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Chair Duckworth, Ranking Member Moran, and Members of the Subcommittee, thank you for the opportunity to testify before you today. My name is Marc Scribner. I am a senior transportation policy analyst at Reason Foundation, a national 501(c)(3) public policy research and education organization with expertise across a range of policy areas, including aviation.[1] Throughout its 46-year history, Reason Foundation has conducted research on air traffic management, emerging aviation technologies, and their interactions with public policy. My testimony today focuses on institutional problems that are undermining efforts to modernize the infrastructure needed to support the continued air traffic volume growth in the National Airspace System.

I.   Introduction

The United States was once the global leader in airspace management. However, in recent decades, we have fallen behind peer countries that have modernized their air traffic control practices and technologies. The Federal Aviation Administration's (FAA) modernization program, known as the Next Generation Air Transportation System (NextGen), has been plagued by cost overruns and delays. This bodes poorly for anticipated traffic growth from conventional airspace users and raises serious questions about long-term efforts to integrate emerging aviation technologies and operations—such as unmanned aircraft systems and advanced air mobility—into the National Airspace System (NAS).

Our increasingly obsolete air traffic control system is preventing airspace users from realizing benefits today while also threatening the future integration of emerging aviation technologies into the NAS. While there are many problems facing FAA's Air Traffic Organization (ATO) generally and NextGen specifically, they can be grouped into three categories:

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1.   My biography and writings are available at https://reason.org/author/marc-scribner/.

- **Funding:** uncertain, unstable, and poorly suited to paying for large-scale capital modernization programs such as NextGen.
- **Governance:** a system with so many legislative branch and executive branch overseers that it focuses ATO management attention far more on overseers than on ATO's aviation customers.
- **Culture:** an organizational culture that is status-quo oriented.

These are all interrelated. The uncertain nature of the annual appropriations process makes it difficult for the ATO to complete major procurements in a timely fashion. As a governmental entity charged with regulating safety while providing air navigation services, unfortunately, FAA focuses on remaining accountable to its many political and administrative overseers rather than the users of its navigation services. FAA's dual regulator/service provider mission also presents a fundamental conflict of interest.

II.   Problems Identified in the GAO Report and Responses

September's Government Accountability Office (GAO) report catalogued a lengthy list of problems plaguing FAA efforts to modernize aging, outdated air traffic control (ATC) systems.[2] GAO researchers identified 138 ATC systems, and its assessment found that 37% are unsustainable (i.e., need to be replaced) and 39% are potentially unsustainable. And 58 of those systems "have critical operational impacts on the safety and efficiency of the national airspace."

Even worse, GAO found that FAA has 64 ongoing efforts aimed at modernizing 90 of the unsustainable and potentially unsustainable systems. But current FAA plans show that many of these systems will still be in operation for between six and 13 more years before being either replaced or modernized. Table 3 in the report lists 17 of the "most critical and at-risk" ATC systems, all of which are "unsustainable" and shows that 13 of them are not projected to be replaced until the 2030s—and that four of them have no modernization investment underway at all. GAO notes that the reason four at-risk systems have no modernization plans is because the 2023 operational risk assessment was not completed in time for those four to be included.

GAO referenced the November 2023 report of the National Airspace System Safety Review Team,[3] which highlighted several aging systems as indicative of broader problems:

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2.   Government Accountability Office, "Air Traffic Control: FAA Actions Are Urgently Needed to Modernize Aging Systems," GAO-24-107001 (Sep. 23, 2024). *Available at* https://www.gao.gov/products/gao-24-107001.

3.   "Discussion and Recommendations to Address Risk in the National Airspace System," National Airspace System Safety Review Team (Nov. 2023). *Available at* https://www.faa.gov/NAS_safety_review_team_report.pdf.

- Airport Surface Detection Equipment Model-X (ASDE-X), deployed in the early 2000s to track surface movements and alert controllers to potential conflicts, is no longer in production and "spare parts are extremely limited."[4]
- Beacons used for en-route surveillance, with 20-year-old transponders and no available replacement antennas.
- Instrument landing systems (ILSs), most of which are at least 25 years old and for which manufacturer support is no longer available.

GAO highlighted comments from the Safety Review Team and from both the National Air Traffic Controllers Association and Professional Aviation Safety Specialists that "should be timelier in identifying and addressing concerns with unsustainable systems given the length of time it takes to move through the acquisition process."[5] Table 4 of GAO's report shows that it can take between two and nearly nine years "to establish an acquisition program baseline" once a candidate system has been identified. This means that the time from the start of program planning to delivery of a modernized or replacement system can range from 5.5 years to as much as 19.5 years, by which time many selected technologies will be obsolete.

In response to GAO's September report, numerous stakeholders contacted Reason Foundation to share their experiences with FAA's ATC modernization efforts.[6] These responses offer insight into FAA's particular failures. I highlight three below.

- A recently retired FAA engineer explained a general cultural problem within the agency:

  > Political overseers have made over FAA in their own image, putting people in charge of things for which they are not qualified: engineering programs run by non-engineers, operations run by non-operational people, logistics run by non-logisticians. The systems engineering that FAA once had has been destroyed… . I hope the GAO report elicits some positive action, but I wouldn't bet on it. It's an accident waiting to happen, but until it does, the current "leadership" is just making sure they don't get blamed for it.

- A consultant who has worked within and external to FAA wrote in with disturbing details on specific aging ATC systems, including Mode-S:

  > Mode-S (secondary surveillance radar) is in such poor condition that it is operated in violation of FAA's own commissioning orders for technician

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4.   Government Accountability Office, *supra* note 2, at 7.
5.   Id. at 22
6.   Robert W. Poole, Jr., "Responses to GAO Report on Aging FAA Systems," *Aviation Policy News*, No. 228, Reason Foundation (Nov. 2024). *Available at* https://reason.org/aviation-policy-news/spirit-bankruptcy-space-launches-and-response-to-report-on-aging-faa-systems/#a.

certification of its operational performance. As many as half of current Mode-S systems are operated in "IBI," meaning they have zero Mode-S accuracy and capability. Accuracy of these radar systems drives the separation criteria of three and five miles near airports and in en-route airspace. The lack of this radar input makes the surveillance fusion with ADS-B less accurate and reliable. This data is what feeds the automation inputs of both en-route and terminal airspace.

- An engineering manager at a European aviation technology company compared FAA's modernization efforts and procurement process to those of gold-standard ANSP Nav Canada:

  > Look at Nav Canada. How many primary radar types do they have for terminal surveillance? One. How many does FAA have? Three, dating back to the 1980s. The manufacturers of two of them are out of business. FAA has four types of secondary/beacon radars. Nav Canada does a wholesale replacement, launching a project at the end of life to replace them all at once. Nav Canada has one primary switch for all systems: tower, approach, and en-route. One backup switch for all. They just did a replacement tender for them all… FAA is never a single buy. All are indefinite quantity contracts. So suppliers deliver 10 to 20 systems a year. It is the [indefinite delivery/indefinite quantity] type of contract process, related to funding, that does not allow for a realistic replacement.

GAO also reports that FAA budget requests for facilities and equipment "have remained relatively constant at about $1 billion annually."[7] While NextGen's flat budget is indeed a problem, GAO does not mention the two reasons why FAA has been unable to request adequate financial support for modernization. First, FAA's budget request must be approved by the Secretary of Transportation. Second, the Office of Management and Budget has the last word on how much the Department of Transportation (and hence FAA) can request.

This is not how critically important public utilities operate, whether government-owned or investor-owned. Utilities plan their capital spending needs and obtain approval to set their rates to provide the needed revenue streams to pay off bonds used to finance large facility and equipment investments. That is true of federal government utilities like the Tennessee Valley Authority, but nothing like that process exists for FAA's ATC system. It has no bonding authority, must compete against unrelated Department of Transportation and broader Executive Branch priorities, and then depend solely on inadequate annual appropriations from Congress.

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7.   Government Accountability Office, *supra* note 2, at 10

III.   Problems with FAA ATO's Institutional Design

A decade ago, my Reason Foundation colleague Robert Poole conducted an in-depth study of the structure of and culture at FAA and their relationship to innovation.[8] He selected seven innovations in air traffic control and did brief case studies on each, observing how each innovation has been dealt with by the ATO and its counterparts overseas. In each of these, he found that ATO's approach was far more hesitant than that of air navigation service providers (ANSPs) in other countries that are structured as public utilities. He then developed five explanations of why this status-quo bias exists, which were subsequently validated by a panel of more than a dozen expert peer reviewers.

These five identified detrimental institutional deficiencies at FAA's ATO are as follows:

1. **Self-identity as a safety agency rather than as a technology provider.** This stems from the ATO being embedded within FAA, whose mission is safety. Nearly all the innovations relevant to NextGen come from the aerospace/avionics industry, which has a much more innovative, dynamic culture. Those companies are regulated at arm's length by FAA—but the ATO is embedded inside the regulator.
2. **Lack of, or loss of, technical expertise.** Partly due to its status-quo culture and partly due to civil service pay scales, the FAA has a chronic problem with not attracting or not being able to retain the best engineers and software professionals. This means that a lot of the detailed requirements for new air traffic control and aviation systems end up being defined by contractors, which can lead to costly additions that make the systems more complex and costly than necessary.
3. **Lack of, or loss of, management expertise.** For the same reasons that FAA has limited technical expertise, it also has trouble attracting and keeping top-notch program managers who are used to being held accountable for results.
4. **Excessive bureaucracy labeled as oversight.** Inherent in being a large government agency that is spending taxpayers' money, the FAA must be held accountable to all the normal government overseers. The ATO must respond to oversight by the FAA Administrator, the Secretary of Transportation, the Office of Inspector General, the Office of Management and Budget, the GAO, and up to 535 Members of Congress. While safety is the top priority, responding to the requests and whims of all these overseers takes up a large amount of senior management's time.
5. **Lack of customer focus.** Because the ATO gets its funding from Congress, it ends up— de facto—acting as if its customer is Congress rather than the aviation customers it is supposed to serve.

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8.   Robert W. Poole, Jr., "Organization and Innovation in Air Traffic Control," Reason Foundation Policy Study 431 (Jan. 2014). *Available at* https://reason.org/wp-content/uploads/files/air_traffic_control_organization_innovation.pdf.

IV.   The Global Air Navigation Service Provider Landscape

The status-quo ANSP model in the United States was historically the dominant model globally, whereby air traffic control was provided by a civil aviation authority within the transport ministry. That model has undergone major change since 1987 outside of the United States, starting when the government of New Zealand removed its air traffic control system from the transport ministry by restructuring it as Airways New Zealand, a self-supporting government corporation. Within 10 years, more than a dozen other countries had followed suit.

Separating the provision of air navigation services from the civil aviation authority and putting the ANSP at arm's length from its safety regulator, like all the other key players in aviation—airlines, business aviation, general aviation, airframe manufacturers, engine producers, pilots, mechanics, and so forth—is now the globally recognized best practice. For more than two decades, this has been International Civil Aviation Organization (ICAO) policy.[9] The United States is among the last industrialized countries that have not taken this step to eliminate the fundamental conflict of interest of having an aviation regulator also operate a service it is tasked with regulating.

The revenue source for ANSPs operated as public utilities is globally accepted cost-based user fees in accordance with the airport and air traffic control charging principles promulgated by ICAO.[10] Prior to the conversion of these ANSPs to public utilities, those revenues were nearly always paid by airlines and other airspace users to the respective national governments. In most cases, once an ANSP has been converted to a utility, the user-fee revenue flows directly to the ANSP as its primary source of revenue. This makes it possible for the ANSPs to issue revenue bonds based on their projected revenue streams, just as airports do today in the United States and elsewhere. It is through their predictable streams of revenue that come directly from users that ANSPs outside the United States can successfully finance large-scale capital modernization efforts.

Globally, three ANSPs have been moved out of the government entirely under either an independent nonprofit user cooperative model or as partially privatized companies. Another 55 operate as wholly owned government corporations. Just 19—mostly developing countries, but also including the United States, Japan, and Singapore—operate as part of legacy civil aeronautics authorities that also regulate aviation safety. ANSPs that operate as

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9.   International Civil Aviation Organization, *Safety Oversight Manual*, Doc. 9734, Part A, Paragraph 2.4.9 (2001).

10.   International Civil Aviation Organization, *ICAO's Policies on Charges for Airports and Air Navigation Services*, Doc. 9082 (9th Edition, 2012).

public utilities funded by user fees now number 62 and serve 83 countries globally.[11] Appendix A lists ANSPs around the world by governance model.

V.   Conclusion

The modernization of existing air traffic management infrastructure in the United States continues to fall behind peer countries and is straining from the continued operations and growth of conventional airspace users. The prospect of new airspace entrants raises even more questions about the ability of the United States to accommodate the future of aviation, which would have significant negative impacts on the economy and safety. Evidence suggests that successfully modernizing the technology and service provision of air traffic management of the National Airspace System will require institutional modernization.

Thank you for the opportunity to testify before the Subcommittee, and I welcome your questions.

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11.   Marc Scribner, "2024 Annual Privatization Report: Aviation," Reason Foundation (May 2024) at 26–29. *Available at* https://reason.org/wp-content/uploads/annual-privatization-report-2024-aviation.pdf.

Appendix A: Air Navigation Service Providers, by Type of Organization

Country	ANSP	Organization Type	Notes
Canada	Nav Canada	Nonprofit corporation	
Italy	ENAV	Part investor-owned	
UK	NATS	Part investor-owned	
UK	Serco	Shareholder-owned	
Albania	ALBCONTROL	State-owned company	
Argentina	DGCTA	State-owned company	
Armenia	ARMATS	State-owned company	
Australia	Airservices Australia	State-owned company	
Austria	Austro Control	State-owned company	Also regulates
Belgium	Skeyes	State-owned company	
Botswana	CAAB	State-owned company	
Bulgaria	BULATSA	State-owned company	
Cambodia	CATS	State-owned company	
Croatia	Croatia Control	State-owned company	
Curacao	DCANSP	State-owned company	
Czech Republic	ANS CR	State-owned company	
Denmark	Naviair	State-owned company	
Egypt	NANSC	State-owned company	
Estonia	EANS	State-owned company	
Fiji	Airports Fiji Ltd.	State-owned company	
Finland	Finavia Corp.	State-owned company	
Georgia	Sakaeronavigatsia	State-owned company	
Germany	DFS	State-owned company	
Hungary	HungaroControl	State-owned company	Also regulates
Iceland	ISAVIA	State-owned company	
India	Airports Authority of India	State-owned company	
Indonesia	AirNav Indonesia	State-owned company	
Iran	Iran Airports Company	State-owned company	
Ireland	AirNav Ireland	State-owned company	
Israel	Israel Airports Authority	State-owned company	
Kazakhstan	Kazaeronavigatsia	State-owned company	
Latvia	LGS	State-owned company	
Lithuania	Oro Navigacija	State-owned company	
Macedonia	M-NAV	State-owned company	
Maldives	Maldives Airports Co.	State-owned company	
Malta	MATS	State-owned company	
Moldova	MoldATSA	State-owned company	
Mozambique	Aeroportos de Moçambique	State-owned company	
New Zealand	Airways New Zealand	State-owned company	
Nigeria	NAMA	State-owned company	
Norway	Avinor	State-owned company	
Papua New Guinea	PNG Air Service	State-owned company	
Portugal	Nav Portugal	State-owned company	
Romania	ROMATSA	State-owned company	

Country	ANSP	Organization Type	Notes
Russia	State ATM Corporation	State-owned company	Also regulates
Serbia & Montenegro	SMATSA	State-owned company	
Slovak Republic	LPS SR	State-owned company	
Slovenia	Slovenia Control	State-owned company	
South Africa	ATNS	State-owned company	
Spain	ENAIRE	State-owned company	
Sri Lanka	AASL	State-owned company	
Sweden	LFV	State-owned company	
Switzerland	Skyguide	State-owned company	
Thailand	AEROTHAI	State-owned company	
Turkey	DHMI	State-owned company	
Uganda	CAA Uganda	State-owned company	
Ukraine	UkSATS	State-owned company	
Vietnam	VATMC	State-owned company	
Zambia	NACL	State-owned company	
Bangladesh	CAAB	Civil aviation authority	Financially autonomous
Cyprus	DCA Cyprus	Civil aviation authority	
Dominican Republic	IDAC	Civil aviation authority	
Ghana	Ghana CAA	Civil aviation authority	
Greece	HCAA	Civil aviation authority	
Japan	JCAB	Civil aviation authority	
Jordan	CARC	Civil aviation authority	Financially autonomous
Kenya	Kenya CAA	Civil aviation authority	
Mongolia	CAA of Mongolia	Civil aviation authority	
Myanmar	DCA Myanmar	Civil aviation authority	
Nepal	CAA Nepal	Civil aviation authority	
Saudi Arabia	GACA	Civil aviation authority	
Singapore	CAAS	Civil aviation authority	
Swaziland	SWACAA	Civil aviation authority	
Taipei FIR	ANWS	Civil aviation authority	
Tanzania	TCAA	Civil aviation authority	
Trinidad & Tobago	Trinidad & Tobago CAA	Civil aviation authority	
Tunisia	OACA	Civil aviation authority	
United States	FAA	Civil aviation authority	
Azerbaijan	AZANS	Government department	
Brazil	DECEA	Government department	
France	DSNA	Government department	
Mexico	SENEAM	Government department	
Netherlands	LVNL	Government department	Financially autonomous
Poland	PANSA	Government department	
United States	DOD Policy Board, Aviation	Government department	Military
Belgium	MUAC	Intergovernmental	Upper airspace
Honduras	COCESNA	Intergovernmental	6 countries
Senegal	ASECNA	Intergovernmental	17 countries

Country	ANSP	Organization Type	Notes
Angola	ENANA-EP	uncategorized	
Haiti	OFNAC	uncategorized	
Luxembourg	ANA	uncategorized	
Sudan	Sudan ANS	uncategorized	
Dubai	DANS	uncategorized	