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Report to Congressional Committees, Executive Agencies, and the National Civil Aviation Review Commission

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NATIONAL AIRSPACE SYSTEM

Issues in Allocating Costs for Air Traffic Services to DOD and Other Users

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Congressional Committees, Executive Agencies, and the National Civil Aviation Review Commission

The United States government operates a joint civil-military air traffic control and navigation system. The Federal Aviation Administration (FAA) has the primary responsibility under federal law for the development and operation of the system for both military and civil aircraft in the nation's airspace.[1] The Department of Defense (DOD), in coordination with FAA, provides air traffic services to military aircraft, in support of its national defense mission, and also to civil users.

Over the past decade, the growth of domestic and international air travel has increased the demand for FAA's services. At the same time, FAA and other federal agencies, including DOD, have operated in an environment of increasingly tight federal resources. FAA anticipates funding shortfalls of several billion dollars over the next several years, according to current assumptions about future growth in air traffic and costs. These resource constraints, in addition to the pressures to finance additional safety and security improvements and FAA's efforts to modernize air traffic control (ATC), contribute to the projected funding shortfalls. The Congress has recognized the seriousness of FAA's financing problems and, under the Federal Aviation Reauthorization Act of 1996,[2] called for an independent assessment of FAA's financial requirements and created the National Civil Aviation Review Commission, which was charged with recommending how best to finance FAA.

The imposition of user fees for FAA's services is being considered as one option for helping FAA to meet its future financial requirements.[3] Because DOD is a user of FAA's air traffic services, some have advocated that it "pay" for the services it receives from FAA. Unlike other users, however, DOD also contributes to the operation of the nation's airspace and navigation system, including the provision of air traffic services to military and civil users. Before making a decision about the application of user fees, the Congress sought additional information. In the 1996 Reauthorization Act, it

[1]49 U.S.C. 40103 and 47103.

[2]P.L. 104-264.

[3]At present, FAA receives its financing from two sources: the Airport and Airway Trust Fund and the Treasury's general fund. In recent years, the Trust Fund has generally financed about 75 percent of FAA's budget; the general fund has contributed the remaining 25 percent. Revenues for the Trust Fund are largely derived from the excise tax on domestic airline tickets—currently, the tax is 10 percent of the fares paid by passengers—and other taxes on commercial and general aviation users.

directed GAO to report on the manner in which the costs of air traffic services are allocated between FAA and DOD. The Congress also directed us to identify opportunities to increase the efficiency of the air traffic services provided by FAA and DOD.

In response to the act and as agreed with the House and Senate aviation subcommittees, this report discusses the issues that must be resolved in allocating the costs of air traffic services to DOD and other users. It also discusses funding options for DOD's share of costs if DOD is found to owe a payment to FAA. As for opportunities to increase the efficiency of air traffic services, we explored the potential for better management of special-use airspace. (Information on this subject is provided in app. I.) Our review did not focus on DOD's costs of providing air traffic services to the military or the merits of moving to a user fee system. (App. II provides detailed information on our objectives, scope, and methodology.)

Background

The U.S. airspace system, which is in continuous operation 24 hours a day, 365 days a year, is commonly referred to as the National Airspace System (NAS). The principal component of the NAS is the ATC system—a vast network of radars; automated data processing, navigation, and communication equipment; and traffic control facilities. It is through the ATC system that FAA and DOD provide services such as controlling takeoffs and landings and managing the flow of traffic between airports.[4] Other components of the NAS include airports or landing areas; aeronautical charts, information, and services; rules, regulations, and procedures; technical information; and personnel and material. Furthermore, portions of certain components of the ATC system, such as long-range radars, are shared jointly between FAA and DOD.

Since 1958, as established by the Federal Aviation Act, FAA and DOD have been partners in jointly operating the NAS and in providing air traffic services. They also cooperate in various other areas, such as air defense, drug interdiction, and weather research. The details of how FAA and DOD

[4]FAA uses three types of facilities to control traffic. Airport towers direct aircraft on the ground, before landing, and after takeoff when they are about 5 nautical miles from the airport and up to about 3,000 feet above the airport. Terminal radar approach control facilities sequence and separate aircraft as they approach and leave busy airports, beginning about 5 nautical miles and ending about 50 nautical miles from the airport and generally up to 10,000 feet above the ground. Air route traffic control centers, called en route centers, control planes in transit and during approaches to some airports. Most of the en route centers' controlled airspace extends above 18,000 feet for commercial aircraft. En route centers also handle lower altitudes when dealing directly with a tower, or when agreed upon with a terminal facility. DOD also operates tower and approach control facilities. FAA provides additional services, such as weather and pilot briefings, through a network of flight service stations.

work together are embodied in joint manuals and hundreds of letters of agreements at both the national and regional levels. For example, Patuxent Naval Air Traffic Control Facility in Patuxent River, Maryland, provides radar coverage for a geographic area of about 6,400 square miles; its boundaries stretch from Bethany Beach, Delaware, along the Atlantic coast to Leedstan, Virginia. Patuxent has entered into a letter of agreement with FAA's Washington Air Route Traffic Control Center in Leesburg, Virginia, to provide approach control services during certain hours as stipulated in the agreement. Similar agreements exist between FAA's facilities and DOD's facilities across the United States.

In fiscal year 1995, FAA reported that it handled about 150 million aircraft movements, such as airport arrivals and departures. About 10 million, or 7 percent, of these movements involved DOD aircraft. DOD reported that it handled 18 million aircraft movements. Civil aircraft accounted for about 4 million, or 20 percent, of the aircraft movements handled by DOD.[5] For the same period, FAA and DOD reported that the cost of providing ATC services—including the costs associated with operating and modernizing the system—totaled about $6.9 billion—$6.3 billion spent by FAA and $0.6 billion spent by DOD. (See app. III for more details on the air traffic services provided by FAA and DOD.)

Results in Brief

In the development of user fees for air traffic services, important data, conceptual, and policy issues need to be resolved in allocating ATC costs to the users of the system, including DOD. These issues include:

- Accurate and reliable cost data will enhance efforts to develop cost-based user fees for air traffic services. Currently, FAA and DOD have limited ability to accumulate such data, and both plan to improve their cost-accounting capabilities. Despite FAA's lack of a cost-accounting system, an independent contractor's review found that it is possible, on an interim basis, to attribute FAA's costs to broad categories of users.
- Notwithstanding the deficiencies in FAA's and DOD's capabilities to assign costs, the data currently available indicate that a large portion—55 percent

[5]We use the term "aircraft movements" to include services, such as arrivals and departures, that FAA and DOD provide to aircraft in the tower, terminal, and en route airspaces. Total aircraft movements between DOD and FAA are not entirely comparable. For example, while movements handled by DOD include only services in terminal and tower facilities, a large portion of the services provided by FAA are in en route facilities. According to FAA, en route services are considerably more expensive to provide than other air traffic services. Additionally, in 1995, FAA reported that it provided over 35 million services through its flight service stations. DOD does not operate en route centers or flight service stations. We did not verify any of the data and were unable to reconcile the data provided by FAA and DOD because consistent definitions of the types of services do not exist. As a result, we did not total the aircraft movements.

of FAA's costs—are "common," or not directly related to any particular user. The method for allocating common costs could have a profound impact on the costs assigned to various users. For example, under one method for assigning these costs, the total costs assigned to DOD for air traffic services would be more than twice as much as under another method. Policy issues—such as the effects of the allocation on economic efficiency, equity across users, and DOD's mission—are involved in determining what share, if any, of these common costs should be assigned to DOD. FAA and DOD strongly disagree about how the common costs should be allocated.

- Another issue that needs to be resolved is whether and to what extent DOD's costs of providing air traffic services to civil users should be included in the development of user fees. If DOD's costs are included, fees could be collected from civil users for the services provided by DOD, thereby providing an offset to what DOD may owe FAA. Theoretically, DOD could receive a net inflow of funds if the amount it is owed for providing services to civil users exceeds the amount it owes for the services provided to it by FAA. While DOD spends considerable amounts in support of the National Airspace System ($622 million on air traffic services alone in fiscal year 1995), most of this expenditure goes to support the military mission, and only a portion of DOD's costs should be assigned to civil users.

A move to user fees would likely eliminate the general fund appropriation that FAA currently receives for a significant part of its budget. Policy issues are also involved in deciding on a funding source for DOD's share if the Department is found to owe a payment for the consumption of FAA's services. This payment could be funded in various ways. One option is to require DOD to pay user fees directly to FAA. In this case, DOD could be appropriated the additional funds for this payment or it could be required to absorb this expense out of its regular appropriations. Another option is that DOD would not pay user fees and that an appropriation would be made from the general fund directly to FAA to cover DOD's payment. FAA and DOD have different views on how various options would affect their missions and partnership in providing air traffic services.

Issues Require Resolution in Allocating and Funding the Cost of Air Traffic Services

Important issues must be resolved in determining the shares of ATC costs to be allocated to DOD and other users. Once allocation decisions are made, attention can be turned to how DOD's share of the costs should be funded if the Department is found to owe a payment for its use of FAA's services. While these decisions are related, they are also separable in that even if a policy choice is made to exempt DOD from the payment of user fees, the Department should still be included in the allocation process.

This inclusion will help ensure that the directly assignable costs of DOD's use of FAA's services are not passed on to other users.

Allocation decisions involve data accuracy and reliability, the treatment of common costs, and the inclusion of DOD's costs of providing civil air traffic services. (See apps. IV and V for a more detailed discussion of cost allocation issues.) Additionally, choices exist for the source of funds for paying DOD's share of ATC costs if the Department is found to owe a payment.

Data Accuracy and Reliability

Cost-based financing systems rely on the accumulation of accurate and reliable cost data. Without such data, it would be difficult to determine the costs of providing air traffic services or to assign costs to the users. Currently, FAA and DOD have limited capabilities to accumulate accurate, reliable cost data.

Our reviews have found that FAA lacks a cost-accounting capability and, in lieu of one, relies on an assortment of accounting and financial management systems. However, these systems do not capture all relevant costs.[6] The February 1997 Coopers and Lybrand report on FAA's financial requirements notes that despite FAA's lack of a cost-accounting system, it is possible, on an interim basis, to attribute FAA's costs to broad categories of users. The report further states that if FAA is required to adopt a comprehensive system of user fees, a modern cost-accounting system should be implemented to more reliably assign costs to specific products and services.[7] FAA is developing a cost-accounting system as required by the 1996 Reauthorization Act and plans to have the system in place by October 1997.

As DOD has acknowledged and our financial statement audit work has consistently confirmed, significant problems exist with the comprehensiveness and accuracy of DOD's reported cost information. In fact, in our recent high-risk report on defense financial management, we noted that DOD's inability to accumulate accurate cost information is one of six areas presenting the greatest challenge to the agency as it seeks to

[6]See Air Traffic Control: Improved Cost Information Needed to Make Billion Dollar Modernization Investment Decisions (GAO/AIMD-97-20, Jan. 22, 1997).

[7]Federal Aviation Administration: Independent Financial Assessment (Feb. 28, 1997).

put in place an effective financial management structure.[8] DOD is undertaking reforms to strengthen its cost-accounting practices.

If DOD's costs are included in the allocation of ATC costs, the issue of comparability between FAA's and DOD's cost data also becomes important. FAA and DOD would need to define and agree on specific definitions of services and associated cost categories for which data would be accumulated.

Treatment of Common Costs

A significant portion of FAA's costs have been found to be costs that are not directly associated with the use of the system by particular users.[9] The allocation of these large common costs could have a profound impact on the share of total costs assigned to each user. In allocating common costs, assumptions and judgments must be made, and the goals of enhancing economic efficiency and maintaining equitable treatment of multiple user groups should be considered. Different user groups are likely to have diverging opinions about what constitutes an equitable cost allocation.

A March 1997 study by GRA, Inc.,[10]—a contractor to FAA—found that FAA's costs directly assignable to DOD, or the marginal cost of DOD's use, totaled just over $100 million, or about 2.6 percent of the total directly allocable costs for fiscal year 1995. However, the study, using an allocation method based on "Ramsey" pricing,[11] assigned about $430 million, or about 9 percent of FAA's common costs, to DOD.[12] Ramsey pricing assigns higher

[8]High-Risk Series: Defense Financial Management (GAO/HR-97-3, Feb. 1997).

[9]In many other production processes, costs that are not attributable to particular outputs, such as administration, are likely to be "overhead." For ATC services, on the other hand, large facilities, such as en route centers, are needed for the production of many different outputs and services provided to various users. Some of the large common costs of ATC services are attributable to particular facilities, but not to particular users, and some costs are not attributable to particular facilities or users. For the remainder of this report we will refer to both of these types of costs as "common" costs, even though some are fixed and some are pure common costs.

[10]A Cost Allocation Study of FAA's FY 1995 Costs (Mar. 19, 1997).

[11]Ramsey pricing is a commonly used method for pricing services such as electricity and telecommunications because these industries, like ATC services, have large facilities costs that need to be allocated to users in order to recoup adequate revenues.

[12]The high level of common costs allocated to DOD results from how the Ramsey-based method assigns those costs. In particular, because ATC costs are minor in terms of DOD's total flight costs, the agency's sensitivity to price changes for ATC services is calculated to be less than most other groups'. These differential flight costs are due, in part, to DOD's longer average flight distance.The high level of common costs allocated to DOD results from how the Ramsey-based method assigns those costs. In particular, because ATC costs are minor in terms of DOD's total flight costs, the agency's sensitivity to price changes for ATC services is calculated to be less than most other groups'. These differential flight costs are due, in part, to DOD's longer average flight distance.

prices to those users who are less likely to reduce their consumption of air traffic services in response to price increases.

According to economic theory, the application of Ramsey pricing leads to the most economically efficient pricing of services provided to multiple user groups. The better the data are, the more confidence can be placed in the Ramsey-based allocation method. In this case, however, the large percentage of common costs, in combination with the fact that little is known about users' actual sensitivity to changes in the price of air traffic services, raises concerns about the level of confidence that can be placed in the Ramsey-based method to provide the most efficient outcome.

The application of Ramsey pricing will likely assign considerable common costs to DOD because the Department, in performing its mission, would have little discretion to reduce its use of air traffic services in response to higher prices. A policy decision could be made, based on a concern about the Department's national defense mission, to exclude DOD from a Ramsey-based allocation.[13] However, such a decision would have implications for other policy goals, such as the promotion of equity across user groups and economic efficiency. In particular, because the exclusion of DOD results in nonmilitary users' being allocated a greater share of costs, this may be viewed as unfair and may diminish those users' support for user fees. Also, excluding DOD (or any user group) would lead to a less efficient outcome because the higher prices faced by other users could cause them to reduce their use of ATC services. Ultimately, various policy goals—including economic efficiency, equity across users, and protecting DOD's national defense mission—need to be weighed in deciding how to allocate common costs among users.

At our request, GRA, Inc., provided an alternative allocation of common costs in which all user groups received a share of common costs that was a proportionate increase over their directly assigned costs for air traffic services. Under this scenario, common costs were allocated very differently than under the allocation mechanism employed by the contractor. For example, under the Ramsey-based method, the total allocation for domestic jet carriers was $4,616 million and for DOD, $530 million. Under the proportional allocation method, these two user groups' total allocations were $4,031 million and $230 million, respectively. Commuter carriers and general aviation users received a much higher share of common costs under the proportional method. As a result, the

[13]As long as the marginal costs of DOD's use are not passed on to other users and any additional common costs allocated to other users does not raise their cost share above their "stand-alone" level (what they would pay if they were the only system users), there would be no subsidy to DOD.

total cost assigned to general aviation increased by about 50 percent, and the total cost for commuter carriers increased by nearly 100 percent. If the proportional allocations were the basis for user fees, prices for the latter groups could be so high that their use of FAA's services would likely decline considerably. According to FAA, the development of user fees using other than the Ramsey-based method for the allocation of common costs could be expected to cause more significant shifts in consumption of its services because more costs would be allocated to the more price-sensitive users.

Regardless of which allocation method is used, DOD contends that the military should not bear any of FAA's common costs because DOD is only a marginal user of FAA's air traffic services and has a minor impact on FAA's cost structure. While it is clear that DOD consumes a small percentage of FAA's services, the same is true of other users such as air taxi operators. The exclusion of DOD or any minor user from the allocation of common costs would result in these other users' being allocated a larger share of total costs.

Inclusion of DOD's Costs

Another major issue to resolve is whether and to what extent DOD's costs of providing air traffic services to civil users should be included in the development of user fees. In essence, addressing this issue is part of a broader issue of whether the development of user fees should be designed to recover the total costs to the federal government or strictly FAA's costs. If DOD's costs are included, fees could be collected from civil users for the services provided by DOD, thereby providing an offset to what DOD may owe FAA.[14] DOD could even receive a net inflow of funds if its costs of providing civil ATC services exceed the costs it imposes on FAA. While DOD spends considerable amounts on air traffic services ($622 million in fiscal year 1995 alone), most of this expenditure goes to support the military mission, and only the portion of these costs that are related to providing services to civil users should be assigned to them.

According to the Statement of Federal Financial Accounting Standards number 4, federal agencies providing services to other agencies are

[14]If a decision is made to include DOD's costs in the development of user fees, a collection mechanism would be necessary. Establishing two separate collection systems—one for FAA and one for DOD—would not seem to be an appropriate use of federal resources. (See Office of Management and Budget Circular A-25, secs. 7(e) and (f)).

directed to account for all of the costs of providing those services.[15] Although DOD's services are provided directly to civil users rather than to FAA, this standard could be interpreted to mean that all air traffic services provided by FAA and DOD are required to be counted for the purposes of cost allocation for the development of user fees.

If DOD's costs are included, issues need to be addressed about which of DOD's costs to include and how its air traffic services should be valued:[16]

- One issue needing resolution is whether DOD's common costs of providing ATC services are considered relevant for the purpose of developing user fees. On the one hand, DOD's ATC infrastructure was designed and built primarily to support the Department's military mission, and according to DOD, the provision of ATC services to civil users is incidental to DOD's air traffic system. As a result, a policy decision could be made to pass on only the marginal costs of DOD's civil services to these users. On the other hand, DOD's system still handles nearly 4 million civil aircraft movements annually, which is 20 percent of DOD's total ATC workload. At many locations, the Department's services provided to civil users can be substantial.[17] Therefore, the decision could be made to allocate some of DOD's overhead or common costs to civil users since they do benefit from the entire military ATC infrastructure.
- A second issue to address is whether to value DOD's provision of air traffic services to civil users on the basis of the actual costs incurred by DOD or on the costs that FAA "avoids" because DOD provides these services in lieu of FAA. We believe that the most appropriate valuation of these services is based on the actual cost to DOD in providing them, rather than on FAA's avoided costs. Our reasoning is twofold. First, federal law establishes that the goal of user fees is generally to recoup the actual costs of a government agency's provision of services to users.[18] While other factors, such as the value of services to users, may influence the fees—for

[15]The Statement of Federal Financial Accounting Standards no. 4, Managerial Cost Accounting Concepts and Standards for the Federal Government, is effective for fiscal periods beginning after September 30, 1996. Under this standard, the full cost of a project is described as the sum of (1) the costs of resources consumed by the project that directly or indirectly contribute to the output and (2) the costs of identifiable supporting services provided by other organizations within the reporting entity and by other reporting entities.

[16]Although the inclusion of DOD's costs may be appropriate, it is important to note that the cost of undertaking the analysis necessary to include these costs may be viewed as high relative to the benefits to be derived.

[17]For example, at Eglin Air Force Base in Florida, civil traffic accounted for about a third of total aircraft movements.

[18]31 U.S.C. § 9701.

example, the value of services could be used to charge one group of users higher prices than another—user fees in the aggregate are usually designed to recoup only the actual costs. Second, it would be very difficult to identify FAA's avoided costs because it is questionable whether FAA would provide the same services to users if DOD was not providing them.[19]

- A third issue needing resolution is whether the costs of the military's satellite constellation—called the Global Positioning System (GPS)[20] —should be passed on to ATC users. This system provides a variety of navigation and other applications for military and other users, including pilots, truckers, and hikers. DOD contends that its GPS costs should be considered as part of its support of the NAS. However, the nature of GPS services makes it virtually impossible to measure who uses the system and assign costs to them. FAA contends that the costs to build the system are not relevant for allocating ATC costs because GPS was developed for military purposes. Nevertheless, FAA recognizes that DOD must modify the system to accommodate civil transportation needs, and the Department of Transportation (DOT) and DOD have negotiated a cost-sharing agreement to pay for the added costs. In our view, when future costs for GPS can be shown to specifically benefit civil aviation users or result from their use, it would be appropriate to include those added costs in undertaking a cost allocation. For example, some portion of the $371 million that DOD expects to spend on its Navigation Warfare (NAVWAR) project, which DOD must undertake to protect its military mission while accommodating civil use of GPS, should be included as part of the cost allocation. Of course, if any GPS costs are passed on to civil users, the Congress may choose to reduce DOD's appropriation for GPS by a commensurate amount.

Source of Funds to Pay Amounts That May Be Owed by DOD

A move to user fees would likely eliminate the general fund appropriation that FAA currently receives for a significant part of its budget. Under user financing, all users—including DOD—would be assigned a share of the costs of air traffic services. Policy issues are involved in deciding on a funding source for DOD's share if DOD is found to owe a payment to FAA. This payment could be funded in various ways.[21] One option is for these costs to be recovered from DOD itself as a user fee. In this case, DOD could

[19]FAA does have establishment criteria that provide some guidance on the types and levels of service that could be provided at the locations currently served by DOD.

[20]GPS is a satellite constellation developed by the military to support missions such as air, land, and sea navigation; missile guidance; search and rescue activities; and precision surveying. Currently, FAA is undertaking a major initiative to augment the GPS to enable civil aviation users to use it as a primary means for navigation and permit FAA to eventually replace the land-based systems now in place.

[21]If DOD's costs are included in the development of user fees, any payment that DOD owes FAA would be the net amount after factoring in fees collected from users of DOD's air traffic services.

be appropriated the additional funds to pay FAA or it could be required to absorb this cost out of its regular appropriation. Another option is that DOD would not pay user fees and that FAA would be provided with an appropriation from the general fund designed specifically to cover what DOD owed FAA. FAA and DOD have different views on how these various options would affect their missions and partnership in providing air traffic services.

DOD argues that its capability to perform its mission could be reduced if the Congress does not provide DOD with a compensatory increase to cover any payment it might owe to FAA. DOD has noted that nearly every activity in which the Department is engaged—including training, transporting troops and cargo, and testing weapons—requires using the airspace. Although DOD provides for many of its air traffic needs through its own facilities and personnel, FAA provides over 40 percent of the ATC services consumed by DOD. If DOD's funding is reduced or it does not receive additional funding to pay for these mission-critical services provided by FAA, it would have fewer resources available to carry out its other activities.

On the other hand, FAA officials expressed a concern that the agency's dependence on the appropriation process to pay for DOD's share could leave the agency at risk in future years of not getting the necessary funding. Since it is unlikely that FAA could deny service to military aircraft, FAA may be forced to pass DOD's costs on to other users. Such a circumstance would raise equity concerns among other users.

As for changes in the partnership between FAA and DOD, FAA concedes that some changes may result but does not foresee any fundamental changes that would affect the provision of ATC services. DOD foresees a change—a potentially dramatic change—in the nature of DOD's partnership with FAA if it is required to pay for FAA's services. DOD notes that the current partnership has evolved over nearly 40 years, has led to the provision of seamless ATC services, and is viewed by other nations as a model. In addition to the hundreds of agreements spelling out the formal aspects of the relationship, a fair amount of informal interchange, especially at the staff level, also takes place. Therefore, according to DOD, the result of putting the relationship on a businesslike basis—when FAA and DOD begin to weigh the cost and value of every interaction—could lead to a gradual unraveling of the very fabric of the partnership.

Conclusions

Financing FAA over the long term involves tough decisions. There are no easy answers, and policy issues will arise in deciding how the users of air traffic services will contribute to financing FAA. One key issue that policymakers will need to decide is whether all of the government's costs of air traffic services, including those borne by DOD, should be recouped from user fees. Our report discusses the data, conceptual, and policy issues at hand in determining (1) how cost allocations for ATC services should be made across user groups and (2) how any costs that may be assigned to DOD could be funded. These two issues are distinct. Even if it is decided as a matter of policy that DOD will not have to pay for the services from FAA that it uses, the Department should be included in the allocation process because the costs that it imposes on FAA are important to understand. This knowledge will help to ensure that, in the development of user fees, any directly assignable costs related to DOD's use of FAA's services are not passed on to commercial and other nonmilitary users.

Decisionmakers in the Congress and the administration will make policy judgments about cost allocation and the funding of DOD's assigned share. As a result, we did not consider it appropriate to suggest a particular allocation method, quantify DOD's share of ATC costs, or recommend a particular funding option. Therefore, this report contains no recommendations.

Agency Comments

On March 18, 1997, we provided a draft of this report to DOT, DOD, and FAA for review and comment. We met with officials from the Office of the Secretary of Transportation and FAA, including FAA's Director, Office of Aviation Policy and Plans. DOT and FAA officials stated that the report was balanced, professional, and insightful in discussing key issues that the National Civil Aviation Review Commission will be considering. They also provided a variety of detailed comments that have been incorporated in our final report as appropriate.

On March 31, DOD provided written comments. The Department stated that it believes strongly that it should not pay user fees because the DOD makes substantial contributions to the National Airspace System that outweigh the "marginal financial burden" that the Department imposes on the annual cost of FAA's operations. DOD stated that requiring the Department to pay fees runs the risk of adversely affecting defense readiness, aviation safety, and its partnership with FAA. Furthermore, DOD's comments, signed by the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence, expressed concern about several

aspects of our report. In particular, DOD stated that (1) the scope of the study was too narrow and that we seemed preoccupied with user fee determinations; (2) we did not accurately depict DOD's partnership with FAA in managing the NAS; and (3) we relied too heavily on a contractor's study, which used the Ramsey-based method for allocating common costs. DOD officials also provided a variety of specific comments.

We revised the report to respond to many of DOD's concerns. However, we disagree with DOD's contention that the report is very narrow in scope and that we were preoccupied with user fee determinations. It is important to note that section 274 of the Reauthorization Act, which contained the mandate for this review, directed that the issues surrounding user-based financing of FAA's budget be explored. In response, we examined a broad range of issues—data, conceptual, and policy—that would need to be considered before imposing user fees for air traffic services.

We believe the report provides significant information about the partnership between DOD and FAA in operating the National Airspace System. We emphasize that DOD is unlike other users in that it is a coprovider of air traffic services and makes large contributions to the National Airspace System. In both the background section of the letter as well as in appendix III, we provide information about the level of services provided by each agency.

Although DOD believes that we relied too heavily on the GRA, Inc., study, we believe it is the only detailed analysis of the cost allocation of air traffic services available. We reviewed this work and found it to be well constructed and a good starting point for our own analysis. Both the February 1997 Coopers and Lybrand report and an unpublished Arthur Andersen review found that the GRA, Inc., study provides an acceptable interim basis for the analysis of potential user fees. At the same time, our report raises several concerns about the study, including the application of Ramsey pricing for the allocation of common costs to DOD. Moreover, while the GRA, Inc., study focused on the recovery of FAA's costs, we raise the issue of whether DOD's costs in providing civil air traffic services should also be included in the development of user fees.

After considering FAA's and DOD's comments on our draft report, we provided a revised draft to FAA and DOD on April 17, 1997. On April 21, FAA's Director, Office of Aviation Policy and Plans, expressed concern that we had not adequately explained the implications of a policy decision to exclude DOD from a Ramsey-based allocation of common costs. We revised

the report to detail these implications—for example, a decision to exclude DOD would result in other users' being assigned a greater share of common costs. That same day, DOD provided us with written comments on the revised draft. The Department stated that the presentation of issues and uncertainties in our report was more comprehensive, even-handed, and clear. They continued to believe that Ramsey pricing is not an acceptable means for allocating common costs for air traffic services.

The complete text of DOD's April 21 and March 31 written comments and our response appear in appendix VI.

As directed by the 1996 Reauthorization Act, this report is being sent to the Administrator, FAA, and the Secretary of Defense. In addition, we are sending copies of this report to the Secretary of Transportation; the Director, Office of Management and Budget; and other interested parties. We will send copies to others upon request.

If you have questions, please call me at (202) 512-2834. Major contributors to this report are listed in appendix VII.

John H. Anderson, Jr.
Director, Transportation Issues

List of Recipients

The Honorable John McCain
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The Honorable Ernest F. Hollings
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The Honorable Slade Gorton
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The Honorable John J. Duncan, Jr.
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The Honorable Norman Y. Mineta
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Contents

Abbreviations

AFB	Air Force Base
AIMD	Accounting and Information Management Division
ATC	air traffic control
ARTCC	Air Route Traffic Control Center
ATS	air traffic services
DAFIS	Departmental Accounting and Financial Information System
DOD	Department of Defense
DOT	Department of Transportation
FAA	Federal Aviation Administration
FSS	Flight Service Stations
GPS	Global Positioning System
IFR	instrument flight rules
MOA	military operations area
NAS	National Airspace System
NAVWAR	Navigation Warfare
RCED	Resources, Community, and Economic Development
SUA	special-use airspace
TRACON	Terminal Radar Approach Control
VFR	visual flight rules

Users Have Raised Concerns About the Management of Special-Use Airspace

Within the National Airspace System (NAS), some airspace is designated for use by the Department of Defense (DOD) and other federal agencies to carry out special research, testing, training, and other activities. Nonparticipating aircraft—both civil and military—may be restricted from flying into such areas. Although special-use airspace (SUA) serves the important safety function of segregating hazardous or incompatible activity from non-participating aircraft, civil users have voiced concerns about whether SUA is being efficiently managed.

FAA Has Designated Six Categories of Special-Use Airspace

Special-use airspace is generally defined as airspace within the NAS where activities must be confined because of their nature, or where limitations may be imposed upon aircraft operations that are not a part of those activities. Although the majority of SUA is for military use, the Department of Energy, the National Aeronautics and Space Administration, and civilian, nongovernment users have designated airspace for their use. The Federal Aviation Administration (FAA) has six categories of SUA.

- Prohibited areas are designated when it is determined to be necessary to prohibit flight over a surface area in the interest of national security and welfare. No person may operate an aircraft within a prohibited area without the permission of the using agency. Examples of prohibited areas are the airspaces around the White House, the Capitol, and national monuments. There are nine prohibited areas, none of which are used by DOD.
- Restricted areas are designated when it is determined to be necessary to confine or segregate activities considered hazardous to nonparticipating aircraft. A restricted area is airspace within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Examples include the Department of Energy and its contractors' weapons, radiation, and laser-testing areas.
- Military operations areas (MOA) are established below 18,000 feet to separate and segregate certain nonhazardous military activities, such as air combat maneuvers, air intercepts, and acrobatics, from instrument flight rules (IFR) traffic and to identify for visual flight rules (VFR) traffic where these activities are conducted.[1] MOAs are established to contain military activities in airspace as free as practicable from nonparticipating aircraft. Officially, nonparticipating aircraft operating under VFR may fly through

[1]In general, a pilot flying under instrument flight rules is flying at a specific altitude, route, and time. To fly IFR, the pilot must file a flight plan and receive approval to operate from ATC personnel. Generally, a pilot flying under visual flight rules must observe minimum visibility requirements and is responsible for maintaining separation from other aircraft and objects.

the areas even if they are "active." No hazardous activities may take place in a MOA.

- Warning areas are designated over domestic or international waters that extend 3 nautical miles from the coast of the United States to contain activity that may be hazardous to nonparticipating aircraft. The purpose of such warning areas is to warn nonparticipating pilots of potential danger. Because international agreements do not prohibit flight in international airspace, no restriction on flight is imposed.
- Alert areas are used to inform pilots of specific areas where a high volume of pilot training or an unusual type of aeronautical activity is taking place. The activity within an alert area must be conducted in accordance with Federal Aviation Regulations, without waiver, and pilots of participating aircraft, as well as pilots transitting the area, are equally responsible for avoiding collisions. The establishment of alert areas does not impose any flight restrictions or special communication requirements. Examples of alert areas include areas around Miami, Florida, where heavy flight training takes place, and areas around McConnell Air Force Base (AFB) and Wichita, Kansas, where a high volume of air traffic exists associated with military training flights at McConnell AFB and with flight test aircraft transiting to and from Cessna, Beech, and Boeing manufacturing facilities.
- Controlled firing areas are established to provide a controlled environment for activities of short duration or that are capable of immediate suspension, which would otherwise be hazardous to aircraft. Users are responsible for terminating activities to protect nonparticipating aircraft. Examples of activities in this airspace are the firing of missiles and rockets and the disposal of ordnance.

The airspace under the first two categories—prohibited and restricted areas—can be designated or changed only through rulemaking action. Most SUA proposals are subject to (1) an aeronautical study by FAA, (2) an environmental impact analysis, and (3) public comment. FAA headquarters is the final approval authority for all SUA except controlled firing areas, which are approved at FAA's regional offices. Except for controlled firing areas, SUA is included on aeronautical charts so that pilots know of its location.

Special-Use Airspace Can Affect Civil Users

FAA has established a policy of joint use, meaning that when the military is not using it, special-use airspace is returned to the national airspace system for use by civil users. Notwithstanding this policy and the fact that special-use airspace is established to accommodate a specific military mission requirement, SUA can and does preclude civil use of the airspace.

Also, by its location, SUA can limit air traffic to and from a particular location. For example, congestion often occurs in the southern to central California area, particularly in the area around Edwards Air Force Base known as R2508 Complex, partly because of the location of the SUA and also because of other factors such as inclement weather.

In 1988, we examined FAA's and DOD's use and management of SUA and made recommendations aimed at improving the effectiveness of these efforts.[2] We found that FAA did not have adequate data to ensure the efficient and appropriate use of the airspace. Furthermore, even if such data existed, FAA had not established guidance for its regions to reduce or eliminate SUA that was inefficiently or inappropriately used. However, the management of SUA's use has improved since our 1988 report. FAA and DOD have worked together to develop procedures to re-route traffic through SUA on the East Coast when severe thunderstorms occur. Additionally, many letters of agreement between FAA and DOD contain provisions for FAA to gain access to SUA to accommodate emergency situations and/or peak traffic periods. In consideration of the congested airspace on the West Coast, DOD schedules its use of SUA around "push" times for aircraft departing the Los Angeles Basin eastbound. Furthermore, DOD has had a long-standing policy of returning SUA to the FAA when not in use.

Also in response to our 1988 report, FAA and DOD began to develop new systems to track the usage and enhance the management of SUA. However, both DOD and FAA have had difficulty in developing these systems, developing a common interface between the two systems, and making real-time information available to all civil users. While FAA, DOD, and industry officials have told us that the management of SUA has improved since the late 1980s and that the current policy of joint use of SUA is sound, these officials note that room for improvement exists. According to these officials, the real-time exchange of the information about when SUA is available for commercial use would lead to more efficient use of the airspace. DOD and others believe that it is FAA's role as manager of the nation's airspace to inform civil users about the status of SUA. While FAA does not disagree, it points out that the information on availability is not always provided by DOD. DOD, on the other hand, believes that it makes a concerted effort to turn back SUA to the FAA when not in use. Moreover, DOD indicates that, in many cases, attempts to return SUA when not in use are refused by the FAA. FAA officials told us that it may not accept the airspace if sufficient time is not available to adjust the flow of civil traffic.

[2]Airspace Use: FAA Needs to Improve Its Management of Special Use Airspace (GAO/RCED-88-147, Aug. 5, 1988).

SUA has become a much more urgent issue because of the aviation community's movement toward "free flight." Under a "free flight" operating concept, the users of the system would have more freedom to select preferred routes free of many of the current restrictions as long as such routes do not interfere with safety, capacity, and SUA airspace. In 1995, the RTCA Free Flight Task Force, a joint government/industry group, made several recommendations to improve civil aviation's use of SUA when the airspace is not being used by the military.[3] A key recommendation from the task force is the establishment of a "real-time" system to notify commercial users of the availability of SUA. FAA and airline officials told us that at a minimum, airlines need 2 hours' notice to take advantage of SUA.

The effective management of SUA is, in part, a function of the commitment and cooperation between DOD and FAA working together to resolve conflicting demands for access to airspace. Other important factors include communications capabilities between FAA and DOD agencies using the airspace and consultation with users in implementing procedures to improve the flow of information. One example of cooperation is the government/industry task force that is presently conducting an operational test at the R2508 Complex at Edwards AFB in California. The current trial being conducted at the R2508 complex is an outgrowth of a site visit in September 1996 when government and industry officials reviewed the information exchange between FAA and DOD and found it to be efficient. Now, representatives are exploring new procedures that may prove beneficial to civil users without disrupting DOD's activities. In particular, air carriers are seeking to streamline the approval of routing through the R2508 complex before take-off in both directions, particularly from the Bay Area going southeast. The results of this operational test and others that are planned could go a long way toward resolving civil users' concerns that the lack of real-time information about the availability of SUA inhibits the efficient use of the airspace.

[3]Final Report of the RTCA Task Force 3, Free Flight Implementation (Oct. 1995).

Objectives, Scope, and Methodology

To identify the issues related to the allocation and recovery of costs for ATC services, we analyzed the draft fiscal year 1995 cost allocation study prepared by GRA, Inc., for FAA and the DOD-supplied data on the Department's total contributions to the National Airspace System. We analyzed the study's findings and underlying assumptions. We met with contractor officials to discuss their econometric model (see app. V for a description of the cost allocation model).[1] For a further understanding of the application of Ramsey pricing, we consulted with leading economists who have written extensively about and/or applied Ramsey pricing in the context of production enterprises. We also consulted with DOD officials from the Office of the Executive Director, DOD Policy Board for Federal Aviation, and FAA's Acting Assistant Administrator for Policy, Planning, and International Aviation on the options for allocating and recovering DOD's cost of ATC services. We reviewed the congressional hearing record and consulted with staff from the House and Senate aviation subcommittees for background information on the issues related to cost allocation between FAA and DOD.

To identify the volume and total costs of ATC services, we obtained data on total aircraft movements from FAA's Office of Aviation Policy and DOD's Integrated Product Team for NAS Costs. Combined data for total ATC aircraft movements do not exist. FAA collects data on the traffic handled by FAA-operated and contractor-operated facilities, but it does not collect data on DOD-provided services. Furthermore, DOD does not routinely collect data on its ATC aircraft movements, and the officials had to request traffic counts and cost data from the individual services and component units. FAA's cost data were taken from the draft of FAA's 1995 cost allocation study prepared by GRA, Inc. We did not verify the service or cost data provided by FAA and DOD.

To identify opportunities to increase the efficiency of air traffic services between FAA and DOD, we consulted with subcommittee staff and met with officials from FAA's Offices of Air Traffic Airspace Management and Air Traffic Operations and DOD's Integrated Product Team for NAS Costs. We met with aviation industry representatives, including air traffic officials from the Air Transport Association, the Aircraft Owners and Pilots Association, and the National Business Aircraft Association to discuss the management of special-use airspace. We reviewed materials on special-use airspace prepared under the auspices of the RTCA free flight task force.

[1]The final report, A Cost Allocation study of FAA's FY 1995 Costs, was released on March 19, 1997.

We performed our review from November 1996 through March 1997 in accordance with generally accepted government auditing standards. The majority of our review was performed at FAA and DOD headquarters in Washington, D.C. To observe DOD's ATC aircraft movements, including the facilities and procedures related to special-use airspace, we visited three DOD facilities. These were the Patuxent Naval Air Station at Patuxent River, Maryland; McGuire Air Force Base in New Jersey; and Oceana Naval Air Station in Virginia Beach, Virginia. We did not visit any FAA facilities because the team performing the review was very familiar with FAA's operations and has toured numerous FAA facilities.

FAA and DOD Provide ATC Services

Since 1958, FAA and DOD have acted as partners in providing ATC services daily to thousands of civil and military users. In fiscal year 1995, FAA and DOD reported that they spent a combined total of $6.9 billion to provide these services.

FAA and DOD Jointly Operate the National Airspace System

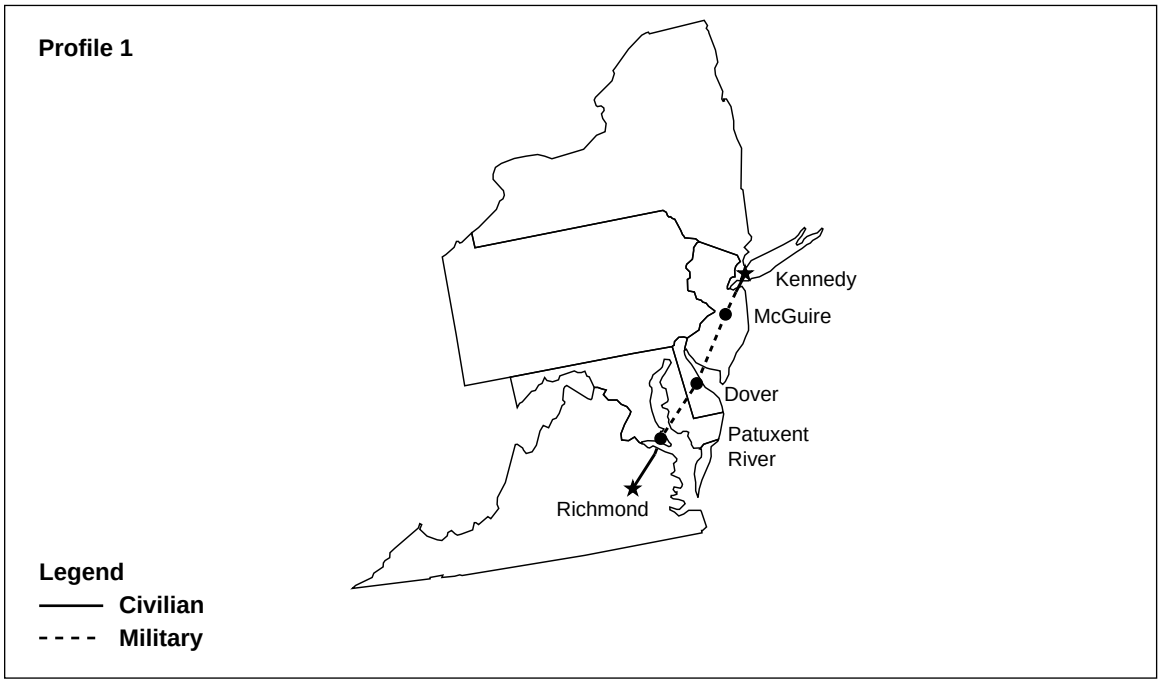
The ATC system is the principal component of the National Airspace System. It is through the ATC system that FAA and DOD provide services such as controlling take-offs and landings and managing the flow of traffic between airports. In addition to providing ATC services, they also cooperate in various other areas, such as air defense, drug interdiction, and weather research. The details of how FAA and DOD work together are embodied in joint manuals and hundreds of letters of agreements at both the national and regional levels.

In general, the types of services that FAA and DOD provide depend on a number of factors such as the specific user, destination, length of flight, and geographic location. Many users file a flight plan and receive instructions from ATC personnel on how to depart the airport and surrounding airspace and the necessary route to merge with the intended route of flight.[1] After the pilot receives an approved clearance from an airport tower, the flight begins with take-off and departure from the airport. Once airborne and clear of the immediate airport vicinity, the tower controller hands the aircraft over to a controller in the terminal radar approach control facility who is responsible for the specific airspace through which the flight will transit.

As the flight climbs, it will transition into en route airspace and be handed over to an air traffic controller in an en route center. Depending on the length of the flight, a particular aircraft can pass through several en route centers and be handled by many en route controllers. As the aircraft approaches the arrival airport, the process is reversed. The aircraft is passed from the last en route center to a terminal facility and finally to a tower for landing. Except for en route centers, which only FAA operates, a flight could be handled by a combination of FAA and DOD facilities and controllers. Because of the seamless nature of the system, the user may not be aware of who provided the service along the flight path. See figure 1 for examples of flights handled by military and civil ATC facilities.

[1]One exception may be a pilot flying under visual flight rules.

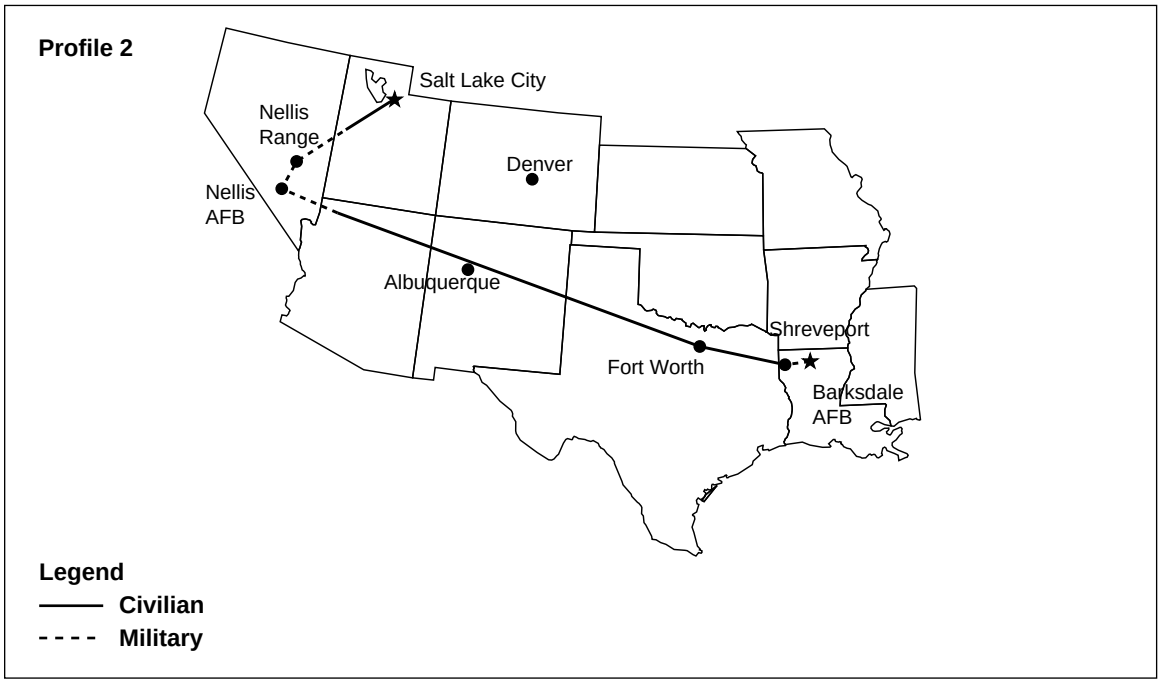
Figure 1: Depiction of Flights Through the NAS



Profile 1: A general aviation aircraft takes off from Richmond, Virginia, on a flight to Kennedy International Airport, New York. Shortly after take-off, it is handed off to approach control at the Naval Air Station, Patuxent River, Maryland; to the approach control at Dover Air Force Base, Delaware; to the approach control at McGuire AFB, New Jersey; and finally to the terminal radar approach control in New York. DOD estimates that approximately 80 percent of this flight receives service from military approach controls. While this example represents one route, mainly for low-altitude aircraft, FAA officials did note, however, that most commercial users and many general aviation users would receive services from FAA terminal and en route facilities because they would fly at higher altitudes.

Profile 2: A B-52 training mission takes off from Barksdale AFB, Louisiana, on a bomb/navigation training mission to Nellis AFB, Nevada. The flight to Nellis has the aircraft in contact with a variety of military and civil air traffic control facilities. Its take-off is controlled by Barksdale tower,

which hands off to approach control at Shreveport, Louisiana; to the en route center at Fort Worth, Texas; to the en route center at Albuquerque, New Mexico; to the en route center at Denver, Colorado; to approach control at Nellis AFB, Nevada; to range control at Nellis, Nevada; to a landing controlled by the tower at Salt Lake City, Utah.



In fiscal year 1995, FAA reported that it handled about 150 million aircraft movements, such as airport arrivals and departures. About 10 million, or 7 percent, of this total involved DOD aircraft. As shown in table 1, DOD reported that it handled 18 million aircraft movements. Civil aircraft accounted for about 4 million, or 20 percent, of the aircraft movements handled by DOD. The largest amount is provided to general aviation users by Air Force facilities.

Table 1: Military Traffic Counts, by Branch of Service and Category of User, 1995 (Tower and Radar Control Traffic Combined)

Numbers in thousands

	Air Force	Navy/Marines	Army	Total
Military	4,838	4,564	5,288	14,690
General aviation	1,752	613	584	2,949
Commercial aviation	395	252	116	763
Total civil aviation[a]	2,147	865	700	3,712
Grand total	**6,985**	**5,429**	**5,988**	**18,402**

[a]Total civil aviation is the sum of general aviation and commercial aviation.

Source: DOD's data.

We did not verify the data provided by FAA or DOD. For a number of years, FAA has collected and published data on air traffic activity generated by FAA-operated and contractor facilities.[2] FAA-generated data do not include any traffic handled by the military. For this review, we requested and received data from DOD on its air traffic operations. DOD does not routinely collect these data, and officials had to request this information from each of the services and component units. A more standardized collection process within DOD and between FAA and DOD would facilitate future analyses of costs and services.

FAA and DOD Collectively Spend Billions on Air Traffic Control Services

The FAA's entire mission is aviation-related; therefore, its entire budget may be attributed to the provision of mission activities. FAA is organized along lines of business, one of which is air traffic services. In fiscal year 1995, the total cost allocated to this line of business was $6.3 billion, which includes the operation and modernization of FAA's ATC system.

DOD's mission, on the other hand, is to provide for the nation's defense. Air traffic control, while important, is a very small part of DOD's overall budget. DOD maintains air traffic control facilities and trains its ATC personnel in order to facilitate troop and equipment deployment. For fiscal year 1995, DOD reported that it spent $622 million to provide air traffic services to itself and to civil users. Included in this amount are operating, modernization, and some research, development, test, and evaluation costs. DOD officials told us that although 20 percent of DOD's ATC workload is service to civil aircraft, it would be difficult to assign a specific cost to those services.

[2]See for example, FAA Air Traffic Activity Fiscal Year 1994, Office of Aviation Policy and Plans (FAA APO-95-11). FAA officials indicated that data for fiscal year 1995 will only be available electronically.

As with the traffic data, we did not verify the cost data. As we have previously noted, both FAA and DOD have limited ability to accumulate and report accurate and reliable costs.

Assessing Options for Allocating ATC Costs Involves Conceptual and Policy Issues

This appendix provides further discussion on several important conceptual and policy issues that need to be resolved in determining the allocation of ATC costs to DOD and other users. In particular, further details are provided on issues surrounding (1) the treatment of common costs and (2) the inclusion of DOD's costs of providing civil air traffic services in the allocation of air traffic costs to users.

Conceptual and Policy Issues Involved in the Allocation of Common Costs

A considerable percentage of FAA's costs are not directly associated with the use of the system by any particular user group. That is, many costs have been found to be common costs. These large common costs may, in part, result from FAA's current accounting practices, which do not provide detailed costing information. But at the same time, these common costs are also likely to be an outcome of the nature of producing FAA's services because the same facilities provide many different services for many different types of users.[1]

Large common costs render the task of determining the costs imposed by particular users difficult because of the lack of a direct cost-based assignment method. Assumptions and judgments must be made in order to allocate these costs. Because considerable judgment is involved, different user groups often will have significantly diverging opinions about how cost allocation should be done.

[1]In fact, other production processes, such as telecommunications or electric utilities, that are characterized by large facilities costs and low marginal costs also tend to have high common costs that are not attributable to any particular user. The new accounting system that is being developed for FAA may help to provide more detailed cost information that will reduce the measured common costs. However, to the extent that common costs are more related to the production process itself, accurate cost data may only go so far in reducing the level of common costs.

Recent Cost Allocation Study Allocates Common Costs on the Basis of Users' Willingness to Pay for Services

FAA has undertaken several analyses of the costs that various users of its services impose on the air traffic system. FAA contracted with GRA, Inc., for the most recent cost allocation study. GRA used data on FAA's 1995 obligations[2] to allocate the budget over 12 user groups, one of which is DOD (see app. V for a more detailed discussion of the GRA cost allocation model).[3]

To undertake the cost allocation, GRA first determined what components of FAA's 1995 total obligations of $8.6 billion[4] could be directly assigned to specific user groups—that is, what costs could be directly traced to the use by each group. Only 45 percent of the total obligations could be allocated to users in this fashion, leaving the remaining 55 percent—approximately $4.8 billion—as the sum of common costs.

In order to assign the common costs to specific user groups, the GRA analysts employed a commonly used method known as Ramsey pricing. In particular, this method relies on measures of users' sensitivity to price changes—known as elasticities of demand—to set prices across user groups. In this context, the Ramsey-based method assigns more common costs to users who will not change their consumption of the service much in response to a price increase and assigns less common costs to users who would reduce their consumption of the service considerably in response to such an increase. The Ramsey-based method is often used in such industries as telecommunications and electricity that, like ATC services, have large facilities and overhead costs and low marginal costs of production. These circumstances will lead to an inability to price services at marginal costs because such pricing will not cover all costs. By setting prices according to the Ramsey rule, the least possible distortion in economic efficiency is caused while total costs are recouped through prices or fees.

[2]Obligations are definite commitments that create a legal liability of the federal government for the payment of appropriated funds for goods and services ordered or received.

[3]Many assumptions were made in performing this analysis. For example, the goal of the study was to allocate FAA's entire budget to direct users of FAA's services. Therefore, the costs of air traffic as well as other FAA services, such as Airport Improvement Program grants, were included. Coopers and Lybrand, in its recent report, noted that the categories of users to whom final costs are attributable should be broadened to include—in addition to air traffic system users—those who use and/or benefit from FAA's other services. Also, because the actual cost data were not available, obligations were used instead on the assumption that obligations are a reasonably good indicator of the government's resource commitments in a given year. Although obligation data do not represent the true cost of activities in any one period, over the long term, these two measures will tend to be close.

[4]The 1995 fiscal year budget was actually $8.7 billion, but some small accounts were excluded from the allocation study and only $8.6 billion was allocated. For simplicity, we refer to the 1995 budget as being $8.6 billion throughout this report.

With little available information about how the 12 user groups would respond to price changes, the GRA analysts made what may be considered a "neutral" assumption: If the cost of flying a flight rises by 10 percent, a user will fly 10 percent fewer flights.[5] This assumption was used for 11 of the 12 user categories; an assumption of a greater price sensitivity for general aviation piston users was used.[6]

GRA found that DOD imposed just over $100 million, or about 2.6 percent, of the directly assignable FAA costs. However, as explained in footnote 5, because DOD was treated as a user that would, in effect, be relatively insensitive to price increases, it was allocated $428 million, or 9 percent of the common costs. Table IV.1 shows GRA's allocation of directly assignable, common, and total costs for the user groups.

[5]Although this model maximizes consumer well-being over the number of flights each user group is taking, the component of flight costs that is being adjusted through the model is only the air traffic costs—one component of flight costs that includes many components, such as fuel, crew, and so forth. Therefore, for a given user group, the smaller the share of total costs that are due to air traffic costs, the less total flight costs will change from a given change in air traffic costs. In essence, an implied elasticity of demand for air traffic costs is being measured within the model on the basis of the relative share of total costs that air traffic costs represent. The costs of flying military aircraft are high, and the cost of air traffic services makes up a small percentage of the total costs of flying. As such, the implied elasticity of demand for the military that is used in the model is smaller than for most other user groups.

[6]According to information from several studies, all user groups except general aviation piston users were assigned an elasticity of demand of –1 for flights. On the assumption that general aviation piston users are more sensitive to price changes, this category of users was assigned an elasticity of demand of –1.5—meaning that a 10-percent increase in flight costs will lead to a 15-percent decline in flights taken by these users.

Table IV.1: GRA's Allocation of Directly Assignable, Common, and Total Costs to User Types Under Ramsey Pricing, Fiscal Year 1995

Dollars in millions

User type	Directly assignable costs	Common costs assigned by Ramsey-based method	Total costs assigned[a]
Domestic jet carrier	$1,972	$2,644	$4,616
Charter	46	102	148
Cargo	243	488	731
International	199	328	527
Commuter	472	202	674
Air taxi	183	88	271
General aviation	622	385	1,007
Military	102	428	530
Other public user	23	19	42
Overflights	13	77	90
Total costs[a]	**$3,875**	**$4,761**	**$8,634**

Note: Over $1 billion of directly allocable costs for domestic jet carriers is for Airport Improvement Program grants to airports. Because grants are based on enplanements, and most enplanements are for jet commercial flights, most of these funds were allocated to the domestic jet carrier users. The high level of common costs allocated to DOD results from how the Ramsey-based method assigns those costs. In particular, because ATC costs are minor in terms of DOD's total flight costs, the agency's sensitivity to price changes for ATC services is calculated to be less than most other groups'. These differential flight costs are due, in part, to DOD's longer average flight distance.

[a]Columns and rows may not add due to rounding.

Source: Cost Allocation Study of FAA's FY 1995 Costs, prepared by GRA, Inc., for FAA, Mar. 19, 1997.

FAA officials told us that they do not believe that justification exists for treating DOD differently than any other user group in the cost allocation analysis. They noted that although DOD's use of the system is relatively minor, its requirements create significant costs in areas such as the coordination of military airspace and FAA-controlled airspace. Additionally, FAA officials told us that certain aspects of the current infrastructure, such as equipment to allow DOD to operate in all weather conditions, are necessary for DOD to perform its mission and that FAA's entire infrastructure could become a part of DOD during a national emergency. Therefore, although civil traffic uses most of the ATC services, the ATC system also serves a national security function. Finally, FAA officials also noted that every group that uses FAA's services—except the domestic jet carriers—could make the argument that its use imposes only marginal

costs on FAA. Accepting this reasoning would result in all of the common costs being assigned to and recovered from domestic jet carriers.

DOD officials told us they do not believe that DOD should be assigned any of FAA's common costs. In particular, they told us that DOD is a marginal user of FAA's system and its use has a minimal impact on FAA's infrastructure. DOD officials do not believe that it is appropriate for DOD to be assigned the costs of a system infrastructure that was put into place to meet commercial needs.

DOD officials also noted that they were concerned about the use of the Ramsey-based method to allocate common costs. They noted that this method assigned common costs on the basis of users' willingness to pay rather than why those costs are incurred. They stated that despite the fact that FAA's basic infrastructure is in place for the needs of commercial users and that DOD itself imposes none of these costs, DOD is still assigned a share of common costs because of the nature of this method.

We found that the high level of common costs of providing air traffic services makes an assessment of cost allocations across users fundamentally difficult and subject to considerable judgment. In particular, if cost allocations are to be the basis for user fees, the general criteria for developing such fees require the consideration of the costs to the government, the benefits to the service's recipient, and the consideration of public policy goals,[7] such as economic efficiency, equity, and ease of administration.[8] Additional considerations involve the allocation of ATC costs to DOD. Our analysis focused on (1) whether Ramsey pricing can be relied upon to provide economically efficient pricing in this case, (2) whether including DOD as a user group in a Ramsey model poses particular concerns, (3) how alternative allocations would assign common costs, and (4) the implications of assigning to DOD only the marginal costs of its use.

[7]31 U.S.C. § 9701.

[8]The recent Coopers and Lybrand report notes that if the FAA is required to adopt a comprehensive system of user fees, two additional steps should be undertaken prior to the implementation of such a system. First, FAA's products and services should be defined with greater precision, and second, a modern cost-accounting system should be implemented to more reliably assign costs to specific products and services.

Ramsey Pricing and Economic Efficiency

Although a variety of methods can be used to allocate common costs for the purposes of cost recovery, the Ramsey-based method will cause the least possible distortion from economic efficiency[9] while allowing the total costs of providing the service to be recouped through fees or prices. The smaller the common costs that are being allocated via the Ramsey rule, the more confidence that can be placed in the results leading to the most economically efficient outcome. In the case of FAA costs, the large common costs, in combination with the lack of information on users' demand elasticities, raises concerns about the level of confidence that can be placed in the Ramsey-based method to provide the most economically efficient result.

In particular, because the high level of common costs makes the Ramsey-based method have more influence in the final cost allocations, the need for precise elasticities becomes of greater concern. At our request, and with FAA's permission, GRA used alternative elasticities in their Ramsey allocations in order to examine the sensitivity of the results to these changes. The information provided by GRA shows that under alternative assumptions about how two user groups will respond to price changes, the allocation of common costs can be very different (see table IV.2). The results indicate that the combination of large common costs with imprecise measures of price sensitivity pose problems for the application of the Ramsey pricing method.[10]

Table IV.2: Changes in Common Cost Allocations Due to Alternative Elasticities of Demand, Fiscal Year 1995

Dollars in millions

	Common costs		
User group	GRA's base case	Military is less price sensitive	Air carriers are less price sensitive
Air Carriers	$2,643	$2,374	$3,114
Military	$428	$835	$261
All others	$1,691	$1,554	$1,388

Note: In the base case, both the military and air carriers are assigned an elasticity of demand of –1. In each of the other cases, the group assumed to be less price sensitive is assigned an elasticity of –0.5, while the other group is still assigned an elasticity of –1.

Source: GRA, Inc.'s analysis for GAO.

[9]That is, the Ramsey-based method provides that prices are set in a manner that minimizes the economic distortion from what would occur under marginal cost pricing. Thus, it provides for the most allocatively efficient level of service.

[10]The elasticity changes employed in these sensitivity analyses were reasonably large: 50-percent reductions in each case.

Inclusion of DOD as a User Group in Ramsey Model

While commercial users' elasticities are tied to the willingness of their customers to pay for the passenger travel, cargo, and other services they are being provided, the "customers" of the military are U.S. citizens who do not directly have the option to make different decisions about military operations in response to a price change. Assigning the DOD a share of common costs through the Ramsey-based method requires assigning to them an elasticity of demand.

The application of Ramsey pricing will likely assign considerable common costs to DOD because the Department, in performing its mission, would have little discretion to reduce its use of air traffic services in response to higher prices. A policy decision could be made, based on a concern about the Department's national defense mission, to exclude DOD from a Ramsey-based allocation. [11] However, such a decision would have implications for other policy goals, such as the promotion of equity across user groups and economic efficiency. In particular, because it results in non-military users being allocated a greater share of costs, the exclusion of DOD from a Ramsey-based allocation may be viewed as unfair and may diminish those users' support for user fees. Also, excluding DOD (or any user group) would lead to a less economically efficient set of prices than a full application of the Ramsey-based method. Ultimately, various policy goals—including economic efficiency, equity across user groups, and protecting DOD's national defense mission—need to be weighed in deciding how to allocate common costs among users.

Allocation of Common Costs Based on Proportional Allocation

In order to examine how cost allocations would vary under an alternative approach, we asked GRA to provide us with an allocation of common costs based on a proportional markup for all user groups. Such an allocation may have an appeal based on "fairness" since each group is receiving a share of the common costs that is a proportional increase over the marginal costs of the services they receive. These results are provided in table IV.3.

[11] See FN 38.

Table IV.3: GRA's Allocation of Directly Assignable, Common, and Total Costs to User Types Under Proportional Assignment of Common Cost, Fiscal Year 1995

Dollars in millions

User type	Directly assignable costs	Common costs assigned	Total costs assigned[a]
Domestic jet carrier	$1,972	$2,059	$4,031
Charter	46	58	104
Cargo	243	341	584
International	199	165	364
Commuter	472	833	1,305
Air taxi	183	231	414
General aviation	622	885	1,507
Military	102	128	230
Other public user	23	32	55
Overflights	13	32	45
Total costs[a]	**$3,875**	**$4,764**	**$8,639**

Note: Over $1 billion of directly allocable costs for domestic jet carriers is for Airport Improvement Program grants to airports. Because grants are based on enplanements, and most enplanements are for jet commercial flights, most of these funds were allocated to the domestic jet carrier users. The high level of common costs allocated to DOD results from how the Ramsey-based method assigns those costs. In particular, because ATC costs are minor in terms of DOD's total flight costs, the agency's sensitivity to price changes for ATC services is calculated to be less than most other groups'. These differential flight costs are due, in part, to DOD's longer average flight distance.

[a]Columns and rows may not add due to rounding.

Source: GRA, Inc.'s analysis for GAO.

Compared to the original Ramsey-based allocation, common costs are assigned very differently under a proportional assignment. Under the Ramsey-based method, the total allocation was $4,616 million for domestic jet carriers and $530 million for DOD. Under the proportional allocation method, these user groups' total allocations were $4,031 million and $230 million, respectively. Commuter aviation and general aviation piston users would be allocated higher levels of common cost. As a result, these users' demands for FAA's services could decline considerably. Therefore, while a proportional allocation provides a useful tool for understanding how costs would be assigned under another method, this method may result in prohibitive prices for some users.

Implications of Charging DOD Only Marginal Costs of Use

Assigning large amounts of common costs to users may require making judgments and policy decisions about why the air traffic system looks as it does, which users' requirements influenced the system's present structure, and how the system is "stressed" by various users.[12] If policymakers believe that most aspects of the current infrastructure of the ATC system can be attributable to satisfying certain commercial users' needs, despite the inability to measure this on the basis of direct cost assignments, it may be appropriate to assign DOD minimal common costs.

At the same time, while DOD is indeed a small user of FAA's services, other user groups could make the argument: Their use is minimal and imposes only marginal costs on FAA. Thus, it would be difficult to justify an acceptance of this argument for DOD only. Ultimately, however, policy considerations, such as the desire to support DOD's national defense mission, may exist for excluding DOD from being assigned some common costs. If such a determination is made, equity concerns would require that the marginal costs of DOD's use of FAA's services not be passed onto other users.

Issues Need to Be Addressed About Whether DOD's Costs of Providing Air Traffic Services to Civil Users Should Be Assigned to Those Users to Offset What Costs DOD May Owe FAA

Allocating air traffic costs to the military or other user groups by using only FAA's costs provides an incomplete representation of total system costs. Because DOD also provides services to civil, public, and other federal users as well as military users, the larger issue of what the U.S. government spends in providing air traffic services to civil and nonmilitary users may be a more appropriate focus. If DOD's costs are included in allocating costs for the development of user fees, any payment owed by DOD will be offset by fees collected from other users for the services provided by DOD. Under the new Statement of Federal Financial Accounting Standards no. 4, a reporting entity is required to accumulate and report the cost of its activities for management reporting purposes. Although DOD's civil services are provided directly to users rather than to the FAA, the new accounting standard could be interpreted to mean that

[12]Because of data limitations, the GRA study did not account for how different users stress the system in terms of their use during peak time periods or within congested areas. This might be of particular concern in terms of the military because, we were told, they tend not to fly into some of the most congested air traffic areas. Similarly, military officials told us that DOD's concentration of flights during the day does not match the peak timing of commercial flights. This would imply that DOD may stress the system less than commercial traffic, for which congestion issues are key. On the other hand, a military presence in some remote locations might require FAA's facilities to be located in areas where they otherwise might not be. Also, the location of special-use airspace near congested areas may exacerbate congestion among commercial users of FAA-controlled airspace, even if DOD itself does not fly much into the FAA-controlled airspace in that region. In short, the influences of congestion and peak time-of-day usage are not easily determined.

these services are required to be included as part of the total systems' costs of air traffic services.

FAA Contends That DOD Provides Civil Services Directly to Users

FAA officials told us that they undertook a cost analysis based on the congressional and administrative directive to begin the process of allocating and recovering their budget. These officials do not believe that the costs of the services provided by DOD to civil users are relevant for such an analysis. In particular, these officials told us that the recovery of DOD's civil air traffic costs is a matter separate from FAA's budget allocation and recovery.[14] Furthermore, FAA officials stated that if DOD's costs are included, the costs of the Global Positioning System should not be passed on to civil air traffic users because (1) the system was primarily developed for military purposes and (2) the benefits of GPS that are enjoyed by civil users make its financing through taxes (rather than user fees) appropriate. Moreover, they noted that the costs for FAA's augmentation to GPS, which will provide benefits more directly related to aviation, will, in fact, be passed on to users through fees.

DOD Believes That It Makes a Large Contribution to the NAS

DOD officials told us that the Department should not have to pay for any of the FAA-provided ATC services it uses because these costs are more than offset by DOD's large contribution to the NAS and provision of services to civil users. In particular, they noted that approximately 20 percent of DOD's total ATC services are provided to civil users. Officials also noted that while the actual cost to DOD of handling this traffic may be small, its efforts save the FAA considerable costs because DOD's salary structure is much lower than FAA's. DOD officials also noted that FAA radars are sited on DOD bases, thereby saving FAA the cost of locating the radars on private land. Furthermore, DOD officials also told us that the Department's development and implementation of GPS, on which it will have spent $9.8 billion in fiscal 1997 and prior years, provides large benefits to FAA and its users. DOD officials claim that billions of dollars will be spent on GPS in the coming years and that this system will have saved the FAA the cost of such a satellite navigation system. DOD officials also noted that many other aspects of their operations are important to the NAS.

[14]If a decision is made to recover DOD's costs of providing ATC services, a collection mechanism would be necessary. Establishing two separate collection systems would not seem to be an appropriate use of federal resources. Furthermore, the potential added cost to system users of two collection mechanisms must also be considered. (See Office of Management and Budget Circular A-25, secs. 7(e) and (f)). Regardless of the collection mechanism, both DOD and FAA currently are limited in their capabilities to collect accurate cost data.

GAO's Analysis of the Military Cost of Air Traffic Services

If the policy decision is made to recoup all of the government's costs of ATC services through user fees, the costs of DOD's services to civil users should be included. Theoretically, DOD could receive a net inflow of funds if the receipts it is owed for the civilian traffic it handles exceed its assigned cost burden on FAA. However, not all of DOD's contributions to the NAS may be relevant for the development of user fees for civilian services. In this connection, several issues about how to measure and value these services need to be addressed such as (1) whether civil users should bear any costs beyond the marginal costs of their use of DOD's services, (2) whether these services should be valued at what it cost DOD to provide them or at what DOD's providing the service "saved" FAA, and (3) whether other costs, most notably those for GPS, should be passed onto civil users.[15]

- Because DOD officials told us that DOD's air traffic operations are geared primarily toward military operations and that any civil traffic handled is largely a by-product of that system, the additional costs DOD may incur to handle civil traffic may be incidental.[16] As a result, it may be appropriate to pass on to these users only the marginal costs of DOD's civil services. On the other hand, DOD's system still handles nearly four million civil aircraft movements annually, which is 20 percent of DOD's workload. Therefore, a policy decision could be made to allocate some of DOD's overhead or common costs to civil users, since they benefit from the entire military infrastructure.
- For two reasons, we do not believe that valuing DOD's provision of civil services at the costs "avoided" by FAA is appropriate. First, when government agencies determine the costs of a service provided to users, the focus is generally on recouping the government's aggregate cost, not on the economic value of those services to users.[17] For example, in connection with the siting of FAA's radars on DOD bases, we believe that because no additional costs to the federal government are incurred, FAA's "avoided" costs would not be relevant. Second, it would be very difficult to measure "avoided" costs. One could try to determine what FAA would have spent to provide those services if DOD had never provided them, or what costs FAA would incur to begin providing those services if DOD ceased

[15]The cost of undertaking the analysis necessary to include DOD's costs may be viewed as high relative to the benefit to be derived.

[16]For example, because the military uses UHF radio frequencies for communication and civilians use VHF, military air traffic installations need to be equipped with VHF communications equipment.

[17]Although the value of services to users may also be factored into user fees, particularly in determining different fees for different users, the goal of user fees is generally to recoup the government's total aggregate cost.

providing them. However, using the types and levels of service currently provided by DOD as a starting point may bias such an analysis because it is unknown whether FAA, if faced with DOD's withdrawal of service, would choose to provide the same level of service to these users or what the costs of the services they provide would be.[18]

- While there is no doubt that GPS will have large benefits for air traffic users, this system was developed for military purposes, and DOD officials told us that very little of its design and operation to date was modified for civil users' needs.[19] Also, it would be difficult, if not impossible, to determine how much of its costs should be allocated to civil air traffic users.[20] GPS now has a variety of civil applications, such as tracking the locations of trucks and boats, in addition to air navigation. There is no direct mechanism for measuring who uses the system, and it would be inappropriate for air traffic users to be assigned the costs for services received by others. As a result, it may not be feasible to allocate any of DOD's GPS expenditures to civil air traffic users. However, when future costs for GPS can be shown to specifically benefit civil aviation users or result from their use, it would be appropriate to include those added costs if a cost allocation is undertaken. For example, some portion of the $371 million that DOD expects to spend on its Navigation Warfare (NAVWAR) project, which DOD must undertake to protect its military mission while accommodating civil use of GPS, could be included as part of the cost allocation.

[18]FAA does, however, maintain establishment criteria that provide some guidance on the nature of service that would be provided at locations currently served by DOD.

[19]They did note, however, that more costs in the future will be related to the nature of civilian use.

[20]Two recent reports on GPS support the conclusion that it would be difficult or nearly impossible to calculate user fees for GPS use. See The Global Positioning System: Charting the Future by a panel of the National Academy of Public Administration (May 1995) and The Global Positioning System: Assessing National Policies by RAND (May 1996). In particular, the National Academy's report stated that "it is impossible to calculate the amount of an 'equitable' user charge, given current and likely available data; it is not even technically possible to determine who uses the GPS signal or how much they use it."

Overview of GRA's Model of Cost Allocation

This appendix describes FAA's most recent cost-allocation study, which was developed by GRA, Inc. (formerly Gellman Research Associates). That study was designed to assess the costs that various users of FAA's services impose on the system and to allocate to each user group an appropriate share of FAA's total fiscal year 1995 obligations. Because the nature of the process in which air traffic and related services are produced, many of FAA's costs are not clearly attributable to any particular user group. Thus, a key focus of the study is determining what costs are assignable to particular users and developing a method whereby nonassignable or "common" costs are allocated. In this study, a Ramsey pricing method is used in which common costs are assigned on the basis of how sensitive the user groups are to changes in the price of the service.

This appendix (1) describes the lines of business and the user groups to which FAA's costs are to be assigned, (2) describes the data sources and assignments of costs to FAA's lines of business, (3) describes how costs from all non-air-traffic lines of business are assigned to particular user groups, (4) provides an overview of the econometric model developed to estimate the air traffic costs that are attributable to particular users, and (5) outlines the application of the Ramsey-based method.

Definitions of "Line of Business" and "User Group"

GRA first assigned all of FAA's costs to the lines of business produced by the agency and then to specific user groups within those lines of business. In order to do so, both lines of business and the set of users were defined.

According to FAA, the agency provides services within seven lines of business. However, because two of the seven represented services that certain parts of FAA perform for internal customers, the costs for these lines of business were reallocated to the remaining five, which represented the production of "outputs," or services, to external customers. The five lines of business include Air Traffic Services (ATS), Aviation Regulation and Certification, Civil Aviation Security, Airport Development, and Commercial Space. A sizable majority of FAA's costs were devoted to the provision of air traffic services.

Four major user groups are used for the study, three of which have subgroups. In total, the GRA study uses 12 user classifications.[1] The goal of

[1]While the lines-of-business classifications were derived directly from FAA's data sources, the decision about user groups was not straightforward. Some entities that may use or benefit from FAA's services are not directly included. For example, aircraft manufacturers may be considered a user, or the public at large, which benefits from aviation safety. For the purposes of this study, users were defined as those who are flying planes and thereby using FAA's services.

the GRA model is to allocate all of FAA's fiscal year 1995 budget to these 12 user groups. The classifications are as follows:

1. Commercial users, including

- domestic jet flights, charter flights, cargo flights, international flights, commuter flights, and air taxi flights.

2. General aviation, including

- general aviation piston flights, general aviation turbine flights, and rotocraft flights.

3. Public users, including

- military flights and other public flights.

4. Overflights.[2]

Data Sources and Assignment of Costs to Lines of Business

All data for the GRA study were obtained from FAA data sources. The primary data on costs were derived from FAA's Departmental Accounting Financial Information System (DAFIS). DAFIS provided detailed information on obligations within four major categories (Operations; Facilities and Equipment; Research, Engineering, and Development; and Airport Improvement Program) and also contained more detailed information that enabled GRA to assign specific costs in various ways. Information for the 1995 study used the DAFIS information on fiscal year 1995 obligations except for certain categories of capital costs for which average levels of obligations over a longer period of time were used in order to more appropriately deal with the costs of items that will have productive capacity over a period of time.[3]

To start, GRA used the DAFIS information to assign obligations to "tiers," or geographic levels at which FAA's obligations were classified. Costs were assigned to a total of five tiers. Tiers 1-3 represented the costs that were obligated to headquarters or other national FAA programs, while tiers 4 and

[2]Overflights originate and terminate within foreign countries but pass through U.S. airspace along their route.

[3]FAA does not have a standard cost accounting system from which depreciation can be used as a measure of the portion of accumulated capital costs that are "spent" towards production in a given year. In the method used here, the average costs for the capital categories over several years are used to provide a proxy for costs over a period of time.

5 were the costs for regional and field facilities, such as en route centers, towers, and so forth. Field facilities, the tier 5 costs, accounted for the largest percentage of total costs—$3.2 billion of FAA's total budget of $8.6 billion for fiscal year 1995.

After these geographical assignments were made, GRA divided the costs at each tier into costs within specific lines of business. For tiers 1-4, these allocations could be made by using other information available from FAA that would indicate what the costs were at various locations. Similarly, some tier costs were allocated to lines of business through the use of some activity measures of functions performed. For tier 5 facilities, the DAFIS information usually indicated how the costs should be assigned to lines of business. For example, the cost of an en route center would be assigned to the air traffic line of business, while the cost of an aircraft certification office would be assigned to aviation regulation and certification. In the final allocations, $6.3 billion of FAA's total fiscal year 1995 budget of $8.6 billion was assigned to air traffic services.

Allocation of Costs to Users for Non-Air-Traffic Services

GRA attempted to assign to users the costs that their use imposed on FAA. In general, various workload measures were used to assign some of these costs across the 12 user categories. For example, the data on work hours for airline certification were used to allocate certification costs across user groups. Although direct assignments using workload measures were made, considerable costs in these lines of business were not directly assignable to any user group. Of the $2.3 billion dollars in these four lines of business, GRA was able to directly allocate only $1.6 billion. However, the remaining $700 million is common to the provision of these services across all user groups and could not be specifically assigned to any user type. These costs are allocated via the Ramsey-based method at the last step in the model.

Overview of Econometric Model for Costs of Air Traffic Services

In order to estimate the costs imposed by a particular user type at particular types of air traffic facilities, an econometric model was used to estimate the marginal costs of providing services to each of the 12 user groups at each type of facility. The theory underlying this method is that given the data available on the costs and services provided at FAA's facilities across the entire country, one could estimate the cost imposed by additional services provided to particular users through a cross-sectional model that relates outputs for various users to the total costs at each

facility. This calculation would provide estimates of the marginal costs imposed by each kind of user in each kind of facility.

Much of the costs that fed into this part of the allocation model were from tier 5, which had costs broken out by individual facilities, but some costs from each of the other tiers could also be assigned to particular facilities. Although a total of $6.3 billion is assigned to the air traffic line of business, only $3.8 billion of that cost is analyzed in the econometric model. This occurred because only the costs that could be directly attributed to particular facilities could be analyzed in this fashion.

In order to develop the model, activity data are used for each type of site to measure the proportion of site activities provided to each user group. The measure of activity varies across the types of sites: For ARTCCs, the measure is departures and overflights; for TRACONs, the measure is primary operations, secondary operations, and overflights; for FSSs,[4] the measures are contacts and advisories. There are separate regression models for each type of facility. For example, one regression is for TRACONs (35 observations), another for radar towers (150 observations), and so forth.

The models are specified as linear equations where:

$$TC_j = a + b_1 + b_2 ... + MC_1Q_1 + MC_2Q_2 + \ldots$$

where j is a particular location for a particular kind of FAA facility, the Q's are the level of services provided to a particular type of user,[5] and the b's are other characteristics of particular facilities that need to be controlled for because they may affect the cost of one facility as compared with another.[6] The results will provide a coefficient which is the measure of marginal cost for a particular user group at a particular kind of FAA facility. The constant, a, is a measure of the fixed costs of that type of site that cannot be allocated across user groups at the site.

The model's results were generally very significant. In most cases, the marginal cost of handling one type of user was not different from the marginal cost of handling a different type of user. For example, for the regression for domestic en route centers, the fixed cost, as measured by

[4]ARTCCs, FSSs and TRACONs are names of different kinds of FAA air traffic facilities.

[5]That is, Q_1 might be the number of operations performed for domestic jet carriers, while Q_2 is the number of operations performed for cargo carriers.

[6]For example, in some models a dummy variable was included if the facility was located in Alaska because the costs of services are systematically higher in that location.

the constant term, was found to be $32 million per facility, and the marginal cost of a departure (for any type of user) was found to be $52. For flight service stations, the marginal costs were found to differ for different kinds of services, such as pilot briefs ($8 each) and air contacts ($4 each). The model's results indicate that of the $3.8 billion attributable to specific facilities, $2.2 billion was accounted for in the marginal cost assignable to particular user groups and the $1.6 billion in site costs was the fixed costs of the facilities that were not assignable to any particular user. These site fixed costs are allocated via the Ramsey pricing method as the last step of this study.

Allocation of Common and Fixed Costs to User Groups: Ramsey-Based Method

After the attributable costs for the five lines of business are assigned to user groups, a large portion of FAA's total costs are not assigned. These are costs that are either common in the provision of services across many users, or the fixed costs of some facility (which are also common among various users at that facility). Thus, they cannot be directly attributed to any particular user. According to the GRA model, common and fixed costs account for more than half of FAA's fiscal year 1995 budget. Only $1.6 billion of non-ATS costs was assignable to users, and the econometric model for the ATS costs leads to the assignment of an additional $2.2 billion in the marginal costs of using various facilities. This leaves $4.8 billion, or approximately 55 percent, of the total $8.6 billion fiscal year budget to be allocated as common costs.

When common and/or fixed costs are large, charging the users the marginal costs of their use (which would be most efficient from an economic standpoint) will not recover the total costs of production. Therefore, some method needs to be employed to assign to users the common costs. While there are several methods that have been used over the years for the allocation of common costs, one of the most compelling is known as the Ramsey pricing method. The Ramsey-based method uses measures of various users' "willingness to pay" in assigning costs so that those groups that are willing and able to pay more for the service are assigned a larger share of common costs than user groups who will not pay much additional cost and instead would reduce their consumption of the good. The Ramsey pricing method, which assigns common costs to users in inverse proportion to their elasticities of demand, is thus said to result in the least distortion from an economically efficient outcome because it minimizes the degree to which users alter their consumption from what would have occurred under marginal cost pricing.

In applying the Ramsey-based method, an analyst needs to develop information about the demand functions of the user groups. But first, a decision needs to be made about what "product" the user is making decisions about. In this case, although the specific services being provided by FAA are such items as "handles," "take-offs," "radio contacts," and so forth, modelling user demands for these FAA services would not have been straightforward. First, users consume several of these services in a bundle when they undertake air travel; therefore, determining the demand for each service would have been made complicated by the interrelated demands for FAA's other services. Moreover, there is very little in the way of empirical information about users' demands (and therefore demand elasticities) for these specific services. Because of these problems, GRA assumed that users are making decisions about whether they take a flight. Once a user decides to make a flight, he or she simultaneously makes a decision to use all associated air traffic services.

The use of flights as the primary output that users make decisions about implies that the decision to use ATS services is wrapped up within the larger decision. This implication allowed GRA to apply the Ramsey-based method by developing information about users' demands for flights and, in doing so, their demands for ATS services are inferred. Similarly, the cost of a flight is the relevant "price" variable facing the user groups within the model. These total flight costs are derived from FAA's data on the costs of operations for various users (that is, private costs of flying such as fuel, crew, etc.), along with the marginal cost information from the econometric models on the ATS costs.

Because there is little empirically based data on measures of elasticities for flights by various users, GRA assigned an elasticity of –1 for all groups except general aviation piston, which was assigned a value of –1.5 for elasticity of demand.[7] Nevertheless, because the ATS costs make up a differential percentage of the overall costs of flights across users, a given change in the ATS costs implies different percentage changes in the overall cost of a flight for different users. As such, the implied elasticities of demand for the ATS services among user groups are, in fact, different. They

[7]GRA noted in its paper that studies of elasticity of demand by airline passengers were reviewed for FAA's recent study on child safety seats. A significant range of elasticities were found. However, these measures were for passengers rather than for carriers, and it may be difficult to infer the latter from the former. In choosing a value of –1 for an elasticity, GRA made what is often considered a "neutral" choice when good data are not available and one has no theoretical reason for anything else. This occurred because an elasticity of –1 is considered neither inelastic (expenditure will rise with a price increase) nor elastic (expenditures will decline with a price increase). Instead, a user's expenditures are expected to stay the same as the price changes. A 10-percent increase in price elicits a 10-percent decline in purchases.

differ because the model is asking how changes in ATS costs, tracked through the demand for flights, will affect consumption choices. In particular, air carriers, for whom the ATS costs make up only a small percentage of their overall costs, have a lower implied elasticity of demand for ATS than, for example, an air taxi company because the costs of ATS are a smaller proportion of the total costs of flying on the carrier's flight.

The Ramsey-based method is implemented via a constrained optimization problem wherein consumer well-being is maximized subject to the constraint that all of FAA's budget is recovered. Each user group enters the optimization problem for several distance blocks in which a typical flight by that user group over a given distance range is used to measure the demand for flights by that user group within that distance block. Well-being is measured by the area under each demand curve minus the costs paid for the representative flight. The costs include all private costs incurred by the user as well as the FAA costs to be assigned. A primary output of the model is to provide estimates of the costs assigned for each user type/distance block. By subtracting the marginal costs of ATS services for that flight, the allocation of joint and common costs can be calculated. In sum, over $4.8 billion of FAA's costs are allocated via the Ramsey pricing method.

Comments From the Department of Defense

Note: GAO comments supplementing those in the report text appear at the end of this appendix.

COMMAND, CONTROL COMMUNICATIONS AND INTELLIGENCE

ASSISTANT SECRETARY OF DEFENSE

6000 DEFENSE PENTAGON
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April 21, 1997

Mr. John H. Anderson, Jr.
Director, Transportation Issues, Resources,
Community, and Economic Development Division
General Accounting Office
441 G Street, NW
Washington , DC 20548

Dear Mr. Anderson:

Having had the opportunity to review the April draft of your Report on National Airspace System: Issues in Allocating Costs for Air Traffic Services to DoD and Other Users, I am pleased to say that the Department of Defense finds its presentation of relevant issues and uncertainties far more comprehensive, even-handed and clearly expressed than they were in the March draft edition. Your decision to acknowledge the concerns we voiced over the previous draft, both through text revisions and the addition of a section which presents and addresses each of them directly, significantly improves the balance of the analysis.

We regret that areas of appreciable disagreement do remain. The study's continuing depiction of Ramsey pricing, for example, as the least unacceptable of all costing approaches examined, still fails to make it acceptable in our eyes. Nor do we believe that DoD's depiction as a user of FAA services accurately puts it on a par with commercial users. Whether FAA or DoD absorbs the bill, the public ultimately has to pay it.

The explicit presentation of such differing perspectives in Appendix VI and in the newly modified text, however, satisfies our previous concern that the omissions and vagaries of the earlier draft would foster erroneous inference and impede informed decisionmaking. We believe that, after completion of some minor editorial changes (enclosed), the report should go forward in its present form with Appendix VI as amended, in its entirety.

James E. Soos
for Emmett Paige, Jr.

Enclosure

ASSISTANT SECRETARY OF DEFENSE
6000 DEFENSE PENTAGON
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March 31, 1997

COMMAND, CONTROL, COMMUNICATIONS, AND INTELLIGENCE

Mr. John H. Anderson, Jr.
Director, Transportation Issues, Resources,
Community, and Economic Development Division
General Accounting Office
441 G Street, NW
Washington, DC 20548

Dear Mr. Anderson:

After review of the GAO Audit Report, "Assessment of the Manner in Which Costs for Air Traffic Control Services are Allocated Between DoD and FAA" (Draft, March 18, 1997, Code 341512), we were pleased to see that the draft recognizes the significant contributions that the DoD makes to the National Airspace System (NAS) in areas such as airspace management, collaborative system modernization and program management, aviation related Global Positioning System (GPS) contributions, and annual funding in excess of $600 million.

However, after a thorough review, we have concluded that the draft report fails to accurately depict the role played by DoD, in partnership with the FAA, in managing the NAS or the complexity of the system itself. Close analysis of the draft reveals critical shortfalls in several key areas of scope and method. Major modifications are necessary before it will present a clear and comprehensive picture to the Congress. The enclosed comments reflect detailed Departmental views of the strengths and weaknesses of this draft, and must be addressed in the final report.

First and foremost, the report does not adequately address the complexity of the NAS or the full extent of DoD's contribution to its effective operation. It glosses over the long-standing, robust, relationship between DoD and FAA that began after World War II and was formalized by the Federal Aviation Act of 1958. Similarly, it does little to address the issue of the "public good" derived from the current operation of the NAS, including aviation safety and general taxpayer benefits from a system free of user fees. Instead, the draft report attempts to redefine the Defense Department as merely a user, and not as the partner it has been all of these years, dismissing the many benefits not easily measured in dollars.

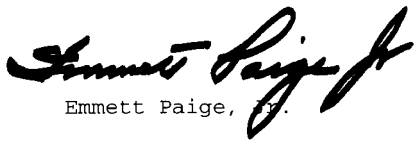
It is clear that from a simple fiscal perspective, the Defense Department poses a "marginal financial burden" to the annual costs of FAA operations, given the GAO's finding of $100 million of direct impact on the $6.2 billion FAA budget. Yet the DoD directly and indirectly contributes in excess of $600 million a year to the overall operation of the NAS. This contribution figure continues to rise as military sortie rates decline, while the NAS itself continues to expand with the increased growth in civil aviation. In fact, if the DoD stopped flying today, FAA costs and the level of effort would not change.

A second concern is the need for a more comprehensive determination of opportunities to increase the efficiency of air traffic control services. The only area which the GAO report considered was Special Use Airspace. Other areas where efficiencies could be gained such as the airspace approval process, program management, and the administrative process, were overlooked.

Finally, all of the report's analyses seem preoccupied with fee determination instead of the cost allocation called for in the Public Law 104-264 legislation. Even if the political decision is to institute a "user fee" system, it is clear that the Defense Department's aggregate contribution far exceeds what is depicted; and DoD should not be asked to do more at the risk of adversely affecting defense readiness, aviation safety, and the DoD/FAA partnership. As noted in the attached comments, the GAO report's financial analysis relies upon many assumptions and ambiguities which, although explicitly acknowledged, still render the recommendations questionable and, in our view, unacceptable, e.g., Ramsey pricing.

If the final GAO report is to be of practical use, it must address these important issues, sharpen its focus on cost allocation between the Departments, show more consideration for the taxpayers' interests, and thereby establish a sound foundation for Congressional decisionmaking on this issue. As we work toward the laudable goal of maximizing the efficiency of the NAS, our desire to cut costs cannot compromise the safety of the American public, either in its use of commercial aviation, or its security from threats beyond our borders. DoD strongly urges the GAO to portray these dual responsibilities to the decisionmakers who may rely on this report.

Sincerely,



Emmett Paige, Jr.

Enclosure

See comment 1.

See comment 2.

See comment 3.

GENERAL COMMENTS

The draft GAO Report, as a whole, is very narrow in scope and fails to adequately address the past, present and future DoD contributions to the National Airspace System (NAS). Although it is understood that the charter for GAO's effort was narrow in scope, the snapshot look and findings of GAO will not provide policy and decision makers with the full true picture of our NAS, which is the model currently being exported to Eastern European countries as well as being the model under consideration by the Peoples Republic of China.

Contrary to the impression given in the report, the DoD and FAA are solid partners in the management of the NAS. It is a partnership that has functionally existed since World War II. The partnership will be dissolved if user fees are imposed on the DoD. The multiple interagency agreements that are supported by hundreds of MOUs and Letters of Agreement between FAA and DoD will need to be re-negotiated along business lines, requiring enormous investments in time and resources. DoD's contribution to the NAS include radar sites, air traffic control towers and equipment, navigational aids, and sometimes even people. For example, DoD air traffic controllers augmented the FAA during the controllers strike in 1981; a mobile air traffic control tower was provided at Kansas City International Airport in 1989 when the permanent tower had to be closed due to asbestos removal; augmentation of the FAA during Operation Desert Shield enhanced the development of safe and efficient flight tracks across the North Atlantic; and creation and deployment of the Global Positioning System has provided, free of charge, the foundation for the future NAS. This interchange of facilities, people, and operational support goes beyond dollar figures. It is an integral part of having the most safe and successful aviation system in the world. Costs are not considered when support, cooperation and, above all, safety, are paramount. Redefining the Department of Defense as merely a "user" and, therefore, a customer of the FAA would impede this essential partnership in the safe management of the NAS for both its security and commercial missions. Moreover, international policy of user fee exemption to "state aircraft" will undoubtedly change, or at least be challenged, which will result in a significant increase in DoD's operating budget to accomplish its global mission.

The GAO has relied heavily on a draft report from a FAA contractor to which the DoD has not had previous access. We are concerned about the many unsubstantiated assumptions made in the analysis and the primary conclusions which are implicit in the GAO's draft. Even though the GAO draft claims to merely point out policy options, the options--especially the option of Ramsey pricing--are based on excursions of the FAA contractor rather than reliable data. Moreover, Ramsey pricing is proposed as an option in violation of Statement of Federal Financial Accounting Standards (SFFAS) Number 4, "Managerial Cost Accounting Concepts and Standards". In short, we find this report an inadequate basis on which to make a potentially significant public policy decision with many possible negative effects on both public safety and military operations.

1

See comment 4.

Ramsey pricing assumes that all customers in the pricing allocation have basically the same status. Ramsey's original analysis was in terms of taxation, and all allocation of taxes was on entities of equal status: citizens of the same state. Using Ramsey pricing as a mechanism for price setting for both private sector users and public sector users raises significant public policy issues which should only be determined at the highest levels of governmental policy making, i.e., OMB. The most consistent use of public administration and economic theory in regard to pricing of FAA air traffic control services would be to charge private sector users an average cost and DoD, and other federal government users, a marginal cost for services. This would make allowance for the non-profit nature of the government as well as be consistent with OMB policy on user fees (OMB Circular A-25).

See comment 5.

Using Ramsey pricing to fund FAA's Air Traffic Control (ATC) program to the degree indicated in this report would violate one of the fundamental principles of Federal budgeting. Federal Accounting Standards Advisory Board Report No. 1 (December 31, 1996) states: "Federal financial reporting should provide information that helps the reader to determine ... how information on the use of budgetary resources relates to information on the costs of program operations." Using large amounts of the Defense budget to fund FAA acquisition and operations would violate this fundamental principle of budget integrity, and lead to strains on the DoD's operations and maintenance account which would have dire consequences on readiness.

See comment 6.

The draft report does not consistently apply these financial management principles in the Statement of Federal Financial Accounting Standards (SFFAS), Number 4. Though the report cites SFFAS No. 4 (page 11), there are other principles in this document, applicable to this issue, which are ignored. A key principle is that SFFAS No. 4 establishes a preferred order of assigning costs. (SFFAS No. 4, paragraph 124). A proportional (i.e., cause-and-effect) basis is preferred to other reasonable and consistent bases. Since Ramsey pricing would fall under the category of "other reasonable and consistent bases," this Federal Financial standard indicates that a method such as Ramsey pricing is not the preferred method.

See comment 7.

The use of Ramsey pricing is highly dependent on the assumed user elasticities. This high degree of dependency opens the door to the potential gaming of results. Nowhere in the document do the authors present empirical data to support the demanded elasticities they so freely proffer. The reader is left to trust the judgment of the FAA contractor.

See comment 7.

To invoke Ramsey pricing in the determination of proposed user fees would require further estimates on the elasticities of demand for all FAA user groups, not just DoD. Without empirical data, each estimate becomes highly judgmental and subject to error.

See comment 8.

Ramsey pricing assumes monopoly, or near monopoly, conditions. While FAA has a near monopoly on ATC services, it is not a total monopoly--DoD has substantial

ATC capabilities within military airspace. To impose high levels of user fees implied by a Ramsey pricing method of allocation would unleash economic forces which could be detrimental to both public safety and military training: e.g., avoidance by military aircraft of FAA-controlled airspace. Note: we don't suggest this would become DoD policy. However, commanders, with already tightly strained budgets, would, under the influences of the laws of supply and demand, take into account such fees into their mission planning, whereas their main concerns should be efficient military operations and the safety of their troops as well as the safety of the public. It is a fundamental principle of economics that, if price increases, demand decreases. Thus user fees, especially high level fees implied by Ramsey pricing, would result in a decrease in demand, and thus would not raise the projected revenue.

See comment 3.

It is questionable why the GAO would accept the findings of a contractor (GRA, Inc.) paid by the FAA, to analyze a public policy question of this magnitude. We view this type of analysis to be inherently governmental research that should be accomplished by organic government resources.

See comment 9.

No estimate has been made of the cost involved in administering a "user fee" based system of cost recovery. What mechanisms would be needed, what computer infrastructure, how many personnel, etc.? How do these costs compare with the benefits to be derived? SFFAS No. 4 (paragraph 142) states that a cost accumulation and assignment method should be used when it is economically feasible. There is no consideration given in this report to this fundamental issue. It is likely that the cost of raising revenue through user fees, with the mechanisms which would be necessary to measure and collect the fees, is greater than raising revenue through general taxation.

SPECIFIC COMMENTS

See comment 10.

Title page Change the title to: "An Assessment of ATC Cost Allocation Between the Federal Aviation Administration and the DoD."

RATIONALE: PL 104-264 language states, "The Comptroller General shall conduct an assessment of the manner in which costs for air traffic control services are allocated between the Administration (FAA) and the Department of Defense." The current title does not fully reflect the charge by PL 104-264 and emphasizes FAA's services to DoD vice the broader issue of Federal cost allocation between the Departments.

See comment 11.

Page 1 First paragraph, after the last line, add a new sentence: "It should be noted that although the FAA has overall management responsibility for the NAS, it is, by definition, comprised of FAA and DoD components and is jointly operated."

RATIONALE: More clearly defines the NAS and the partnership that is mandated.

See comment 12.

Page 1 Second paragraph, change second sentence to read: "At the same time, both FAA and DoD have operated in an environment...".

RATIONALE: All federal agencies are operating under tighter budgets.

See comment 13.

Page 1 Second paragraph, after the last line, add a new sentence: "Although DoD is a major stakeholder in this process and a potential revenue provider to the FAA, the DoD's request to be included on the NCARC was denied."

RATIONALE: The GAO should inform Congress that the DoD petitioned the DoT for membership on the NCARC and was denied.

Now on p. 1.
See comment 14.

Page 2 First paragraph, change second sentence to read: "Some have chosen to characterize the DoD as a user of air traffic services and advocate that the DoD should be required to pay for the services it consumes."

RATIONALE: This entire paragraph mischaracterizes the DoD as a mere user of FAA services.

See comment 15.

Page 2 Second paragraph, first sentence, change to read: "...be resolved in deciding to what extent the DoD resources should be reallocated to FAA for air traffic services."

RATIONALE: The implication of this paragraph highlights DoD's concern about this report. The idea that the DoD should "pay" for FAA services demonstrates an ill-conceived notion that the DoD is just another user and should be charged for using FAA services.

See comment 16.

Page 2 Second paragraph, second sentence, change to read: "...efficiency of air traffic services, we explored the potential for better management of special use airspace."

RATIONALE: As with the preceding paragraph, this sentence highlights a stilted view of how the NAS works. Greater civil access to Special Use Airspace (SUA) does not add to the efficiency of air traffic services. It simply provides greater civil access to SUA.

4

Now on p. 2. See comment 17.

Page 4 First sentence, change to read: "Since 1958, as established by the Federal Aviation Act of 1958, FAA and the DoD have....".

RATIONALE: The FAA Act, as public law, defined the tenants of the Nation's ATC system and sets the foundation for the FAA/DoD partnership.

Now on p. 3. See comment 18.

Page 5 Change entire page to read: "Important public interest, national security, public law, and US navigation fee policy issues need to be addressed in assessing the ATC cost allocations and inclusion of the DoD in any user fee model.

-- The general public pays for, and benefits from, the current structure of the NAS and the DoD/FAA partnership. Local communities, civil aviation, and airports near DoD installations benefit from safe, advertised, highly utilized, and well coordinated ATC services by DoD and FAA. Any financing reform which could reduce the degree of service or the public willingness to pay for these services in terms of user fees could jeopardize the safety of the system.

-- National security, public law, and Presidential Orders must be considered in cost allocation assessments. The Federal Aviation Act of 1958 calls for a common civil-military system, consideration of the requirements of national defense, and residential transfer of the FAA to the Secretary of Defense in time of war (also Executive Orders 11161 and 11382). The appropriateness of user fees to fund these responsibilities, and the premise that the DoD should pay user fees to perform its mission of national defense must be weighed.

-- The U.S. Government policy, as stated by the State Department, concerning fees for State aircraft is: "Based upon international custom and practice, flights of aircraft owned and operated by sovereign States will not be required to pay navigation or overflight fees. State aircraft are those military and other government aircraft operated for non-commercial purposes. The U.S. Government does not impose such fees on foreign State aircraft visiting or transiting the United States." The DoD estimates that if the U.S. was to begin paying charges for air navigation or overflight, the cost could exceed $100 million annually. The income to the United States derived from the imposition of the same fees on foreign State aircraft in the U.S. would be less than $5 million annually. Assuming other nations

5

would charge U.S. State aircraft if the U.S. did the same, any user fee based system must consider both U.S. policy and the overall impact to the U.S. taxpayer.

-- As a matter of fairness and equability, user fees, if adopted, should be placed on all governmental agencies which use FAA services, not just the DoD. Example agencies include the Department of Interior, Department of Energy, NASA, etc. In addition, this assessment was developed in a potential user fee scenario, not as a basis for a possible "stand-alone" DoD payment to FAA. That issue would require further analysis."

RATIONALE: For the above; all are self-explanatory.

Now on p. 6.
See comment 19.

Page 8

The GAO report is almost completely underpinned from this point on by these two entities (GRA report and Ramsey method). The GAO report states that the GRA report was written under FAA contract in 1995, is still in draft, and has not been released by the FAA. The GRA report is based primarily on the Ramsey method of pricing, which is not a Federal standard. Neither of these factors were discussed in the exit briefing and the DoD was never offered a review of either. At this point, the GAO report digresses into cost and accounting methods in discussions which assume that a formula must be developed to determine how much the DoD should pay.

Now on p. 8.
See comment 20.

Page 9

Third paragraph, line 22, comment: The comparison of the DoD to the charter carriers and air taxi operations is not balanced. No "marginal impact" civil user is a provider of ATC service.

Now on p. 9.
See comment 21.

Page 11

Third paragraph, line 10, replace the second sentence with the following: "Although DoD's air traffic system was designed primarily for the military system, it provides nearly four million services to civil aircraft annually, and at some locations, such as Patrick AFB, Florida (90%), services to civilians far outweigh those to the military. Even though ATC services provided to civilians by the DoD are, in fact, incidental to the military mission at many locations, 20% of DoD's ATC workload is civil traffic and the inherent safety and public service this provides is substantial. The DoD comprises 7% of FAA's workload, and by comparison, is considered "incidental" to the FAA's primary mission of providing the nation's air traffic system."

6

RATIONALE: Congress must be informed of the total worth of the DoD air traffic control to the nation, not just in the context of marginal, or incidental costs.

Now on p. 9.
See comment 22.

Page 11 Paragraph 2, indented portion, lines 2 through 5, change sentence to read: "Although the DoD's air traffic system was designed to meet the military mission, it was ultimately designed to be an integral part of a common ATC system with the FAA and the DoD as service providers. DoD's provision of ATC service to civil users of the NAS is incidental to its mission, but not inconsistent with the joint operation of the common system."

RATIONALE: The common system of the FAA/DoD ATC service provision is being marketed to the world as the model for worldwide adoption. We are fiscally and "contractually" involved in the NAS modernization with the DOT and FAA. If the DoD only provisioned their facilities to support the military mission; the only DoD communication requirement would be for UHF radios. External automation to transfer control jurisdiction and to perform inter-departmental control functions would not be required.

See comment 23.

Page 11 Second paragraph, indented portion, line 8, states: "DoD did not include overhead in its total." We asked the GAO analyst who worked on this report what he meant, since DoD's data submission did include overhead for the Military Services. The analyst said it referred to any overhead of the DoD not covered by Service overhead. We believe there is no significant cost of overhead not included in the Service overhead amounts. The only possibility we are aware of would be the OSD staff in the Pentagon: this would not be a material amount, i.e., this would not have to be included. The estimate of $621.5M which the DoD provided was rounded to $622M in the report, which would cover any Pentagon salaries involved directly in air traffic control administration. Also, some Pentagon positions which administer the ATC program may also administer other non-ATC programs. Thus, we recommend this statement be deleted from the report.

Now on p. 9.
See comment 24.

Page 12 Regarding the Second Issue, we recommend that the GAO conduct a study that would focus on the cost savings that the DoD would realize if they turned over all ATC functions to the FAA on June 1, 1997, and compare that result with the additional cost the FAA would incur from that same action. This initiative would present a factual answer for consideration.

7

Now on p. 10.
See comment 25.

Page 13 Source of Funds to Pay DoD's Share, delete entire paragraph and replace with the following: "If user fees are adopted and it has been decided that DoD will pay, potential funding sources to pay for DoD's share of ATC costs include: (1) providing the DoD with additional appropriations that would be paid to FAA, (2) requiring the DoD to absorb all or part of the costs out of its appropriations account without a compensatory funding increase, (3) appropriating DoD's share of ATC costs through DOT's budget with a compensatory decrease in DoD's budget, or (4) appropriating DoD's share of ATC costs through DOT's budget without a compensatory decrease in DoD's budget. DoD's position, if the DoD is required to pay user fees, is option (4). Option (4) would be the best for both agencies.

RATIONALE: GAO did not consider all of the options. Option (4) aligns the function of ATC services under DOT and allows both the FAA and the DoD to accomplish their respective missions. It would also eliminate the accounting drill required by options (1) and (2).

See comment 26.

Page 14 First sentence, second line, modify: "consequences" to "serious consequences".

RATIONALE. Same as before in defining financial consequences to the DoD as serious.

Now on p. 27.
See comment 27.

Page 17 Line 8: Oceana misspelled; located in Virginia Beach vice Norfolk, VA.

Now on p. 22.
See comment 28.

Page 18 First paragraph, second sentence, delete: "Civil"; add, "Non-participating aircraft both civil and military...".

RATIONALE. The correct distinction is participating versus non-participating aircraft. If the area is active, even non-participating military aircraft cannot or should not enter.

See comment 28.

Third sentence, delete: "civil aviation"; add "non-participating aircraft...".

RATIONALE. Same as above.

Now on p. 22.
See comment 29.

Page 18 Third paragraph, last line, change: "five" to "nine".

8

Now on p. 22. See comment 30.

Page 19 Second paragraph, line 8, change to read: "Non-participating aircraft under visual flight rules may fly through Military Operating Areas (MOA) even if they are active."

RATIONALE: Same as above.

Now on p. 24. See comment 31.

Page 21 Paragraph 2, line 7, change to read: "The utilization management of SUA has improved since our 1988 report."

RATIONALE: The term "utilization" by itself implies that activity in the SUA has increased when in most cases it has not. The recommendation of the 1988 report was to suggest that the FAA and the DoD manage SUA more efficiently.

Now on p. 24. See comment 32.

Page 21 First paragraph, last sentence, change to read: "...Edwards Air Force Base known as the R2508 complex, can cause congestion when associated with other factors such as inclement weather."

RATIONALE: Air carrier routes are established around some SUA. The time to circumnavigate these routes is figured into their normal route time. Thunderstorms and other unplanned events can cause narrow flight corridors to become congested which can cause delays.

Now on p. 24. See comment 33.

Page 21 Paragraph 2, lines 14-17, change sentence to read: "DoD has had a long standing policy of returning SUA back to the FAA when not in use. The Military Services have made a concerted effort in implementing that policy. The FAA has embraced that policy and along with the civil users, considers that policy to be sound."

RATIONALE: Clarifies the issue.

Now on p. 24.

See comment 34.

Page 22 Paragraph 1, lines 8-10, change sentence to read: "While the FAA does not disagree, it points out that the information on availability is not always provided by DoD. The DoD, on the other hand, believes that it makes a concerted effort to turn back SUA to the FAA when not in use. Moreover, DoD indicates that, in many cases, attempts to return SUA when not in use are refused by the FAA. Speculated reasons range from not enough time to adjust the flow of traffic, to union concerns over added workload for controllers."

RATIONALE: Clarifies the issue.

Now on p. 25.
See comment 35.

Page 23 Paragraph 1, line 3, delete the rest of the paragraph starting with, "The objectives of the test..."
In its place add the following: "As a result of a site visit to Edwards AFB 24, on September 25, 1996, by representatives from the FAA, the DoD, the DOI, and commercial and general aviation, it was clear that the information exchange between the DoD and the FAA on the real time joint use of the R2508 complex was very efficient. The current trial being conducted at the R2508 complex is attempting to improve the information exchange between the FAA (High Desert Tracon) and the commercial air carriers. Specifically, air carriers are seeking to streamline the approval of routing through R2508 via J-110 before take-off in both directions, particularly from the Bay Area going southeast. The results of this operational trial will serve as a first step in a collaborative process of managing and using the airspace more efficiently. It should be noted that the major challenge confronting the more efficient management of the airspace, acknowledged by the FAA, is information dissemination from the FAA to all civil users on the status of SUA."

RATIONALE: Clarifies the issue.

See comment 36.

Page 23 Add as last sentence: "As a matter of DoD policy, information is provided to the FAA on all SUA that the DoD uses. The manner and timing of such information is mutually agreed upon by the FAA and the DoD."

RATIONALE: Clarifies the existing last sentence.

Now on p. 31.
See comment 37.

Page 30 Second full paragraph, sixth sentence, line 8 from bottom, change from: "DoD officials told us that the services it provides to civil users are incidental....", to: "DoD officials told us that although 20% of DoD's ATC workload is service to civil aircraft, it would be difficult to assess a specific cost to those services."

RATIONALE: More clearly states what we said.

See comment 38.

Page 36 First Paragraph, lines 6 through 10, delete the following sentence: "Additionally, FAA officials told us that certain aspects of the current infrastructure, such as equipment to allow the DoD to operate in all weather conditions, are necessary for the DoD to perform its mission Therefore, although civil traffic uses most of the ATC services, the ATC system also serves a national security function."

RATIONALE: The FAA's statements referencing unique equipment, and related costs, for DoD aircraft to operate within the ATC system are somewhat misleading. The DoD established policy to operate in the system, specifically IFR was a safety enhancement measure. Except for robust precision recovery systems at civil airports where the Air Force Reserve/Air National Guard is a tenant, or at joint civil/military airfields when the controlling agency is the FAA, there is no investment made by FAA because of military activity, with the exception of TACANS and UHF communications.

Now on p. 42.
See comment 39.

Page 44 FAA Contends that DoD Provides Civil Services Directly to Users. This section transmits an opinion by FAA officials that the costs of services provided by the DoD to civil users of the system are not relevant. The DoD believes that these costs are relevant.

Now on p. 41.
See comment 40.

Page 44 First full sentence, change to read: "Because the DoD also provides services to civil, public, and all federal users as well as military users, the larger issue of what the U.S. government spends in providing air traffic services to civil and public users may be a more appropriate focus."

RATIONALE: Agree that this is the larger issue (as changed) and should be the focus of this entire matter.

Now on pp. 42-44.
See comment 41.

Page 45 DoD Believes That It Makes a Large Contribution to the NAS. Comment: The FAA is touting the cost benefit to the world of a transition from a ground to a space based dependence for en route and terminal navigation. The capability that makes these cost benefits possible is GPS - a system fielded with billions of DoD funds.

Now on p. 43.
See comment 42.

Page 46 Second indented paragraph: The DoD does not concur. The common ATC system and the need to maintain interoperability in a seamless transition from civil to military control is graphic evidence that the DoD, in an effort to maintain the partnership,

often invests in systems which are not essential to the support of DoD mission aircraft. At the end of the paragraph on page 47, add the following as the last sentence: "During BRAC, the FAA demonstrated an inability, due to lack of resources, to assume air traffic control services at some closing bases."

Now on p. 45.
See comment 43.

Page 49

These comments pertain to Appendix V. The GAO claims that neither the FAA nor the DoD has an accurate, reliable cost accounting system. Were this true, the absence of such a system immediately brings into question the accuracy of this study's claimed "common costs" of fifty-five percent for the FAA, (i.e., if we don't know what the costs are with any precision, how can we bifurcate costs into marginal and common and assign percentages).

See comment 44.

According to the draft report, the DoD consumed 2.6% of the marginal costs of the FAA operations yet under Ramsey pricing the DoD would be taxed for about 9% of FAA's common costs. The rationale given appears to be that since the DoD has a relatively large budget it is price insensitive. Without empirical support this is a spurious assumption.

See comment 45.

Overall, the draft report uses economic terms very loosely. For example, the report seems to equate "willingness to pay" with ability to pay (apparently based on budget authority). This interpretation is at odds with microeconomic literature.

See comment 46.

The draft report does not get into enough detail with respect to the cost of "flying a flight" for different user groups. The reader is lead to believe that "commuter aviation" and "general aviation piston" would be disproportionately impacted by the imposition of user fees based on marginal costs rather than Ramsey pricing. The assertion being that FAA costs comprise a higher percentage of "flying a flight" costs for these user groups. Without a detailed cost analysis, this assertion is without support.

Now on pp. 36 and 46.
See comment 47.

Page 51

Item 4, "Overflights": Per our State Department's policy, we do not charge foreign state aircraft, civil or military, over flight service fees and with few exceptions this policy is returned in kind internationally. The U.S. Military performs more overflight missions in foreign countries than they correspondingly overfly our country. Because of forward basing in support of international policy goals, any policy change toward "fees for service" could

expose the U.S. as a fiscal target for increased revenue. The financial impact on the DoD could be tremendous.

GAO's Comments

The following are GAO's comments on the Department of Defense's letter dated March 31, 1997.

1. We disagree that our report is very narrow in scope and lacks historical perspective. We point out a broad range of issues—data, conceptual, and policy—that would need to be considered before a decision is made to impose user fees on DOD. The issues we address are not bounded by time and would be relevant to any discussion of fee-for-service methods of financing air traffic services. DOD's comments, while providing more historical details on its contribution to the NAS, do not surface additional issues for our consideration.

2. The report specifically states that DOD and FAA are partners (see report, p. 2-3). Moreover, appendix III is devoted entirely to describing the partnership in detail (see report, pp. 28-32). In response to DOD's comments, however, we supplemented the report's background information on the partnership (see report, p. 3). We disagree that the report treats DOD merely as a customer of FAA. While DOD is a user of FAA's services, the report discusses numerous policy issues that are relevant because DOD also provides air traffic services. As for changes in the partnership, the report specifically discusses FAA's and DOD's views (see report, p. 11). While we agree that the partnership would probably change to some degree, it is unclear to us why the imposition of user fees alone should cause the partnership to dissolve. DOD would continue to provide ATC services to itself and could continue to serve civil, public, and other federal users.

DOD's contributions to the NAS in terms of equipment are discussed in the background (see report, pp 2-3) and in appendix III. The creation and deployment of the Global Positioning System, which was funded by taxpayers through appropriations to DOD, is discussed on p. 10 and in appendix IV. Undoubtedly policy decisions, in addition to the ones we note in this report, may be relevant in deciding if, and to what extent, user fees are imposed on DOD. The implications for changes in international policy may be one such policy decision that would require the involvement of the Departments of State and Transportation.

3. As part of our analysis, GAO did draw on a study conducted by GRA, Inc., a contractor to FAA. In the course of our work, we reviewed the study and found it to be a reasonable starting point for the development of user fees for ATC services. In particular, the entire study was well documented and constructed and in line with economic theory and applications. Despite

some concerns about the model, two independent reviews reached similar conclusions. Coopers and Lybrand noted that "the GRA cost allocation study provides an acceptable interim basis for attributing costs to broad categories of users." Arthur Andersen concluded that the GRA model "represents a reasonable tool to meet the FAA's short-term needs."

At the same time, however, our report expresses some concerns about the study, particularly in connection with the use of Ramsey pricing for determining the costs assigned to DOD, (see report, pp. 7-8 and 37-41). In particular, we expressed concern about the high level of common costs and the lack of elasticity information with which to apply Ramsey pricing. We also noted that various policy goals would need to be weighed in deciding whether to exclude DOD from a Ramsey-based allocation. Additionally, the focus of the GRA study was on the allocation of FAA's cost across user groups, and we provide considerable discussion about the relevance of including DOD's costs of providing ATC services to civil users in the development of user fees (see report pp. 4, 8-10, and 41-44). If DOD's costs are included, fees could be collected from civil users for the services provided by DOD, thereby providing an offset to what DOD might owe FAA. Finally, we do not find the use of Ramsey pricing in the GRA study to be in violation of the Statement of Federal Financial Accounting Standards (SFFAS) no. 4 because it is being used to allocate costs as a basis for determining potential prices. It is a well-established standard (see, for example, 31 U.S.C. § 9701.) that government price setting should take costs into account but that other factors, such as the value of services to users, are also to be considered. For a further discussion about the difference between costing and pricing see Federal Aviation Administration: Independent Financial Assessment, pp. IX-7 to IX-8, Coopers and Lybrand, L.L.P. (Feb. 28, 1997).

In response to DOD's comment that the Department did not have access to the GRA draft report prior to its public release on March 19, 1997, access to this work was controlled by FAA, not GAO.

4. We agree and noted in our report that there are public policy issues at stake in making the decision to include the DOD in the Ramsey pricing model. (See report pp. 7 and 39). We also note that charging DOD only the marginal cost of its use is a policy option that could be made, but choosing this option means that other users will pay more for their services (see report, p. 41). In short, our view, as discussed throughout our report, is that the allocation process, as part of the development of user fees, entails

many policy choices that should be evaluated from the standpoint of their effects on a variety of, and sometimes conflicting, public policy goals.

5. Our report does not explicitly endorse the use of Ramsey pricing. In any case, if user fees were imposed and it were determined that DOD will pay for its use of FAA's services, we do not believe that this would "violate . . . budget integrity" because such a payment would represent costs that are incurred in order for DOD to perform its mission much like the costs of other goods and services used by the military.

6. As noted above, we do not believe that the use of Ramsey pricing within the GRA model is inconsistent with SFFAS no. 4 because it is being used for the purpose of determining potential fees for users. Other applicable federal standards and law (for example, 31 U.S.C. § 9701) note that while costs should be considered in setting user fees, other issues, such as the benefit of services to users, should also be considered. The Ramsey method is a widely used and accepted pricing tool for situations in which, like ATC services, the production process entails low marginal costs but considerable common costs because the same facilities provide services for many uses and user groups.

7. We agree with DOD that using the Ramsey method is highly dependent on knowledge of elasticities of demand across the various user groups (see report, pp. 7 and 38-40). Contrary to the implication in DOD's comment, GAO is not endorsing the elasticities chosen by GRA. We agree that the use of Ramsey pricing by FAA would be enhanced by better empirical data about users' response to price changes. Unfortunately, little information is currently available. Moreover, it is crucial to understand that any allocation mechanism—whether Ramsey or something else—must assume a set of price elasticities. For example, under a proportionate allocation method of assigning common costs, if it is assumed that users will continue to consume the same amount of a service after their prices rise, an implicit assumption is being made that all users have a demand elasticity of zero. This is a highly unlikely assumption.

8. While our report discusses several concerns about the application of the Ramsey-based method, we believe that DOD's comments actually present an argument for the use of the Ramsey method. DOD is suggesting that economic forces will cause response to price increases in the form of reduced flights taken or changes in flight patterns (to bypass FAA-controlled airspace). If, as DOD suggests, it would reroute its own flights out of FAA-controlled airspace, it may need to be viewed as a highly

price sensitive user group if it were included in a Ramsey pricing model. Thus, it would not be assigned much of the common costs of ATC services.

9. We agree that the report does not provide an estimate of the cost of administering a user fee system based on cost recovery. Estimating such costs were outside of the scope of our review. However, it is important to note that a primary purpose of a user fee system is to assign the cost of the system's use to those who benefit from the services provided. Raising revenue through general taxation, while it may raise the same amount of revenue, would not tie system use to the revenues collected. With respect to collection, the report acknowledges that a mechanism would be necessary and that establishing two collection mechanisms—one by DOD, if its costs are included, and one by FAA—would not seem to be an efficient use of resources (see footnote 14, p. 42).

GAO's Response to DOD's Specific Comments

10. We revised the title.

11. We added a statement that the United States government operates a joint civil-military air traffic control and navigation system (see p. 1).

12. Sentence changed to: "At the same time, FAA and other federal agencies, including DOD, have operated in an environment of increasingly tight federal resources."

13. No changes made. Members of the National Civil Aviation Review Commission were appointed by the administration and by the leadership of the Congress. We understand that the Commission will hold public hearings, thereby providing DOD and other aviation system users with an opportunity to present their views.

14. No changes made. DOD is a user of FAA's air traffic services. The next sentence in that paragraph states quite clearly that DOD also provides air traffic services; therefore, DOD is unique among users.

15. Again, this sentence does not treat DOD as any other user. Throughout the report, we are careful to note that a policy decision is involved in deciding about the sources of funds to pay DOD's share. A congressional decision to exempt DOD from paying user fees is one option that we discuss in the report.

16. We made the suggested change.

17. We made the suggested change.

18. The Results in Brief section of a GAO report is intended to summarize the results of our review. While the points that DOD makes are important, we do not believe it is appropriate to include them in the summary section of this report. DOD could make these points to the National Civil Aviation Review Commission. In connection with charging other users, FAA does allocate a share of the cost to other public users, which would include state and local governments as well as other federal agencies (see tables on pp. 36 and 40). We did not discuss these users because our scope was to look at the use and provision of services by DOD. However, if FAA moved to a user fee system, then a decision would need to be made about recouping fees from other public users.

19. As discussed earlier, we believe that the use of the Ramsey-based method violates no federal standard because the standards on price setting and user fees suggest that value of service as well as cost can be taken into account. We agree that our discussion of the assignment of costs to the DOD should be premised on the notion that DOD's costs are important to understand for the development of user fees even if a policy decision is made to exempt the Department from having to pay user fees itself. We revised the report to make this clearer. Finally, we note that DOD has stated that requiring the Department to pay for ATC services without a compensatory increase in its appropriation could have ramifications for the Department's mission (see report p. 11). We believe that the issue of the source of funds for DOD's share of ATC costs, if user fees are imposed, should be resolved by policymakers in the Congress and the administration.

20. We agree that DOD is a unique user of FAA's services because it is also a provider of those services and contributes to the NAS (see report p. 3 and app. III). The point we are making in the paragraph is that DOD's status as a minor user is not justification alone for DOD's being relieved of paying any common costs of FAA's service. Instead, a decision to relieve DOD of the responsibility of paying common costs could be made by policymakers on the basis of policy goals such as protecting DOD's role in providing national defense and security.

21. We revised the report to reflect the volume of civil traffic that DOD provides. We did not include suggested language about the percentage of FAA's workload that DOD comprises because it is not relevant to a

discussion of which DOD costs—common or marginal— should be included for the purposes of cost allocation.

22. The change suggested above was inserted in the indented portion of the paragraph. While we do not disagree that DOD's system was designed to be an integral part of a common ATC system, it is primarily for DOD's military mission and is supported by taxpayers. This paragraph discusses the appropriate costs to be included in allocating costs to ATC system users.

23. We deleted the sentence as DOD suggested.

24. In this comment, DOD is taking exception to our view that its costs of providing civil services should be valued at actual cost. Instead, DOD's view has been that it should get credit for the costs it saves the FAA by providing civil services. In connection with the study that DOD suggests GAO undertake, such an analysis would be very difficult to do because it is not possible to determine how or whether FAA would provide the same level of service that was being provided by DOD (see report pp. 10 and 44). Furthermore, it is also difficult to determine what costs would be incurred by FAA for whatever level of service it chooses to provide in lieu of DOD's provision. However, the criteria developed by FAA for determining where to establish air traffic facilities may provide some useful guidance on this issue. These criteria, which lay out rules for the level of service that FAA provides in various locations on the basis of traffic levels and patterns, would provide some sense of the nature of FAA's likely service at various locations if DOD were to abandon providing civil services.

25. We do not agree that four options exist for the payment of DOD's share of ATC costs if user fees are adopted. Under user fees, DOD, as the user, would be required to pay for the costs of ATC services. Therefore, the option would be for DOD to pay FAA out of its regular appropriation with or without a compensatory increase. A decision could be made that the funds would be appropriated from the general fund to FAA for DOD's use of the system. Such an appropriation would be specifically designed to cover DOD's cost burden on FAA but, since it is not a user fee, would not be an option if it has been decided that DOD should pay. DOD stated that continuing the current practice would be best for both agencies and would eliminate the accounting drill required by having DOD pay out of its appropriations. However, it is important to note that DOD's air traffic service costs are necessary for the Department to perform its mission and not unlike the costs of other goods and services used by the military.

Furthermore, appropriating the funds to FAA would require that FAA annually attempt to justify the appropriations to cover DOD's share of the costs of air traffic services.

26. The funding options section has changed and the sentence referred to has been deleted. The report notes that FAA and DOD disagree on how funding options would affect their missions and partnership and provides opinions from both FAA and DOD. (See report p. 11).

27. We revised the report as DOD suggested.

28. We revised the report as DOD suggested.

29. We revised the report as DOD suggested.

30. We revised the report as DOD suggested.

31. We revised the report as DOD suggested.

32. We revised the report as DOD suggested.

33. We concur with most of the change as suggested and have revised the report accordingly. The last sentence concerning "soundness of the policy" is already included in the report on page 24.

34. We revised the report to incorporate the suggested change made by DOD about its policy of turning SUA back to the FAA. We included FAA's rationale for why the agency may refuse to accept SUA that DOD attempts to return to the NAS.

35. We revised the report to incorporate all of the changes except the sentence about the major challenge confronting the more efficient management of the airspace. As acknowledged in the RTCA recommendations, an important element to improve the efficient use of the airspace is the establishment of a real-time system to notify users of availability. As we state in the report, both FAA and DOD have had difficulty in developing such systems to enhance the management of SUA (see report p. 24).

36. We do not concur with the suggested changes because relevant points about information exchange are already made in the report (see p. 24).

37. We revised the report as DOD suggested.

38. We do not concur with the suggested deletion because we believe that the statement as written is supported by DOD's admission that special equipment is needed for its mission activities.

39. In this comment, DOD takes exception with a view presented by FAA. We include FAA's views in this report as we include DOD's views on many issues. On this particular issue, DOD's views are presented in the paragraph following the one expressing the FAA view (see report p. 42).

40. We revised the report as DOD suggested.

41. We agree that the backbone of FAA's ability to develop its space-based navigation system is the GPS. GPS is being paid for by the U.S. taxpayers through appropriations to DOD. We noted in our report that to the extent that future costs of GPS can be shown to benefit civil aviation or arise from its use, those costs could be appropriately passed on to these users through user fees (see report p. 44).

42. The concern that DOD expresses does not directly relate to the point we are making. In our report, we are discussing the issue of valuing DOD's services at actual or saved costs, and we express the view that actual cost is the more appropriate measurement. DOD's comment suggests that there are specific (and actual) costs that it incurs in order to maintain the seamless nature of the NAS. We would agree that any costs incurred above and beyond those that are necessary for providing for DOD's military activities would be relevant to include as DOD's costs of providing civilian services. Such costs should be viewed as "additional," or "marginal," costs of providing civil services.

43. We agree that the lack of good cost-accounting information reduces the reliability of FAA's cost information. However, the limitations of these data are primarily reflected in the high level of common costs found by the GRA study. Where costs could be directly tied to particular users, the data limitations were less of a hindrance. It is likely that with better cost-accounting information, the measured marginal costs of all users will rise, while the pool of common costs to be allocated via Ramsey or some other method will shrink.

44. The fact that DOD has a relatively large budget is not the reason that it was assigned a large share of common costs under the Ramsey method

used by GRA. The reason relates to how elasticities of demand for ATC services (which reflect the expected price sensitivity of users) were calculated in the model. Although all user groups (except general aviation piston users) were assigned the same elasticity of demand for flights, the operative elasticity was one that was imputed within the model to predict the sensitivity of users to changes in the price of ATC services, a component of total flight costs. As we discuss in our report, the elasticities of demand for ATC services were imputed based on the share of total flight costs that are related to ATC costs (see report, footnote 12, p. 7; footnote 5, app. IV; and pp. 50-51). DOD flight costs, according to FAA's data, are high compared to many other groups; therefore, its imputed elasticity of demand for ATC services was relatively low. Hence, this is the primary reason that DOD is assigned a disproportionate share of FAA's common costs by the GRA study.

45. We disagree with DOD's interpretation of the microeconomic literature regarding the meaning of terms "willingness to pay" and "ability to pay." The phrase "willingness to pay" is generally used to refer to the nature of demand for a product or a service by an individual or group of people. The phrase "ability to pay" would refer to the income or budget constraint faced by those people. Since a primary determinant of demand (willingness to pay) is the income or budget constraint, the ability to pay is a key factor that determines the willingness to pay.

46. This discussion of the cost of flying a flight relates to how elasticities of demand for ATC services are derived within the Ramsey model (which is used to allocate common costs) and has no relation to the issue of marginal cost pricing. For more about the context of this discussion in our report, see comment 44.

47. The category of overflights within the GRA model includes state aircraft. This study was designed to be a tool for showing the costs associated with various services and for analyzing how prices might be assigned to users for the recovery of FAA's total costs. Issues of law, regulation, and policy would need to be taken into account as part of the ultimate fee-setting process.

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Glossary of Cost Terms

Common Costs	Common costs are costs that are incurred in producing more than one product. These costs will be incurred even if any one of the products ceased to be produced. Therefore, common costs can not be directly attributed to the production of any one of the products. In the discussion in this report, the term common costs is used to include both fixed costs and common costs that cannot be traced to the production of ATC services for any particular user group.
Directly Assignable Costs	Directly assignable costs are those that can be traced to the production of a particular output. In this report we use this term to mean costs that were attributable to the production of ATC services for a particular user group.
Fixed Costs	Fixed costs are costs that do not vary in the short run as the production volume of a good rises or falls. In this report, fixed costs of air traffic facilities, which may be common over the many outputs for various consumers that use services from that facility, are included under the umbrella term "common costs."
Marginal Cost	The economic concept of marginal cost is a measure of how the total cost of producing a good will rise or fall as the level of production increases or decreases. In this report we refer to the marginal cost of a certain user group's use of ATC services as being those costs that could be directly attributed to the groups' use. Thus, the term marginal cost is being used somewhat differently than the strict economic meaning because some fixed costs, in addition to marginal costs, may be attributable to a particular user groups' use of ATC services.
Stand-Alone Costs	Stand-alone costs are the costs that would be incurred to produce a product for one type of user in the absence of any other users. In a general sense, the stand-alone costs of one user would include common costs, fixed costs, and marginal costs. However, because producing a product for certain users might require a lesser total infrastructure than is the case for other users, the fixed and common costs included in the stand-alone costs for some user groups may be less than the observed pool of common and fixed costs.

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