although self-funded, as a governmental agency the Civil Aviation Authority was subject to borrowing regulations and was unable to directly access capital for its long-term financing and investment needs.<sup>156</sup>

In 1996, the system was corporatized, becoming a totally government-owned corporation. In 1998 the new Labour government was elected and a new reform exercise began. The goal was to create a system that would have the capability to attract capital to invest in the system and to separate service provision from safety regulation. The options studied included: reforming the public corporation that existed, full privatization, creating a non-profit system, or a P3. The conclusion was that a P3 would be the best fit, as it would be able to solve NATS's budget and capital restraints, and would provide more incentives for efficiency than a government corporation.

In July 2001, NATS was taken out of the Civil Aviation Authority and restructured into a P3. The Civil Aviation Authority remained a government agency and continued to be responsible for safety and economic regulation. In the creation of NATS, 46% of its shares were sold to a consortium of airlines (The Airline Group) for £758 million (USD\$960 million), 5% to employees, and the remaining 49% remained under state control.<sup>157</sup>

NATS is governed by a board of 14 members, including nine non-executive directors appointed by both the public and private shareholders. The government nominates four members and the private sector nominates five members. As the biggest shareholder, The Airline Group can nominate the chair of the board, but the government retains veto power.<sup>158</sup>

NATS is unique because it is the only system subjected to a price-cap regulatory regime. Under this rule, prices cannot increase in a year more than a set value; this value is periodically revised by its economic regulator, the Civil Aviation Authority.

NATS was formed a few months before the terrorist attacks of September 11, 2001, which resulted in far less traffic and revenue than was forecasted. NATS revised its revenue forecasts, and predicted a shortfall of £230 million (USD\$290 million) until 2006. Because NATS was heavily leveraged financially, a major restructuring plan was put in place. This included a 10% reduction in operating costs (approximately £170 million or USD\$215 million) until 2006, restructuring debt from loans to bonds, and introducing a new partner, British Airports Authority, plc (now Heathrow Airport Holdings Limited) – the owner of several airports in the UK – that brought £65 million (USD\$82 million) in equity in exchange for 4% of NATS shares. This sum was matched by the government, but the government did not increase their ownership. In 2004, NATS broke even.<sup>159</sup> The last ownership change occurred in 2013 when a pension fund bought 49.9% of The Airline Group.<sup>160</sup>

## 3.7 Overview of International User Fees

Except for the United States, a common characteristic of most developed countries is that funding comes not from taxation but from user fees charged by the provider to users of the airspace. Since the fees are paid directly to the ATC provider, they are kept outside of the government's budgetary process.

All six countries charge airlines based on distance flown and weight of the aircraft, following ICAO guidelines. These charges are the major source of revenue for all these systems.

The basic formula, for en-route and terminal charges, is:

$$\begin{aligned} \text{En-route charge} &= r \times W \times D \\ \text{Terminal charge} &= r \times W \end{aligned}$$

Where “r” is the respective unit rate for the type of service, “W” is the aircraft maximum takeoff weight (MTOW), and “D” is the distance travelled. Within this basic framework, there are variations in the application of the formula. In Canada, France, and Germany terminal charges are the same regardless of the airport used; in Australia, New Zealand, and the UK unit rates vary between airports.

An average flight—an Airbus A319 weighing 70 metric tons that travels 426 miles (roughly the distance between Calgary and Vancouver)—would pay the following in en-route charges (one-way):

**Table 2: En-route user fees in selected countries (October 2016)**

| COUNTRY        | CHARGE (USD\$) | CHARGE (LOCAL CURRENCY) |
|----------------|----------------|-------------------------|
| Australia      | \$148.14       | AUD\$193.88             |
| Canada         | \$106.81       | CAD\$142.55             |
| France         | \$561.11       | €516.13                 |
| Germany        | \$685.98       | €630.99                 |
| New Zealand    | \$227.37       | NZD\$317.39             |
| United Kingdom | \$709.87       | €652.97*                |

*\*All en-route charges in Europe are collected by EUROCONTROL in Euros and the distributed to the countries. For the countries that do not use the Euro, conversion rates are adjusted every month.*

As Table 2 shows, there is a wide gap between the least expensive and the most expensive countries. The problem of high costs in Europe has been identified as the result of the fragmentation in the European airspace. Despite having similarly sized airspaces, Europe has 37 different providers with over 60 en-route centers, compared with one provider and 20 en-route centers in the United States. In a typical European flight, airplanes have to transition between the systems of several different countries. This results in increased costs (the European Commission estimates that this fragmentation leads to costs of over USD\$5 billion annually) and results in higher user charges. Initiatives to handle this fragmentation problem have begun, under the umbrella of the “Single European Sky”.<sup>161</sup> Still, France, Germany, and the UK have en-route rates that are some of the most expensive in Europe; all of them are in the 75<sup>th</sup> percentile.<sup>162</sup>

Table 3 provides estimated terminal charges for the same flight A319 flight. For Australia, New Zealand, and the UK, rates vary between airports. To provide a clear example, two airports in each country were chosen.

**Table 3: Terminal user fees in selected countries (October 2016)**

| COUNTRY           | CHARGE (USD\$) | CHARGE (LOCAL CURRENCY) |
|-------------------|----------------|-------------------------|
| Australia*        | \$925.35       | AUD\$1,211.00           |
| Canada            | \$520.49       | CAD\$694.63             |
| France            | \$625.04       | €574.94                 |
| Germany           | \$439.68       | €404.44                 |
| New Zealand**     | \$282.77       | NZD\$394.73             |
| United Kingdom*** | \$533.30       | £439.30                 |

\*Canberra and Sidney airports.

\*\*Auckland and Wellington airports.

\*\*\*London-area and Aberdeen airports.

Comparisons are not easy due to the United States’ reliance on excise taxes to fund the ATO. To make a crude comparison, considering the United States’ average round-trip domestic fare of \$377 (including all taxes and fees) in 2015, and the 84.98% average domestic load factor in 2015, passengers in the United States of a similar Airbus A319 airplane with 120 seats would pay around \$1250 in passenger taxes for this flight, higher than any of the other international examples.<sup>163</sup>

Unlike user fees on commercial airlines, fees on GA flights vary considerably. The number of registered GA aircraft in each of these countries, plus the United States, is presented on Table 4.

**Table 4: Number of registered general aviation aircraft, including helicopters (2015)**

| COUNTRY        | REGISTERED GA AIRCRAFT |
|----------------|------------------------|
| United States  | 204,408                |
| Canada         | 36,450                 |
| France         | 32,410*                |
| Germany        | 21,213                 |
| United Kingdom | 19,846                 |
| Australia      | 13,585**               |
| New Zealand    | 4,978                  |

\* Data for 2011. \*\* Data for 2013.

Source: General Aviation Manufacturers Association, “2015 General Aviation Statistical Databook & 2016 Industry Outlook”, 2016.

In Australia, GA aircraft are charged regular user fees, both en-route and terminal. However, aircraft owners can enroll in a “General Aviation Option” where the first AUD\$500 (around USD\$380) of charges each year are free. An AUD\$45 (around USD\$35) administrative fee is charged annually for those wishing to use this option. After that, regular user charges apply.<sup>164</sup>

In Canada, lighter aircraft pay an annual flat fee that covers both en-route and terminal charges. For certain international airports, a surcharge of CAD\$10 (USD\$7.50) is due when GA aircraft use those airports. Aircraft heavier than three metric tons (6,614 pounds) have the option of either paying a daily rate for en-route and terminal charges, which varies from USD\$30 to \$1,750 according to MTOW, or they can pay regular user fees similar to commercial airlines.

In Europe, all aircraft with a MTOW of less than two metric tons (around 4,400 pounds) or aircraft that are operating under Visual Flight Rules (VFR) do not pay en-route charges. They do pay terminal charges in commercial airports if they use them; however, general aviation airports normally do not charge any terminal fees.<sup>165</sup>

Finally, in New Zealand, all aircraft operating under Instrument Flight Rules pays regular en-route and terminal user fees. Aircraft operating under VFR do pay regular terminal fees based on weight, but they do not pay en-route charges. They do have to pay a charge (less than USD\$5) when they file a flight plan with Airways New Zealand.

### 3.8 Key Insights from International Experiences

Over the last 30 years, more than 50 countries have concluded that having a highly technical service, such as ATC, directly provided by the government and dependent on national budgets and public sector regulations is not conducive to providing an efficient and cost-effective operation.<sup>166</sup>

**Table 5: Overview of ATC providers**

| COUNTRY     | GOVERNANCE                  | YEAR REFORMED | FULLY SELF-FUNDED? | FUNDING                               | ECONOMIC REGULATION  | SAFETY REGULATION |
|-------------|-----------------------------|---------------|--------------------|---------------------------------------|----------------------|-------------------|
| Australia   | Government corporation      | 1995          | Yes                | User fees                             | Commission oversight | Separate agency   |
| Canada      | Non-profit user cooperative | 1996          | Yes                | User fees                             | Self-regulating      | Separate agency   |
| France      | Government agency           | 2005          | Yes                | User fees                             | Approved by minister | Same agency       |
| Germany     | Government corporation      | 1993          | Yes                | User fees                             | Approved by minister | Separate agency   |
| New Zealand | Government corporation      | 1987          | Yes                | User fees                             | Self-regulating      | Separate agency   |
| UK          | Public-private partnership  | 2001          | Yes                | User fees                             | Price-caps           | Separate agency   |
| US          | Government agency           | 2004          | No                 | Ticket and fuel tax and general funds | Legislature          | Same agency       |

In several countries, there were concerns that non-governmental ATC provision would lead to increased costs to the airspace users, poor service, or unsafe operations. However, the experience in these countries has demonstrated that commercialized providers can keep costs in check, upgrade their systems without public funds, and improve safety. The following elements are needed for governance reform to be effective:

1. **Reliable, independent sources of revenue** have materialized in each country by allowing providers to charge user fees to airspace users, offering a means to match revenues with costs. Providers have also been able to access capital markets for their investment needs. Since ATC is dependent on external demand that affects the airline industry it is important that provisions, like NAV CANADA's "rainy day" rate stabilization account, exist so providers are able to cope with episodic decreases in traffic.
2. **Independent, but accountable, management** is important to efficiently govern the system. Independence allows the management and staff to focus on what is best for the provider and the airspace users. Without independence, managers may be beholden to interest groups or legislators.
3. **Separation of ATC provision from safety regulation** curbs fears that a corporatized system would be more interested in profits than safety. It is also essential to ensure that regulators have access to the information needed to effectively regulate. Experiments in other countries suggest that keeping government in the management board is effective.
4. **Bringing all stakeholders to the process**, including unions, the military, industry, and others helps ameliorate concerns regarding corporatization. In Canada and the UK, for example, air traffic controllers are involved in designing, testing, and implementing new technologies. Canada also includes its key stakeholders on the board of NAV CANADA, allowing it to mostly self-regulate from an economic standpoint, and to make decisions that promote the stakeholders' goals more effectively.

## 4. U.S. ATC Reform Options and Recommendations

This section explores four potential approaches to reform the current structure of U.S. air traffic control provision. For each option, the FAA would retain its role as the aviation safety regulator, regulating safety and administering grants in a manner similar to the other modal administrations within the USDOT. Congress and the federal government would continue to play a substantial role in promoting growth of the aviation system and ensuring continued strong safety oversight. Ultimately, regardless of the model chosen, both Congress and the federal government would be able to intervene in behalf of the public interest if necessary.

Separating ATC provision from the larger FAA under any governance reform option would allow ATC's governance structure to be in accordance with ICAO guidelines, which recommends separating service provision from safety regulation.<sup>167</sup> With this separation of service provision from safety regulation, the inherent conflict of interest that results from an entity providing and regulating a single service would be eliminated. This rationale has been used before in the United States with the Atomic Energy Commission (AEC). Until 1975, AEC performed research and development (R&D) for the nuclear industry, and also regulated the safety of the same industry.

In order to eliminate this potential conflict of interest, these functions were split into two separate entities: The Nuclear Regulatory Commission for safety regulation and the Energy Research and Development Administration (merged into the Department of Energy in 1977) for R&D.

The post-reform FAA would be similar to other federal agencies within USDOT in the sense that it would be the safety regulator and would not operate the service. For example, the Federal Railroad Administration regulates railways and issues grants, but does not manage train dispatching. The National Highway Traffic Safety Administration regulates the safety of motor vehicles, but does not set speed limits or control traffic lights. Separation allows each organization to focus on their core businesses and avoid potential internal conflicts of interest. A new ATC organization could focus on serving customers without having broader regulatory responsibilities, and the FAA could focus on regulating ATC safety and the rest of the aviation industry, ensuring that the U.S. airspace continues to be the safest in the world.

## 4.1 Government Corporation

Creating government corporations to provide ATC services was the preferred route of reform for several countries, including Australia, Germany, and New Zealand. In a government corporation model, a corporation fully owned by the federal government, but acting in a commercial manner, would provide ATC services. This would be similar to many government corporations that exist in all levels of government in the United States, including the Tennessee Valley Authority (TVA), Amtrak, and the U.S. Postal Service (USPS). (See Appendix B.) There are also successful models of government corporations operated by state and local governments, including port and airport authorities.

No government corporation in existence at the federal level provides a perfect parallel to one that would provide ATC services but the TVA is most similar. The TVA is a large corporation that provides 24/7 continuous operational services, is very capital intensive, and does not need public subsidies to operate. Amtrak and USPS also provide operational services, but they do not fully recover their costs, which would be an expectation of the ATC government corporation.

An ATC government corporation would have budget and managerial independence granted by a charter from Congress. Congress would retain an oversight role, but instead of doing so via the annual appropriations process, oversight would come through annual business and financial reports and audit requirements.

The Board of Directors would be composed of members appointed by the president and confirmed by the Senate. These members would directly represent the government, as well as key stakeholders in the aviation industry, allowing the board to be more responsive to the needs of airspace users.

The majority of funding for the corporation would come from user fees levied on commercial airlines. This would allow airspace users to be directly charged, creating a clear connection between services provided and the revenue stream. User fees would be subjected to general principles, including the requirement that they are not set at a level that exceeds the corporation

financial requirements (including debt service), and maintaining prudent financial reserves and credit ratings. A consultation process with stakeholders would be conducted and the right to appeal the fee structure would be guaranteed. The Office of the Secretary of Transportation (OST) would become the economic regulator for the user fees. General and business aviation would also contribute to the system at a level consistent with their current contributions, and the remaining functions and programs of the FAA would be funded through a combination of taxes and general funds.

The corporation's charter would include provisions that allow it to issue bonds and other forms of debt. This would allow the corporation to be completely self-funded for both operational and capital expenditures. Access to capital markets would allow the corporation to make long-term investments to modernize the system without annual appropriations. Some existing government corporations, such as the TVA, currently have this authority.<sup>168</sup>

However, more recent attempts to give bonding authority to governmental entities (including during the USATS proposal in 1994) have met resistance from the Department of the Treasury, insisting that bonds could not be issued directly in capital markets, but had to be issued by the Treasury. Although this might result in lower interest costs, it might mean more oversight and less financial independence for the government corporation.

Government corporations are generally created to provide a business-like approach to service provision and are created to be relatively independent. However, the experience with federal government corporations in the United States has demonstrated that maintaining independence from legislators within a government corporation structure is difficult. This has occurred in cases where government corporations remain dependent on appropriations and where they provide services with high visibility to the general public.<sup>169</sup> This might ultimately lead the government corporation into political and funding battles, affecting its operation. Two examples are Amtrak and the USPS, which Congress compels to act in a manner that is against their commercial interest.<sup>170</sup> (See Appendix B.)

Additionally, the government corporation would be the monopolistic provider of an essential service for the aviation industry. Without proper supervision, there is potential for abuse of this monopoly. The stakeholder presence on the governing board, if correctly structured, would help ameliorate this problem. Since the users are paying into the system, they would have an incentive to keep the costs of operating the system low. The users' presence on the board would therefore help curb any attempts to exploit monopoly power.

## 4.2 Non-Profit, Independent Organization

A non-profit option would have some benefits that would be similar to the government corporation option. This includes the ability to be self-funded, the separation of safety regulation from provision, and providing ATC services in a more business-like manner, taking into account the airspace users' needs.

Like a government corporation, an independent non-profit ATC system would not be subject to congressional appropriations or federal procurement and personnel rules. A potential benefit of this approach is that ATC provision would have a further degree of separation from government oversight, which would allow it to have more independence in day-to-day operations and long-term planning. Any eventual excess revenues in a given year would be reinvested in the system.

To provide a platform for stakeholders to influence the future of the ATC system, the non-profit could be governed by a board that includes industry stakeholders. The board's composition would allow decision making to take into account what is best for the non-profit and for the industry as a whole. Stakeholders would be equitably represented, ensuring that no single interest would dominate. This would allow the non-profit to be a user co-operative, with a system run by the users, for the users. There are precedents for this model in aviation, such as the Aeronautical Radio, Inc. (ARINC), a non-profit created by the airlines in 1929 to provide air-to-ground communications for the airlines until the federal government began providing ATC services in 1936. In the utilities industry there are many examples of user co-operatives in the U.S. at the local level.

The federal government would also be represented on the board, as it would continue its responsibility of overseeing and regulating safety. Representation of federal nominees on non-government entities' board of directors has precedent in the United States, including in the original COMSAT Corporation. This organization was created by an act of Congress in 1963, and prior to its merger with Lockheed Martin in the late 1990s, three out of 15 board members were nominated by the president. The American Red Cross is another organization where the president nominates representatives to the governing board. (See Appendix C.)

Similar to a government corporation, the non-profit would rely on user fees levied on commercial airlines for the majority of its funding needs. A consultation and the right to appeal to the OST would also be guaranteed. The non-profit would have the authority to issue bonds and other kinds of debt that would not be guaranteed by the federal government. The congressional charter that created the non-profit would give tax-exempt status, allowing the entity to issue bonds in more favorable conditions compared to for-profit entities.

Perhaps the biggest concern with this governance model is that removal from government control could jeopardize the public's interest, particularly in terms of the diversity and growth of the system. To mitigate these concerns, the federal government could nominate representatives to be appointed to the non-profit's governing board (as discussed above), allowing the federal government to be able to influence how the system is run. Additionally, a number of safeguards could be included in the non-profit corporate by-laws, specifically mandating that certain decisions in crucial aspects of the public interest require more than a simple majority in the governing board.

As part of the creation of the non-profit, the federal government might receive monetary compensation to transfer assets to the new entity. From the perspective of the Treasury, this might be a benefit. On the other hand, depending on its value, that monetary compensation may hinder the capacity of the non-profit to make capital investments at the level the stakeholders

want. In any case, the valuation of these assets would probably be very difficult and would have to be negotiated between the different interested parties.

## 4.3 For-Profit, Private Corporation

A third option is to create a fully privatized, for-profit corporation. No system like this currently exists in any country. The closest is UK's NATS, which is a P3 where the national government owns 49% of the company's shares, and several private sector entities, including a pension fund, employees, and an airport operator, own the rest. The systems in Australia and New Zealand are for-profit corporations but are wholly owned by the national governments. A private corporation would ensure that there would be clear separation from political interference.

The most significant difference of this model compared to other options is the use of a competitive bidding process to select the provider of ATC in the United States. This would introduce competition for this market, allowing market forces to value both the assets and the liabilities associated with ATC provision. Bidders could, however, overestimate the value of the new corporation to win the bid, leading to a potentially difficult financial situation. This happened in the UK, and the private partner had to be "bailed out" by a cash infusion from the national government due the economic downturn after September 11, 2001.

Similar to the two previous models, the private corporation would rely on user fees levied on commercial airlines for the majority of its funding needs. A consultation and the right to appeal to the OST would also be guaranteed. Like other private entities, this corporation would have the authority to issue bonds and other kinds of debt for its financing needs, and this debt would not be guaranteed by the federal government.

This model would also provide the greatest incentives for achieving efficient outcomes, from an economic perspective. However, the provision of ATC services is not a perfectly competitive market. It is a natural monopoly where having only one service provider delivers the most efficient outcomes. This is also the case of many public utilities, such as water and electricity distribution systems.

While there would be initial competition within the bidding process, after a contract is awarded the competition would cease. A contract could, however, last a set period of time, and a competitive bidding could occur at intervals consistent with the useful lives of major investments. This could bring new players into the market, helping to encourage efficiency and improvements. On the other hand, bidding processes have costs and may be disruptive for operations, and also create disincentives for long-term investments.

Since the ATC provider would have no competition once operation began, some sort of economic regulation of its activities would be needed. However, the imposed economic regulations run the risk of being overly burdensome, discouraging interest in the system's operation. On the other hand, if little or no economic regulation is imposed, the public interest could be put at risk. The private corporation would likely aim to maximize its profits and shareholder value, and without

some level of oversight, it could disregard the growth of the system or other areas of public interest.

It is not clear whether having ATC services provided by a for-profit corporation would have any detrimental effects on safety. Literature on corporatized ATC providers across the world has shown that safety outcomes have continued to improve regardless of ownership. But there are no precedents for a fully private company providing the ATC services of an entire country. In other sectors of the aviation industry though, the existence of for-profit private companies, such as airlines and manufacturers, has not been associated with lower levels of safety as long as effective safety regulation exists. As with other options for governance structures, the FAA would remain the safety regulator to ensure the existence of a safe airspace.

Another issue with this form of governance is that while ATC services are a necessity for the aviation system to exist, some stakeholders might not support reform if these services are to be provided on a for-profit basis. This makes this reform option less likely from a political standpoint as it might lack the support of crucial stakeholders.

After the private operator took charge of the operation, the goals of the corporation would dictate how the system would be governed. It could be argued that this autonomy would be the best way to achieve efficient economic results. It could also be argued that in some markets, with ATC provision potentially being one of these cases, this autonomy may not be the approach to provide a given service. A balance between the goals of the corporation and the goals of other stakeholders could be imposed through economic regulation.

## 4.4 Funding Reform within the Current Structure

An alternative would be to reform only the funding of the current system. Doing so would have the potential to introducing an element of funding stability for ATC provision and modernization, while maintaining the current governance structure within the FAA.

Within FAA's current funding portfolio, only the operations account receives money from the General Fund, while the three other accounts are exclusively funded by the AATF. To insulate ATC operation and modernization from annual appropriations, one option would be to restructure the FAA so that all ATC provision and grant-making functions would be completely separate from certification and safety regulation. Under this scenario, all ATC capital and operating costs (including the ATO and NextGen) would be funded by the AATF and would not receive any General Fund contributions. Only certification and other safety functions, like airport oversight, would be supported by the General Fund.<sup>171</sup>

A reworked trust fund has the benefit of maintaining the current governance structure and eliminating the transition challenges that governance reform could instigate. Additionally, if ATC provision were completely funded by a trust fund, money would not have to be appropriated every year by Congress. Instead, ATC funding levels would be designated through contract authority during each FAA reauthorization bill. Appropriating committees, however, would maintain the power to set obligation limits annually. To further increase the stability of the AATF

funding, Congress could also classify the different AATF programs as “split treatment programs,” preventing them from being subjected to budget sequesters or government shutdowns.<sup>172</sup>

However, this approach would not fully insulate ATC from congressional influence. Congress would continue to control how contract authority is used and the levels of taxes and fees that fund the AATF, and would still dictate the level of obligations limitations, which could limit the levels of expenditures that the FAA could make.<sup>173</sup> In addition, ATC safety regulation and the provision of ATC services would remain together, contrary to ICAO principles calling for organizational separation of these functions.

Funding would continue to be provided based on annual revenues because trust funds are subjected to “pay-as-you-go” rules and cannot have a deficit. This would present an added challenge if traffic (and revenues) were to be below forecasted levels. Forecasting operational expenditures for the medium-term for the aviation industry is difficult, as it is subjected to many external factors like the overall state of the economy. Furthermore, the issue of stability for long-term capital expenditures and modernization efforts could potentially remain unresolved: whenever revenues are below forecasts, operational expenditures would necessarily take precedent, and capital expenditures would be cut. Congress might also decide to divert funds from aviation and into other governmental expenditures. Finally, it would still have to be re-authorized every few years, creating potential instability for the industry.

## 4.5 Liabilities if ATC is Taken out of the Federal Government

It is possible that the federal government might demand a cash payment to transfer all its ATC-related assets to a new organization. Further, if ATC were taken out of the federal government, the new entity would face pension, insurance, and environmental liabilities that the ATO, as part of the federal government, does not. This section explores those issues.

### 4.5.1 Transfer of Assets

When the potential new organization begins its operation, all assets related to ATC provision would be transferred to this new entity. In exchange, the government might be compensated for that transfer. A government corporation may not go through this process, as ATC provision would technically remain a governmental function. However, it is possible that Congress would make the government corporation pay for these assets. On the other hand, since those assets were already paid by the traveling public via the AATF, if a new entity had to pay the government for this transfer of assets, the public would be, in essence, paying twice for them.

The estimation of that value for the purchase price of assets would need to be negotiated between the new organization, the administration, and Congress. The estimation of this purchase price of assets would need to take into account the projected cost savings of the new organization, the capital expenditures envisioned, the resulting free cash flow, and the debt coverage.

## 4.5.2 Pensions

It is likely that current ATO employees within the FAA would move to this new organization. This would allow the new entity to have access to the expertise of the current ATO employees and would help ensure stakeholder support for the transition. There should also be safeguards built into the transition to allow current ATO employees that do not wish to join the new organization to continue to work within the federal government. During any transition, a stable and secure working environment for the employees of the agency will have to be provided, including the continuity of the collective bargaining relationships and processes for employees who are currently represented.

FAA employees, like other federal workers, have a pension scheme that is different from the private sector. Most employees hired before 1984 are covered by the Civil Service Retirement System (CSRS), while all employees hired after are covered by the Federal Employees' Retirement System (FERS).<sup>174</sup> Regardless of regime, all employees contribute to a defined benefit pension scheme deposited into the Civil Service Retirement and Disability Fund (CSRDF), and also have the option to contribute to a defined contribution account (the Thrift Savings Plan, TSP). Employees hired after 1984 also make contributions to Social Security.

For the newer employees that contribute to the FERS regime, the Social Security contributions are made on the same basis as in the private sector, which would be continued within the new structure. Assets within the defined contribution TSP can be kept where they are or, since they are defined contribution plans, they can be easily rolled into new accounts that the non-profit offers.

The most difficult transfer is how to properly account for the contributions to the CSRDF. After assessing the amounts in question, an agreement needs to be reached between the federal government and the new organization to safeguard the rights of employees to ensure that they receive their pensions as well as their age of eligibility to receive benefits. An option would be to terminate the relationship between the employees and the CSRDF at the time of transfer, as if the employees were retiring, and create a new pension scheme. If the new organization becomes responsible to provide pensions for the years that the employees spent in the federal government, a cash payment from the federal government to the new organization would be needed to account for those liabilities.

## 4.5.3 Insurance

Due the exceptional safety that has been cultivated within the aviation industry in the U.S., the number of cases where ATC services have been the subject of legal claims is very small. However, the possibility does exist and as such there would be a need for liability insurance to reduce the financial exposure of the non-profit in case of claims, suits, liabilities, damages, losses, or other risks. Within the current system, ATC liability is ultimately a government liability and the Federal Tort Claims Act covers individual employees.<sup>175</sup> Considering the size of the ATC system the insurance needed against these risks would be substantial. As an example, NAV CANADA, has liability insurance of up to USD\$3.75 billion per occurrence, subscribed by a number of

international underwriters and syndicated at Lloyds of London to pool and spread risk.<sup>176</sup> It is likely that no single insurer would underwrite such a policy for the large U.S. system and a syndicate of insurers would be needed.

The aviation system can also be subjected to acts of war and terrorism. For those types of events, regular commercial insurance available in public markets might not exist or might be too expensive. This has been the case for airlines in the aftermath of the 2001 terrorist attacks. To help, Congress included provisions in the Homeland Security Act of 2002 to create a government-sponsored insurance program for war risks offered by the FAA. The program was extended multiple times until it expired in 2014. Since then, U.S. airlines have to rely on the public insurance markets to cover their war risks. It should be assessed if the new ATC provider could rely on the same public markets, or if it would be necessary to offer government-sponsored insurance.

## 4.5.4 Environmental

The new organization would become the owner of a large number of facilities that are currently owned and operated by the federal government. These include radars, Terminal Radar Approach Control Facilities (TRACON), VHF Omni Directional Radio Range (VOR), and others. With the modernization efforts that are in place, like the NextGen initiative, along with the natural renewal and replacement of older facilities, a potentially large number of facilities across the country could be decommissioned in the next few decades.

Although at this stage there are no certainties about what facilities would close or not, there are concerns about what environmental liabilities related to those facilities that the new organization have to face, and what effects they would have from an accounting standpoint. During the transition there would be a need to evaluate what environmental liabilities the new organization can expect when it takes ownership of the previously government-owned assets, and how this affects the purchasing price of those assets.

## 4.5.5 Remaining Functions of the FAA

A critical component of FAA's role as safety regulator is the certification and approval processes of aviation products, including airplanes and their components. FAA issues these certificates and approvals based on its evaluation of aviation industry submissions, considering the standards set forth in federal aviation regulations and FAA guidelines. FAA also certifies airmen, including pilots and mechanics, airlines, and airports.

Effective and timely certification processes are essential for the industry and the nation's economy, and delays in the approval processes can be extremely costly and disruptive to the successful implementation of NextGen, third class medical reform, and updating the existing GA fleet with modern equipment, among other concerns. Moreover, the current processes are unable to keep pace with the rapid advancements in technology and must be reformed, in order for the national aviation system to continue to be the best and safest in the world. The FAA culture, as well as the

regulatory and certification processes, especially in the area of GA, need to evolve in order to better keep pace with changes in technology. Since safety regulation and the certification and approval processes are inherently governmental functions, these functions should be funded by appropriations from general funds.

Another critical function for the FAA is to promote safety and capacity, environmental, and efficiency improvements throughout the nation's airports, including the funding of research on topics relevant to airports. Around 21%, or \$3.35 billion, of the FAA's budget for FY2016 was dedicated to the grant-in-aid for airports account. From that amount, around 95% was spent on the AIP. The remaining 5% supports personnel, airport technology research, and the Airport Cooperative Research Program.

## 4.6 Eno Recommendations

There are a number of possible avenues for governance reform for the U.S. ATC system, from small changes to the status quo to complete divestiture of the federal government. Table 6 summarizes the main findings regarding the four options.

Experiences in other countries have shown that budget and managerial independence are crucial to achieving the goals of improved efficiency and deployment of modern technologies. Importantly, safety has been improving across the board within all forms of governance, suggesting that safety concerns should not be a limiting factor when deciding for a governance structure. Within each reform option, the FAA would remain as the safety regulator of the system.

**Table 6: Summary of Possible Reform Options for ATC**

| <b>REFORM OPTIONS</b>                   | <b>GOVERNANCE</b>                                | <b>FUNDING</b>           | <b>BONDING AUTHORITY?</b>                 | <b>SAFETY REGULATION SEPARATED FROM PROVISION?</b> | <b>TRANSITION ISSUES?</b> | <b>CONGRESSIONAL INFLUENCE</b> | <b>POLITICAL FEASIBILITY</b> | <b>OTHER</b>  |
|---|--|--------------------------|---|--|---------------------------|--------------------------------|------------------------------|---|
| Government corporation                  | Independent, potential to be stakeholder driven  | Self-funded              | Not with direct access to capital markets | Yes  | Yes                       | Reduced                        | Possible                     | Model most used in the developed world                                |
| Non-profit independent organization     | Independent, stakeholder driven                  | Self-funded              | Yes                                       | Yes  | Yes                       | Low                            | Possible                     | Model is a user co-op, common with natural monopolies, like utilities |
| Private, for-profit corporation         | Independent, profit and shareholder value driven | Self-funded              | Yes                                       | Yes  | Yes                       | Minimal, more than non-profit  | Unlikely                     | Model not used anywhere, UK model is the closest                      |
| Funding reform within current structure | Status quo                                       | Self-funded through AATF | No  | No   | Minimal                   | Status quo                     | Unlikely                     | Uncertainty about outcomes and long-term stability                    |

**Eno proposes that either a new government corporation or an independent, non-profit organization, should be chosen as the new provider of ATC services in the United States.**

The entity would be a mission-driven organization, with a non-profit mandate, which would ensure that the pursuit of profits would not take precedent over safety. This would encourage system reinvestment, as any eventual excess revenues in a given year would be reinvested back into the system such as for modernization or to reduce user fees. A key benefit of this approach is that ATC provision would not be subject to congressional appropriations and federal procurement and personnel rules, allowing the new organization to more efficiently provide these services.

All key stakeholders would be represented in a governing board, making certain that the interests of individual stakeholders do not dominate. However, these directors would be not employees of these stakeholders, nor would they have any financial relationship with them. These directors would also have a fiduciary duty to the ATC provider, not to the stakeholders that nominated them. The federal government would always have a role in the governance structure as a guarantor of the public interest, regardless if the model chosen were a government corporation or a non-profit.

In addition, Eno recommends that the current funding of the ATC system, which is based on a mix of taxes and general revenues, should be replaced, to the extent possible, with direct payments to the air traffic control provider. This funding method would create a self-sustaining system and would be in line with international principles. It would also improve the link between the services provided and the revenues coming in, providing an incentive for efficiency. There also needs to be adequate funding for the remaining FAA functions: safety regulation, including airport oversight, certification, and grant-making.

## 5. Conclusion

For the first time in more than 20 years, a serious effort to reform U.S. ATC governance and funding is taking place. Political developments during 2017, including another round of budget sequester cuts, may make or break the possibility of ATC reform in the near future. Meanwhile, the FAA continues to deploy NextGen and government overseers continue to release reports highlighting the flaws of the current institutional structures.

After decades of attempted reforms, there is now an opportunity to move forward and reform the U.S. ATC provision into a system more ready to deal with the challenges that the increase of air traffic in the next decades will bring.

## Appendix A: History of ATC Governance

In 1914 the first scheduled passenger flight took off from Tampa, Florida. The military also began experimenting with flight before and during World War I. As mail service by air grew in the early 1920s, it started to become clear that aviation might have a relevant role in transportation and the economy.<sup>177</sup> Recognizing this future, the 1926 Air Commerce Act took the first step towards formalized, federal involvement.<sup>178</sup> This act placed the responsibility to “promote civilian aviation” within the purview of the Department of Commerce (DOC). The aim was to establish airways navigation aids, not to encourage regulation.<sup>179</sup>

At this time radio was already being used as a means of communication between airline personnel on the ground and airplanes. Each airline had to individually apply for a license to become a radio operator, a system that was deemed to be inefficient. Because of this, some airlines joined efforts in 1929 to create Aeronautical Radio, Inc. (ARINC), a non-profit organization that from then on was responsible for ground-to-air communication with aircraft. Its role would eventually expand, and during the 1930s ARINC would become the *de facto* air traffic control provider in the United States, until the federal government started to take over existing towers in 1936.<sup>180</sup> ARINC is an early example of a user co-op created to provide services related to air traffic control; an experience that would be replicated in Canada several decades later, with the creation of NAV CANADA in 1996.

With the U.S. Post Office Department providing a constant stream of airmail revenue to airlines, air traffic escalated in the early 1930s. In 1934, Congress created the Bureau of Air Commerce to establish and maintain aviation navigation aids, license pilots, promote safety, and separate aircraft.<sup>181</sup>

In 1935, in part due to a publicized airline crash that killed a U.S. Senator, Congress commissioned the Copeland Committee to explore air traffic safety and governance. The report determined that the Bureau of Air Commerce had become ineffective as a result of political challenges and inadequate funding. In response to this publication, the Civil Aeronautics Authority was created in 1938 with the passage of the Civil Aeronautics Act.<sup>182</sup> The Civil Aeronautics Authority operated as an entity separate from any cabinet level department, the only one that existed at that time. Its regulatory powers included the responsibility of economic regulation, safety, maintaining the airways, providing ATC, and promoting aviation. However, its governance structure, with three different boards responsible for different areas of regulation, was deemed to be ineffective, namely in terms of safety issues. Just a few years after formation, the Reorganization Act of 1939 put the Civil Aeronautics Authority back under DOC purview and renamed it the Civil Aeronautics Administration (CAA). In the meantime, since 1936 the Civil Aeronautics Authority had started to take over control of en-route control towers that had been operated by ARINC.

Following the 1939 Act, the different responsibilities of the previous Civil Aeronautics Authority were split, in 1940, into two agencies: the Civil Aeronautics Administration and the Civil Aeronautics Board (CAB). The CAA was in charge of ATC and airway development, while the CAB was responsible for safety rulemaking, accident investigation, and the economic regulation

of the air transportation system. The CAB would keep that role of economic regulator until cargo and passenger airlines were deregulated in 1977 and 1978, respectively – emptied of its economic regulation role, the CAB would eventually be dissolved in 1984.

With thousands of former military airplanes being transformed into civilian airliners and the economic boom that ensued after the war ended, the post-World War II years brought tremendous growth in civilian air traffic. ATC procedures and technology, however, did not accompany this growth, and by the 1950s traffic delays were widespread. This lack of ability to cope with the increases in traffic also led to safety problems, which came to a head in 1956 with a mid-air collision over the Grand Canyon that killed 128 people. This was just one of dozens – 65 between just 1950 and 1955 – of mid-air collisions in the post-war years that highlighted that safety improvements were much needed.<sup>183</sup>

In 1958 the Federal Aviation Agency was created with the aim to free aviation from the political and financial challenges associated with its placement in the DOC. The agency was funded directly from congressional appropriations and the agency’s administrator reported directly to the president.<sup>184</sup> The newly formed agency was created during a time when radar systems were still being implemented and had substantial ground to make up due to decades of underfunding of air traffic control.

Shortly after the Federal Aviation Agency was created, President Johnson’s administration determined that transportation as a whole would benefit from a coordinated system. On April 1, 1967 the USDOT opened its doors. In turn, Federal Aviation Agency changed its name to Federal Aviation Administration, becoming one of a number of modal agencies within the USDOT.<sup>185</sup>

By the mid-1960s the need to update ATC technology in order to accommodate the growing demand became apparent. At that time, manually controlled radar, general-purpose computers, radio communications, and air traffic controllers operated the national aviation system.<sup>186</sup> In order to increase capacity, FAA began developing the automated radar traffic control system (ARTS).

By this time radar traffic control was semi-automated, helping to accommodate the growing demand. This system required continuous improvement as aviation demand grew, in part due to airline deregulation in 1978. In 1982, FAA released the first detailed plan to modernize ATC and accommodate current and future demand. The plan aimed to consolidate facilities, standardize computer hardware and software, and increase automation for improved safety, fuel efficiency, and productivity.<sup>187</sup> In 1987 the Advanced Automated System (AAS) was launched as part of this initiative; the program was mothballed in 1994 after spending \$1.5 billion, from which \$1 billion were considered to be “wasted”.<sup>188</sup>

Since the introduction of the 1982 plan, FAA has been attempting to modernize ATC. Its inability to expediently update the system, however, has resulted in widespread criticism. This criticism has catalyzed the internal reorganization of FAA multiple times. The most substantial change in governance since the beginning of modernization was the introduction of a performance-based ATC organization, the ATO, which was created as an arm of FAA through an Executive Order in 2000.<sup>189</sup>

FAA's 2003 Vision 100 – Century of Aviation Reauthorization Act established the current technological modernization effort: the Next Generation Air Transportation System, later re-branded as NextGen.<sup>190</sup> To help implement NextGen, Vision 100 also established the Joint Planning and Development Office (JPDO), a public-private partnership with government, academia, and private-sector organizations with the responsibility to plan and coordinate the development and deployment of NextGen. From the government side, the following agencies were initially part of JPDO:<sup>191</sup>

1. Department of Transportation;
2. Department of Commerce;
3. Department of Defense;
4. Department of Homeland Security;
5. Federal Aviation Administration;
6. National Aeronautics and Space Administration;
7. White House Office of Science and Technology Policy;
8. Office of the Director of National Intelligence.

JPDO had a troubled start, and by 2006, three years after its formation, GAO stated that the roles and responsibilities of each different agency had yet to be assigned resulting in diffused accountability.<sup>192</sup> At that time JPDO congregated more than 190 stakeholders across 70 different organizations, with many people being part of JPDO only on a part-time basis.<sup>193</sup> Since its creation a number of initiatives had begun, but JPDO became increasingly dormant and it has not held any events since 2011.<sup>194</sup> JPDO's last progress report was published in FY2011<sup>195</sup>. Its latest publication was a 2013 report about the use of Unmanned Aircraft Systems (UAS), commonly referred as drones, in the US airspace<sup>196</sup>. The FY2014 Appropriations Bill cut all the funding for JPDO, which was disbanded at the time. Since then, Congress has been appropriating all NextGen research money directly to the FAA.<sup>197</sup>

However, like in previous attempts of modernization, the FAA continued to receive criticism for slow execution of modernization under the current institutional paradigm. In response, the FAA Research, Engineering and Development Advisory Committee (REDAC) established a working group to explore financing and funding options for NextGen. Its report was published in 2006. Key findings included the need for new revenues, including general funds, to help augment the multi-decade, multi-billion-dollar NextGen's investment. Despite efforts to accelerate modernization implementation, institutional barriers might be again hindering the quick deployment of modernization initiatives. Previous reforms seem to have been inadequate to resolve the core issues that inhibit the modernization of ATC.

## Appendix B: Government Corporations in the United States

Government corporations are the most prevalent governance structure for air traffic control across the world. The possibility of a government corporation to provide ATC services in the United States has been discussed since the 1970s, including with the introduction of legislation in the House of Representatives during that decade as well in 1994. As government corporations have differing structures in each country, this section provides a short history and analysis of federal government corporations in the United States, highlighting both their benefits and their challenges.

There are numerous government corporations within the United States, but some of the most widely known federal-level government corporations are Amtrak, the Tennessee Valley Authority, and the Postal Service. Amtrak and the Saint Lawrence Seaway Development Corporation are example of two federal government corporations that provide transportation services. The most common rationale for the creation of a government corporation is to allow the entity more autonomy and less political influence, while remaining within government oversight. This autonomy applies specifically to organizations that provide services that have control over their own revenue streams and are designed to be (at least eventually) self-sustaining. For such an independent entity, it is useful to have a governance structure that provides greater flexibility to act in a commercial manner than the budget annual appropriations process permits, including the ability to develop long-term planning.<sup>198</sup>

There is no single definition of what constitutes a government corporation, but a number of common characteristics include:

1. Established in a statute passed by a legislative body and signed into to law by the president;
2. Changeable only by statutory amendment;
3. Authorized to finance or build public and private projects and deliver services;
4. Governed by a board composed of presidentially appointed members for fixed terms of office;
5. Managed by a full-time professional hired by the board;
6. Permitted to issue bonds;
7. Given the freedom to set fees, charges, and rents for services;
8. Exempt from most executive and legislative control over staff appointments, salaries, budgets and contracts;
9. Capable of suing (and of being sued) in their own name;
10. Required to hold public hearing before making major decisions;
11. Permitted to exercise the power of eminent domain.

These definitions apply to corporations created at all levels of government. When discussing government corporations at the federal level, a stricter definition could be:

*“A government corporation is a government agency that is established by Congress to provide a market-oriented public service and to produce revenues that meet or approximate its expenditure”.*<sup>199</sup>

Under this definition there were 17 federal government corporations in 2011. Each individual corporation is created under a unique charter from Congress and is overseen by the committees that have responsibility in their respective policy area. They can exist indefinitely, like the TVA or the Postal Service, or they can be created as a stopgap measure before a future privatization, like Conrail or the U.S. Enrichment Corporation. There are standardized budget, auditing, and debt management procedures under the Government Corporation Control Act of 1945. Government corporations are also still agents of the state and are subject to constitutional limitations.<sup>200</sup>

## Amtrak

The Rail Passenger Service Act of 1970 created a National Railroad Passenger Corporation (now branded as Amtrak), saying it “shall be a for-profit corporation, the purpose of which shall be to provide intercity rail passenger service employing innovative operating and marketing concepts so as to fully develop the potential of modern rail service in meeting the Nation’s intercity passenger transportation requirements. The Corporation will not be an agency or establishment of the United States Government.”<sup>201</sup>

Following the growth of automobile and airplane transportation after World War II, demand for intercity passenger rail services began a fairly rapid decline and the private railroads started incurring substantial deficits providing passenger services. Eventually Congress created Amtrak in 1970 to take over those intercity passenger services and remove the burden of the passenger deficits from the freight railroads. At the time of the passage of the Rail Passenger Service Act, Penn Central, the operator of the most passenger trains in the U.S., had already gone bankrupt, and several other railroads in the Northeast were to enter bankruptcy in the next several years.<sup>202</sup> Within a decade, Congress recognized that Amtrak would not be profitable, and amended the Rail Passenger Service Act so that it now reads, “The Corporation shall be *operated and managed as a for-profit corporation (...)*”<sup>203</sup>

Technically, Amtrak is owned by both the government and the private sector. The government, represented by the Secretary of Transportation, owns 109,396,994 preferred shares, each with a face value of \$100. A total of 9,385,694 shares common shares, valued at \$10 each are owned by four different stockholders. These represent less than 1% of the stock value. Following 1997 legislation, Amtrak was supposed to redeem those stockholders at “fair market value” by 2002, but a long-standing legal battle has ensued, with Amtrak arguing that the fair market value of its common stock is \$0, which the stockholders disagree. Prior to 1997, Amtrak was also, in theory, obligated to distribute a dividend of no less than 6% each year, but has never done so; that requirement was eliminated in the 1997 reauthorization bill.<sup>204</sup>

Amtrak has a nine-member Board of Directors, including seven appointees by the president, plus the Secretary of Transportation and the president and CEO of Amtrak, who is appointed by the other board members.<sup>205</sup> Although it technically has financial autonomy, Amtrak does not have

the authority to issue bonds. The Pennsylvania Economic Development Financing Authority has, however, issued \$50 million in bonds for development on Amtrak facilities in Philadelphia, with Amtrak guarantying the payment of the principal and interest on those bonds.<sup>206</sup>

In the last few years Amtrak has achieved record ridership, with an increase in ridership of 55% from 1997 to 2012, and FY2015, with 30.8 million passengers, was the fifth straight year with more than 30 million passengers.<sup>207</sup> Nonetheless, Amtrak has constantly needed public money to operate, from both the federal government and the 15 states where it has partnerships to provide service. For example, in FY2015 revenues covered 74% of operating costs. Net losses, including capital investments, reached \$1.2 billion.<sup>208</sup>

Since its inception, Amtrak has been the subject of numerous political fights, namely regarding its money-losing long-distance trains. Routes over 400 miles carry only 17% of Amtrak's passengers and lose more than \$600 million annually in operating costs; on the other hand, routes under 400 miles generated \$46 million in positive cash flows in 2012.<sup>209</sup> Right after it was chartered, Amtrak tried to cut service in many of those routes, an effort that was ultimately stopped by Congress due to political pressures from elected officials to retain service within their districts.<sup>210</sup> Since then, the issue of long-distance trains has been discussed in Congress regularly, with members of Congress criticizing Amtrak for losing money in its service, while refusing to allow Amtrak to rationalize its network.<sup>211</sup>

Amtrak's problems are not all a result of its status as a government corporation. For example, Amtrak's own Inspector General has found that the corporation has had issues in the management of capital projects (a \$1 billion-plus annual expenditure). Problems included keeping costs within their budgets, keeping schedules, and ensuring proper oversight.<sup>212</sup>

## Tennessee Valley Authority

The TVA is a federally-owned government corporation that provides wholesale electric power, manages the Tennessee Valley natural resources, and promotes economic development in the region. Created by Congress in 1933 in the New Deal era, it was initially funded partially by the government. Since 1999, it does not rely on any appropriations for its capital and operating expenditures; it had stopped receiving subsidies for its power generation business in 1959 (when Congress allowed the corporation to issue bonds) but kept receiving subsidies after that year for its environmental and economic development activities.<sup>213</sup>

TVA's initial governance structure was a full-time three-member Board of Directors, who were appointed by the president, with the advice and consent of the Senate, for nine-year terms.<sup>214</sup> In 2006, a new governance structure was introduced. Within this new structure the board is composed of eight part-time members and a CEO. New term limits of five years were also established. Appointments to the board continue to be a responsibility of the president, with the advice and consent of the Senate.<sup>215</sup> This board has the power to establish the rates TVA charges for its electricity, and these rates are not subjected to any local, state, federal, or judicial review. They do however have to follow a set of guidelines put forward in federal legislation, including the

goal of covering all costs, including debt service and payments to the states in lieu of taxes, and having to be as low as possible.<sup>216</sup>

TVA's main business is as a provider of wholesale electric power, and it accounts for almost 99% of TVA's revenues.<sup>217</sup> TVA supplies wholesale power to 155 municipal and cooperative power distributors that in turn supply around 9 million people. TVA also supplies 58 large industries and government installations directly.<sup>218</sup> Power distributors with contracts with the TVA are obligated to buy all their power from TVA and termination of said contracts is subjected to five to 15 year notices; contracts with industrial customers are subjected to clauses agreed between TVA and said customers.<sup>219</sup>

In fiscal year 2016, TVA revenues were \$10.6 billion. TVA is exempt from local, state, and federal taxes, but it does have to pay to the states where it operates 5% of gross revenues from the sale of power; in FY2016 those payments amounted to \$522 million. TVA is also authorized to issue bonds and notes (but not equity securities such as stock) up to a statutory limit of \$30 billion in outstanding debt. These bonds are not obligations of the United States. By the end of FY2016, outstanding TVA debt amounted to \$24.1 billion, or 80.3% of the statutory limit.<sup>220</sup> Its proximity to the statutory limit has raised concerns, by both the governing board and the GAO, that TVA's capital plan until 2029 may not be possible to accomplish, even without taking into account eventual cost overruns. This plan includes expansion and modernization of facilities to cope with demand and a \$3-to-5 billion agreement with the Environmental Protection Agency to retrofit facilities in order to reduce the environmental impact of TVA's activities.<sup>221</sup>

## United States Postal Service

The USPS was established as a government corporation in 1971 to provide postal services which previously had been the responsibility of the U.S. Post Office Department. By moving postal services out of the direct control of the federal government, Congress hoped to provide the new independent corporation adequate financing authority and autonomy from politics.<sup>222</sup>

In terms of governance, USPS' board consists of eleven members. Nine of these members are appointed by the president, with the advice and consent of the Senate, and no more than five can belong to the same political party. The nine appointed members select the Postmaster General, the CEO of the organization and a member of the board. The nine members and the Postmaster General then select the Deputy Postmaster General, who is the 11<sup>th</sup> member. The board members appointed by the president serve up to two seven year terms, while the Postmaster General does not have term limits.<sup>223</sup>

In FY2006, USPS delivered 213 billion pieces of mail but by FY2015 volume dropped to 154 billion pieces.<sup>224</sup> Due to the decline USPS has attempted to rationalize their business model, but these attempts have been thwarted by Congress. For example, since 1983, Congress has included language in USPS-related appropriation legislation prohibiting USPS from ending mail delivery on Saturday, a move that would save \$500 million dollars per year.<sup>225</sup>

Congress has also been involved in requiring USPS to pre-fund its retiree health benefits since 2006. Unlike other governmental agencies and corporations, which use pay-as-you-go mechanisms to fund their retiree health benefits, USPS retiree health benefits must be pre-funded at a rate of \$5.5 billion to \$5.8 billion per year. The rationale for this was that USPS' pensions were identified as being underfunded by \$78 billion. In response Congress mandated that the gap should be closed within the next ten years.<sup>226</sup> The immediate outcome of the passage of this law was that from a net income of \$900 million in FY2006, in FY2007 net losses reached \$5.1 billion.<sup>227</sup> From FY2007 through FY2013, total accumulated losses reached \$46.2 billion, exceeding its \$15 billion statutory limit for indebtedness.<sup>228</sup> This level of debt is only partially a result of the requirement to pre-fund retiree health benefits; operating revenues have also gone into the red in some years following the Great Recession.<sup>229</sup>

USPS has requested that Congress restructure its retiree health benefit obligation, with a preference to return to the pay-as-you-go system.<sup>230</sup> The GAO has also urged Congress to change the current system to let USPS enact cost-cutting measures to deal with declining mail volumes.<sup>231</sup>

## Appendix C: Congressionally Chartered Non-Profit Organizations

Congress has the power to grant charters for both for-profit and not-for-profit organizations. An example of a for-profit congressionally chartered corporation is the COMSAT Corporation; the Boy Scouts of America, the American Red Cross, the National Academy of Sciences, and the United States Olympic Committee.<sup>232</sup>

Under Title 36, Congress can grant non-profit charters to organizations with a patriotic, charitable, historical, or educational purpose. Currently, around 100 organizations carry such a charter.<sup>233</sup> These charters create non-profits that are not directly affiliated with the federal government: they are not a government agency, they do not receive direct appropriations, their debts are not covered by the full faith and credit of the United States, and they do not enjoy original jurisdiction in the federal courts. While these non-profits must report their activities to Congress, Congress does not serve in a supervisory role. That is, except for the requirement to report their activities to Congress, these organizations are much like non-congressionally chartered non-profits.

However, due to the fact that Congress has created these organizations, there is often public confusion regarding the role of congressionally chartered non-profits. These organizations benefit from this confusion, using the charter as a sort of “approval” from Congress, sanctioning their work.<sup>234</sup>

Due to this challenging public perception, the House Judiciary Committee, which oversees congressional charters, has imposed a moratorium in 1992 on the establishment of new charters.<sup>235</sup> However, other committees or the full Congress still can (and have done so) grant charters and have them listed in Title 36, essentially limiting the effects of the moratorium. Because of this, a number of organizations have been granted charters despite the moratorium.<sup>236</sup>

## American Red Cross

First established in 1881 by Clara Barton, the American Red Cross was officially chartered in 1900 (prior to 1900 it was a private charitable corporation).<sup>237</sup> Further changes were implemented in 1905 and 1947. The current charter was last updated in 2007.<sup>238</sup> Red Cross's charter has "perpetual succession", i.e., which means that it does not expire and will remain valid until an act of Congress. This charter is unique in that it is the only organization under Subtitle III, "treaty obligation organization", of Title 36 of the U.S. Code. The treaty in question was the Geneva Convention of 1864.<sup>239</sup>

The responsibilities given to the Red Cross in its congressional charter are in response to the Geneva Convention obligations, and include the supply of relief supplies and medical care in times of war and peace. The Red Cross was also mandated by Congress to serve as a liaison between the people of the United States and its armed forces' personnel.<sup>240</sup> During the decades since the Red Cross was first established, its role has evolved. It currently operates in five areas: people affected by disasters in America; support for members of the military and their families; blood collection, processing and distribution; health and safety education and training; international relief and development.<sup>241</sup>

The Red Cross is a large organization with an operating budget of \$2.9 billion in fiscal year 2015.<sup>242</sup> In FY 2015 it provided 32,000 shelter stays for people temporarily relocated, served almost 1 million meals, and processed 5.1 million units of blood from 3 million donors. Internationally, it provided assistance to more than 7.8 million people and vaccinated 215 million children.<sup>243</sup>

Like other congressional charters, the Red Cross's charter gives the organization most of the powers associated with a corporation, including the right to set its own by-laws and its managerial and administrative structures. It is not a government agency, but does receive money from the Treasury as grants and contracts – which many non-profits, congressionally-chartered or not, also do. Like other federally chartered organizations, the Red Cross is obliged to report its activities annually to the Secretary of Defense and Congress, but these two entities are not directly involved in its operations or governance and cannot intervene, except by changing the charter itself.<sup>244</sup>

The Red Cross's congressional charter set the organization's governance structure. The 1947 charter mandated a 50-person governing board. The president appoints eight members for this board, and the remaining 30 members of the board represent the Red Cross's local chapters. There are also 12 independent "members-at-large". The board then nominates an 11-person "executive committee" that exercises the power of the board when the board is not in session.<sup>245</sup>

# United States Olympic Committee

With roots dating back to 1894, the United States Olympic Committee is a congressionally chartered non-profit that is responsible for the training, entering, and funding of U.S. teams for the Olympic, Paralympic, Youth Olympic, Pan American, and Parapan American tournaments.

The Olympic Committee also oversees the bidding process for U.S. cities to host the Olympic/ Paralympic Games, the Youth Olympic Games, and the Pan/Parapan American Games.<sup>246</sup> In 2015 it had revenues of \$141 million.<sup>247</sup>

The predecessor to the current United States Olympic Committee was created in 1894 in response to the need to establish a U.S. committee to participate in the first Olympic Games of the Modern Era in Athens in 1896. In 1921, the committee was formally organized as the American Olympic Association. In 1940 and 1945 the committee would change its name, first to United States of America Sports Federation and then to United States Olympic Association. The current name was adopted in 1961.<sup>248</sup>

The Olympic Committee was granted its congressional charter in 1950. With this charter, the organization could now “solicit tax-deductible contributions as a private, nonprofit corporation.”<sup>249</sup> In 1978, the Amateur Sports Act gave the Olympic Committee the exclusive rights to coordinate all Olympic-related athletic activity in the United States. This act also establish that “recent and active athletes” would have at least 20% of the seats and voting power in the Olympic Committee 16-member governing board.<sup>250</sup>

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