U.S. DEPARTMENT OF TRANSPORTATION

OFFICE OF INSPECTOR GENERAL

FAA Has Taken Steps To Advance the SENSR Program, but Opportunities and Risks Remain

FAA

Report No. AV2019050

April 23, 2019

U.S. DEPARTMENT OF TRANSPORTATION
OFFICE OF INSPECTOR GENERAL

Highlights

FAA Has Taken Steps To Advance the SENSR Program, but Opportunities and Risks Remain

Requested by the House Committee on Appropriations

Federal Aviation Administration | AV2019050 | April 23, 2019

What We Looked At

The Federal Aviation Administration (FAA) depends on a vast but aging network of radars to manage air traffic and weather. FAA has partnered with three other agencies through the Spectrum Efficient National Surveillance Radar (SENSR) program to auction Government-owned electromagnetic spectrum frequencies and use the revenue—expected to be valued in the billions of dollars—to develop and deploy new radar systems. Given the significant investment and coordination required to design, procure, test, and implement a new national air traffic and weather surveillance system, the House Committee on Appropriations directed our office to examine FAA's SENSR program. Our audit objectives were to assess FAA SENSR program's (1) progress, including leveraging of work conducted by other agencies, and (2) plan to mitigate program risks, such as integration with the Next Generation Air Transportation System (NextGen) and the National Airspace System (NAS).

What We Found

FAA has taken initial steps to advance the SENSR program, such as establishing a Joint Program Office and developing a Spectrum Pipeline Plan, which outlines the current schedule for making spectrum available for auction in 2024. However, FAA and partner agencies have not yet defined the program's requirements and are still working to establish firm costs and schedule. FAA also still has opportunities to leverage resources from its partner agencies to help advance the program. Moreover, FAA, partner agencies, and our work have identified several critical risks to advancing SENSR. These include an aggressive schedule and generating sufficient revenue to cover the cost of the program. While FAA has established a plan to mitigate some of these risks, our analysis shows some of the planned mitigations may not be sufficient and require sustained management attention. In addition, FAA has not fully analyzed risks related to integrating SENSR into the many complex systems within the NAS, including NextGen technologies that are currently in development and being deployed.

Our Recommendations

FAA concurred with both of our recommendations to improve the coordination, planning, and risk mitigation of the SENSR program. Based on FAA's response, we consider both recommendations resolved but open pending completion of planned actions.

Contents

U.S. DEPARTMENT OF TRANSPORTATION
OFFICE OF INSPECTOR GENERAL

Memorandum

Date: April 23, 2019

Subject: ACTION: FAA Has Taken Steps To Advance the SENSR Program, but Opportunities and Risks Remain | Report No. AV2019050

From: Matthew E. Hampton
Assistant Inspector General for Aviation Audits

To: Federal Aviation Administrator

The Federal Aviation Administration (FAA) depends on a vast network of radars to monitor weather and air traffic. In some cases, these systems have been in service for over 40 years and have become increasingly difficult and expensive to maintain. While FAA plans to transition to a new satellite–based tracking system[1] for its primary aircraft surveillance starting in 2020, the Agency determined it needs a backup system that can track aircraft not equipped with satellite-based technology. As such, FAA has partnered with three other agencies[2] in a multibillion-dollar infrastructure project intended to replace and modernize our Nation's legacy radar systems.

To finance this project, FAA and its partner agencies plan to auction at least 30 megahertz (MHz) of Government-allocated radio frequencies to private industry for mobile or wireless broadband internet use, as authorized under the Spectrum Pipeline Act of 2015.[3] Specifically, in 2016, FAA formed a cross-agency program with its partner agencies called the Spectrum Efficient National Surveillance Radar (SENSR) program to assess the feasibility of vacating a band of radio frequency valued in the billions of dollars. The proceeds from the auction will be used to finance the deployment of a new system to meet the needs of the

[1] The new satellite-based tracking system is called Automatic Dependent Surveillance-Broadcast (ADS-B), which allows aircraft to broadcast their position to other aircraft and ground systems.
[2] The other partner agencies are National Oceanic and Atmospheric Administration (NOAA), Department of Defense (DOD), and Department of Homeland Security (DHS) and will be referred to as the partner agencies for the rest of the report.
[3] In 2015, Congress directed the Department of Commerce to identify, auction, and vacate Government allocated radio frequencies for non-Federal use.

partner agencies, providing surveillance for air traffic, weather, law enforcement, and national defense.

Given the significant investment and coordination required to design, procure, test, and implement a new national air and weather surveillance system, the House Committee on Appropriations directed[4] our office to examine FAA's SENSR program. Accordingly, our audit objectives were to assess FAA SENSR program's (1) progress, including leveraging of work conducted by other agencies, and (2) plan to mitigate program risks, such as integration with the Next Generation Air Transportation System (NextGen) and the National Airspace System (NAS).

We conducted this audit in accordance with generally accepted Government auditing standards. Exhibit A details our scope and methodology, and exhibit B lists the organizations we visited or contacted.

We appreciate the courtesies and cooperation of Department of Transportation representatives during this audit. If you have any questions concerning this report, please call me at (202) 366-1987 or Nathan Custer, Program Director, at (202) 366-5540.

cc: The Secretary
DOT Audit Liaison, M-1
FAA Audit Liaison, AAE-100

[4] House of Representatives Report 114-606. June 7, 2016

Results in Brief

The SENSR program is in the early stages, and opportunities exist for FAA to leverage other Agency resources.

FAA has taken steps to advance the new backup surveillance program by establishing a Joint Program Office (JPO) to lead and coordinate FAA and partner agencies' efforts. The JPO has developed a plan[5] that outlines a schedule leading to an anticipated contract decision in 2021 and an auction of spectrum in 2024. However, FAA and partner agencies have taken longer than initially planned to define requirements and resolve complex issues, such as making decisions on the number and types of radars that SENSR will replace. FAA will not establish firm costs or scheduled milestones for SENSR until 2021, when the Agency plans to formally baseline the program. FAA has also experienced challenges finding staff with the relevant technical and acquisition experience. Moreover, opportunities exist for FAA to leverage resources from its partner agencies to advance the program. For example, FAA has not established a shared inventory of related programs and expertise across agencies; instead, it is relying largely on industry to identify potential solutions. This could result in FAA and its partner agencies duplicating efforts and missing opportunities to share best practices and expertise to more efficiently advance SENSR.

SENSR faces several critical risks that must be mitigated to meet the spectrum auction date of 2024.

FAA and its partners have identified several potentially high-impact risks for SENSR, and FAA plans to continue to identify additional risks as the program evolves. Based on our analysis and interviews with FAA officials, several of the risks already identified could result in significant impacts to program cost, schedule, and requirements. For example, SENSR program officials we spoke with stated that the schedule for awarding a contract in 2021 and the ensuing auction date of 2024 is aggressive, and most view it as a significant risk. While FAA has a plan to mitigate some of the risks it has identified, our analysis shows some of the planned mitigations may not be sufficient. For example, FAA has removed the "fly-off" phase, where four competing vendors would demonstrate their radars before the contract award in 2021. However, limiting testing may increase the risk that the technology solution chosen may not fully meet program requirements. Furthermore, FAA recognizes that there are risks related to integrating SENSR into the NAS but has not yet fully analyzed the issue. A SENSR technology

[5] The JPO developed the Spectrum Pipeline Plan for the SENSR Program. The plan was developed in support of the SENSR program and to get approval to use funds from the Spectrum Relocation Fund.

solution will need to be integrated with many complex systems operated by FAA and its partner agencies, including developing NextGen technologies. Given the anticipated schedule, costs, and complexity of integrating a new multibillion-dollar system into the NAS, sustained management attention is needed to mitigate these risks and achieve SENSR's envisioned capabilities.

We are making recommendations to improve the coordination, planning, and risk mitigation of the SENSR program.

Background

The NAS relies on a radar infrastructure of over 1,000 systems for aircraft and weather surveillance (see exhibit C for details). In order to mitigate increasing operations and maintenance costs with these aging systems, FAA and three other partner agencies—the National Oceanic and Atmospheric Administration (NOAA), Department of Defense (DOD), and Department of Homeland Security (DHS)—are working to assess the feasibility of creating a new joint national aircraft, weather, and homeland defense surveillance capability.

Government agencies and commercial entities use radio frequencies in the electromagnetic spectrum to transmit and communicate information. In the United States, responsibility for managing the radio spectrum is divided between the National Telecommunications and Information Administration (NTIA) and the Federal Communications Commission (FCC). Together, NTIA and FCC ensure spectrum use is consistent with Federal requirements and economic interests. Spectrum is a valuable but limited resource, as both Federal and non-Federal users rely on its use. FAA and DOD are the top Federal users of spectrum because of their numerous communications, navigation, and surveillance systems.

The Spectrum Pipeline Act of 2015 provides advanced funding through the Spectrum Relocation Fund for research and development, engineering studies, economic analyses, or other planning activities intended to improve the efficiency and effectiveness of spectrum use by Federal entities. It facilitates reimbursement for spectrum consolidation costs from the proceeds of the auction of freed spectrum. The Act requires that auctioned spectrum generate 110 percent of estimated program costs in order for the funds to be allocated to the SENSR program. Federal entities must submit the Spectrum Pipeline Plan to the Technical Panel—the approving entity comprised of representatives from the Office of Management and Budget, NTIA, and FCC—that provides reasonable assurance that an auction will occur by 2024 and will meet the 110-percent threshold.

The SENSR Program Is in the Early Stages, but Opportunities Exist for FAA To Leverage Other Agency Resources

FAA has taken initial steps to advance the SENSR program, such as establishing a JPO and developing and submitting the Spectrum Pipeline Plan with the partner agencies. However, FAA is still in the process of defining the program and its requirements. In addition, FAA can take additional steps to leverage resources from other agencies.

FAA Has Developed a Plan and Established a Joint Program Office for Advancing SENSR

FAA and its partner agencies have taken steps to advance the SENSR program by establishing the JPO and Executive Steering Group. The JPO was established to provide cross-agency support for the execution of SENSR. The Executive Steering Group is a leadership body of senior executives who have decision-making authority over the JPO.

In January 2017, the Executive Steering Group submitted and the Technical Panel approved the Spectrum Pipeline Plan, which outlines the current schedule for making spectrum available for auction in 2024, along with a Concept of Operations.[6] In addition, the JPO issued a Request for Information (RFI) requesting potential technology solutions, testing methodologies, and acquisition strategies from industry. The JPO issued a second RFI in June 2018, and then reissued it in September 2018 because NOAA removed a key weather requirement.[7] FAA and partner agencies are reviewing the information from industry and had planned to update the Spectrum Pipeline Plan by January 2019, but it has been delayed until the end of April 2019.

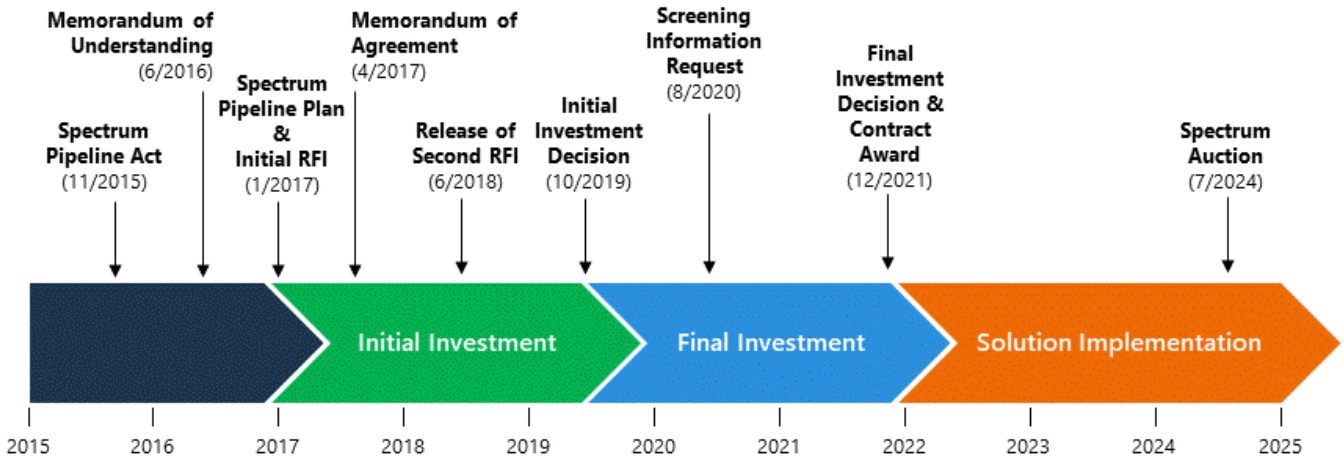
FAA and its partners have also signed a Memorandum of Agreement establishing cross-agency roles and responsibilities for conducting activities to determine the feasibility of the SENSR program. They are relying on $71 million in funds from

[6] A Concept of Operations explains how a new technology or capability works in real world operations, roles and responsibilities of participants, and estimated costs and benefits.
[7] NOAA and the partner agencies specifically agreed to remove the high-resolution weather requirement from the SENSR program. The high-resolution weather requirement is fundamental to early detection of tornadoes, flash floods, winter storms, and tropical cyclones.

the Spectrum Relocation Fund and had planned for an additional $226 million for concept development, defining requirements, and acquisition planning. However, depending on the amount of testing required FAA will determine how much additional funding is needed prior to the contract award and auction.

FAA is the lead acquisition agency for SENSR due to the flexibility of its acquisition process, the Acquisition Management System (AMS),[8] which the partner agencies agreed may help save time. While AMS can be more flexible for managing acquisitions, our work has also identified issues with the process, and we have several open recommendations for FAA to address and implement.[9] The program is currently in the AMS' Initial Investment Phase, working towards an Initial Investment Decision[10] in October 2019. The figure shows a timeline for the SENSR program, starting with the 2015 Spectrum Pipeline Act through the scheduled spectrum auction date.

Figure. Key Dates for SENSR Program



Source: Office of Inspector General (OIG) analysis based on FAA documents

[8] The Acquisition Management System (AMS) establishes policy and guidance for all aspects of lifecycle acquisitions for the Federal Aviation Administration. It provides flexibility to identify service needs, develop requirements, perform investment analysis, and execute solution implementation.

[9] *FAA Reforms Have Not Achieved Expected Cost, Efficiency, and Modernization Outcomes* (OIG Report No. AV2016015), January 15, 2016; and *Improvements Could Be Made in FAA's Award and Oversight of SE2020 Acquisition Program Task Orders* (OIG Report No. ZA2018029), February 28, 2018. OIG reports as well as the current status of our recommendations (including our open recommendations on FAA's AMS) are available on our website at http://www.oig.dot.gov.

[10] FAA defines the Initial Investment Phase as a process to support sound capital investment decisions by balancing timeliness, complexity, and size of the investment with the development of data necessary to make decisions. In the Initial Investment Decision, the Joint Resource Council selects the best alternative for implementation.

As shown in the figure above, based on the JPO's schedule, FAA will not establish firm costs or scheduled milestones for SENSR until 2021, when the Agency plans to formally baseline the program.

FAA Is Still Defining the SENSR Program and Its Requirements

FAA and its partner agencies are in the early stages of the SENSR program, and determining requirements is taking longer than initially anticipated. FAA and its partner agencies have identified competing missions for the SENSR program and are determining which missions can be met within the program's cost and schedule constraints.

FAA and Partner Agencies Have Taken Longer Than Initially Anticipated To Define Program Requirements

FAA has taken longer to complete key documents than anticipated in comparison to its initial program schedule. As a result, the definition of requirements, development of budgets and benefits, and details of the acquisition—which were expected to be completed in 2017—are still ongoing efforts. In particular, FAA and its partner agencies have not yet developed or updated the following documents, which help meet best practices for interagency collaboration by the Government Accountability Office (GAO):[11]

- an **integrated budget**,[12] which can help ensure the right resources from each agency are leveraged, realistic goals are pursued, and adequate funding has been secured;
- an **integrated organizational chart** that clarifies the expertise and organizational structure that will be provided by each agency; and
- an **integrated schedule**[13] with Agency-specific milestones to determine any additional, and possibly time-consuming, steps needed in the acquisition process.

FAA officials stated that future acquisition decision points—including the Initial Investment Decision in 2019 and Final Investment Decision in 2021, as depicted above in the figure—remain on schedule.

[11] See exhibit D for our assessment of SENSR's application of GAO's best practices for interagency collaboration.
[12] The Program Plan included draft costs by agency.
[13] The Program Plan included an initial schedule with only FAA acquisition milestones. FAA has requested the other agencies provide any additional milestones their acquisition process requires. None have been identified yet and it remains a high risk for the program according to their risk registry.

FAA and Partner Agencies Are Determining Which Missions Can Be Met by the SENSR Program

FAA and its partner agencies are determining which capabilities and missions the SENSR program can support. According to GAO,[14] a best practice for interagency collaboration is to define and articulate a common goal for a program. In June 2018, the SENSR program stated that the primary goal of SENSR is to determine the feasibility of vacating at least 30 MHz of Government-allocated spectrum between 1300 and 1350 MHz, with no impacts to other existing systems. However, JPO and Executive Steering Group executives we interviewed provided conflicting expectations for the SENSR program, such as what capabilities and requirements should be included that could significantly increase development time and costs of the joint system.

Additionally, according to the JPO and our analysis of vendor responses to the first RFI, it is difficult for one technology solution to meet NOAA's advanced weather requirements along with the mission needs of the other three agencies. Due to these technical challenges, the other partner agencies had suggested delaying or removing NOAA's key requirements from SENSR. On September 7, 2018, NOAA and the other partner agencies were approved to remove the challenging weather requirements. As a result, NOAA has largely withdrawn from the SENSR program. NOAA plans to develop and deploy new weather radars separately using its own budgetary resources, while remaining in an advisory role to enable continued sharing of weather data and ensure that the new SENSR system will not interfere with NOAA's radars.

FAA and Partner Agencies Are Continuing To Collect Information From Industry To Inform Key Decisions and Their Acquisition Strategy

Although FAA and its partner agencies received a number of responses to their initial January 2017 RFI, the responses did not contain all the information the JPO expected, and industry left out some potentially important technologies, such as advanced sensors that do not use radio spectrum. JPO and Executive Steering Group members recognized the shortcoming and explained that this occurred because the initial RFI included system specifications that were largely based on existing radars, instead of mission-based requirements.[15]

Additionally, the responses from industry indicate that the initial RFI did not include key information about the acquisition strategy and that the schedule is

[14] *Practices That Can Help Enhance and Sustain Collaboration among Federal Agencies*, GAO-06-15. (2005); and *Key Considerations for Implementing Interagency Collaborative Mechanisms*, GAO-12-1022 (2012).

[15] Mission-based requirements describe the capabilities and level of performance needed for the agency to meet its goals. The initial RFI used system specifications which detailed the technical properties of currently deployed radars.

not realistic given the size and complexity of the program. FAA explained that the program is still evolving and that the JPO has made adjustments to the acquisition strategy based on industry feedback. As a result, the JPO consolidated its preliminary requirements and issued a second RFI in June 2018, which was not originally included in the program's schedule. FAA points out that the second RFI was necessary and prudent to gather all the information needed before moving forward with an acquisition.

FAA Can Take Additional Steps To Leverage Resources From Other Agencies

FAA has been able to leverage some resources from other Government agencies, such as a spectrum interference tool originally developed by DOD. FAA plans to use the tool to evaluate proposals from industry and aid in solution implementation. However, FAA can do more to leverage additional resources from its partner agencies, such as relevant research and expertise. This could help avoid the risk of duplicating effort and missing opportunities to share best practices and expertise to more efficiently advance SENSR. For example, FAA has not established a shared inventory of applicable research and development programs to determine whether other resources could be leveraged for the SENSR program. Instead, FAA and its partners stated that they are primarily looking to industry to supply solutions.

However, FAA's partner agencies do have experience in relevant research initiatives and the needed expertise. For example, a key area FAA intended to leverage is the radar consolidation research under the multifunction phased array radar (MPAR) initiative.[16] For almost 20 years, FAA and NOAA have spent over $134 million on the research and development of a system to simultaneously perform air traffic and weather surveillance. According to FAA, this research was a key factor in developing the Spectrum Pipeline Plan. However, FAA ended funding for the research initiative in 2016, and implementation of the program's demonstration system has faced delays. NOAA is continuing the MPAR effort with its own funds and expects an operational demonstration system in 2019. NOAA has also used SENSR research and development funds to prepare phased array radar data simulations and data usage studies and to explore other implementation concepts that could potentially be part of a consolidated radar solution, as described in the Spectrum Pipeline Plan. However, given NOAA's

[16] MPAR uses phased array radar technology, which was developed by the US Navy for military applications and is currently in use. It is capable of similar performance to ADS-B with higher refresh rates and more precise tracking of aircraft compared to traditional rotating radars.

newly reduced role, it is now unclear what impact the MPAR research will have on SENSR, if any.

Moreover, while agencies have some of the needed expertise already within their organizations, they have been slow to move them to support SENSR and have not shared those resources throughout the JPO. GAO notes that a best practice of effective interagency collaboration is including participants with the relevant authority and expertise. The JPO has established a number of working groups to address aspects of the SENSR program; however, obtaining the necessary individuals with the desired experience has been challenging. For example, 3 of 10 FAA SENSR program leadership positions remain unfilled. FAA and partners have also assigned SENSR as a collateral duty, until new full-time staff are assigned or hired.

SENSR Faces Significant Risks That Need To Be Addressed To Meet the Spectrum Auction Date of 2024

FAA, partner agencies, and our work have identified several critical risks to advancing SENSR, including an aggressive schedule and generating sufficient revenue to cover the cost of the program. While FAA has established a plan to mitigate some of these risks, our analysis shows some of the planned mitigations may not be sufficient and will require sustained management attention. Furthermore, while FAA acknowledges integrating a new technology into the NAS has many risks, the Agency has not yet fully analyzed or documented these risks.

Several High Risks Represent Significant Challenges to the SENSR Program

FAA has already identified several risks with potentially significant impacts to technical, schedule, or cost aspects of the SENSR program, and the JPO is continuing to identify additional risks. According to FAA's Systems Engineering Manual, a significant risk impact means that program success could be jeopardized due to unacceptable performance, lack of alternatives, or schedule delays. Further, some of FAA's identified risks may result in significant cost increases. FAA's risk ratings indicate that continual coordination and close monitoring of risks and mitigation strategies is necessary to try to overcome these challenges.

SENSR's Schedule Is Aggressive

SENSR program officials we spoke with stated that the schedule is aggressive, and most view it as a significant risk and determining factor to the success of the program. At the time of our review, over 75 percent (10 of 13) of risks identified by FAA and partner agencies involve the program's schedule. Missed milestones may result in the auction being delayed or canceled, or in a decrease in the auction revenue generated to cover program costs.

FAA's current plan to mitigate these risks has been to adjust a phase dedicated to testing and evaluating technology alternatives. Originally, FAA planned to have vendors build and test prototypes of the top four technologies for comparison in a "fly-off" competition prior to awarding a contract. However, FAA and partner agencies have since removed funding and time dedicated to developing and evaluating proposed SENSR solutions. Instead, FAA now plans to test only one technology solution. According to FAA, the removed phase was unnecessary due to the high maturity level of the radar technology available. However, removing this prototype testing phase may create additional risks to the program. One partner official cautioned against evaluating the industry solutions without comparing physical demonstrations. Regardless of the specifics of the planned evaluation, according to FAA's AMS, system testing must be commensurate with its complexity and level of risk.

Furthermore, the SENSR timeline is ambitious given the number of systems, sites, and capabilities under consideration compared to previous FAA radar acquisitions. As shown in the table, each of FAA's previous radar acquisitions have taken on average over 12 years from contract award to full deployment—SENSR is planning to implement the system in a similar timeframe. However, the SENSR program is currently planning to incorporate aspects of multiple radar programs while manufacturing and deploying an estimated 600 radars, which is 7 times more than the average number of systems from previous radar acquisitions we reviewed.

In response to the initial RFI, industry representatives expressed concern about the feasibility of producing the significant number of new radars within FAA's schedule. Furthermore, deployment and installation of this many new systems at existing sites will be challenging, particularly given they must maintain the ability to track aircraft (and weather) for a seamless transition until SENSR is approved for operation at each site. In addition, if the SENSR program cannot use existing radar sites, there will be additional costs and time to acquire land and conduct the required environmental reviews for these. These are significant risks, since delays in either production or deployment may lengthen the time needed to vacate the spectrum, thus reducing its monetary value and resulting in reduced revenue for the SENSR program.

Table. Timelines for Previous Radar Acquisitions Compared to SENSR Estimate

Program	Timeline	Total Years	Number of Systems
Next Generation Weather Radar (NEXRAD)	Dec '87 – Feb '94 – Mar '98	10.3	156
Air Route Surveillance Radar (ARSR-4)	Jul '88 – Apr '96 – Jul '00	12.0	43
Terminal Doppler Weather Radar (TDWR)	Nov '88 – Jul '94 – Oct '03	14.9	45
Airport Surveillance Radar (ASR-11)	Aug '96 – Sep '03 – Jun '10	13.8	65*
Average		**12.8**	**77**
Spectrum Efficient National Surveillance Radar (SENSR) Estimate	Dec '21 – Jul '24 – Jul '34	12.5	600**

KEY: ○ Contract Award ◐ Initial Use of System ● Full Deployment

* The ASR-11 program originally intended to implement 112 radar systems, but due to cost and schedule delays the program was re-baselined in 2004 and again in 2005.
** Estimate provided by SENSR program office.

Source: OIG analysis of FAA data

SENSR Program Faces Uncertainties With Respect to Auction Revenue and Program Costs

Another high-risk area FAA identified is the uncertainty regarding whether the spectrum auction will fully cover the costs of SENSR. While FAA and its partners have developed some preliminary cost estimates for the SENSR program, they will not be able to develop reliable cost estimates until the requirements are finalized, a technology solution is selected, and number of systems needed is determined. The initial cost estimate was $12 billion—to develop and deploy what would primarily be a backup system for FAA's satellite-based surveillance system[17]—but that does not necessarily include costs associated with meeting the mission needs of the partner agencies. Furthermore, the estimate does not

[17] As we reported in 2017, FAA used a service based contract for Automatic Dependent Surveillance-Broadcast system (ADS-B) estimated to cost $1.8 billion through 2025 and a total lifecycle cost through 2035 of $4.4 billion.

include any operating and maintenance costs which are not covered by the auction revenue and would need to be funded by annual agency budgets.

The most recent auction of Government spectrum was in 2015 and it greatly exceeded expectations, raising over $40 billion for the agencies that released their spectrum. However, that auction included more spectrum than FAA and partners plan to auction for SENSR. Moreover, the actual market value of spectrum can be highly uncertain and impacted by a range of economic factors as well as the physical properties of the spectrum band itself. Estimates for the value of the spectrum we reviewed for auction are wide ranging.

As a result of these risks and uncertainties, it is unclear if the program will be able to raise enough auction revenue to cover 110 percent of its costs, as the Spectrum Pipeline Act requires. FAA's planned mitigations were to identify additional spectrum to include in the auction to increase the proceeds, scale back the program to reduce costs, or seek legislation changes for the program. However, based on feedback from the Technical Panel, FAA is no longer considering additional spectrum, and the full 50 MHz may not be available. FAA and partner agencies may only be able to auction 30 MHz because DOD has additional systems that operate within the proposed band that are not included in the SENSR program and it is uncertain when DOD will complete its analysis of how much of the spectrum can be made available. However, NOAA's decision to remove its key weather requirement from the program may result in lower program costs and help the program reach the 110 percent requirement.

FAA and Partners Plan To Begin Implementing SENSR Before Securing Funding From the Auction

The Spectrum Pipeline Plan had scheduled the JPO to contract with a vendor in 2021 to begin implementing the new surveillance system. However, funding for the contract is not expected to be available until the auction finalizes in 2024, leaving a funding gap of about 3 years. The JPO has identified three options for how to mitigate this anticipated gap in funding: (1) obtain Congressional approval to use spectrum relocation funds for solution implementation, (2) use spectrum relocation funding originally planned for testing and comparing solutions for implementation instead, or (3) have industry finance initial implementation. If these mitigation plans are unsuccessful, SENSR implementation and making the spectrum available for use may be delayed. This delay may lower the market value significantly to potential bidders who are sensitive to the risk of such a large investment with a prolonged period before the spectrum can be used for commercial purposes. FAA and the partner agencies are working to finalize a mitigation strategy for this risk but have yet to identify a specific solution.

FAA and Partners Have Not Yet Decided Who Will Pay for and Operate the System

Another risk centers on the fact that FAA and its partners have not yet made key decisions regarding SENSR's operations. The initial plan for SENSR included a Concept of Operations explaining how the new system would meet the needs of all four agencies. However, the Concept of Operations did not address key operational issues. JPO and Executive Steering Group members pointed out that it was not realistic that one system could meet all four partner agencies' missions simultaneously. They stated they needed a clear agreement on how to prioritize the use of the system for air traffic, severe weather, border protection, and national defense. In response, NOAA removed its most challenging weather requirement, easing the difficulty of developing a Concept of Operations for the remaining agency missions. FAA also stated the second RFI may solicit new technologies that can meet all agency missions. Other unresolved issues include determining system or data ownership and who will actually pay for maintaining and operating the system, as well as how any cost overruns will be shared. These decisions will have significant budgetary and operational consequences. However, FAA has stated these decisions depend on what technology the JPO decides to acquire for SENSR and should be determined at contract award for the new system, currently planned for 2021.

FAA and Its Partners Have Identified Additional Risks to SENSR

In addition to the significant risks outlined above, FAA and partner agencies have identified several additional risks with mitigation plans that we reviewed. Some of these other risks include:

- **Staffing.** GAO states that a best practice of interagency collaboration is including participants with the relevant authority and expertise. However, as previously noted, securing staffing and available expertise has been a challenge. If the JPO is not properly staffed with needed expertise and authority to act, it could delay the program. The JPO had identified three mitigations for this risk, two of which are no longer available as they have been overtaken by events. The third strategy was to identify a place to co-locate all JPO members, which has been completed but does not address the stated risk.

- **Acquisition policies.** Establishing compatible policies and procedures is a best practice for interagency collaboration, according to GAO. While FAA is the lead for SENSR and the JPO has agreed to use AMS, the partner agencies may require additional agency-specific milestones and documents to satisfy their acquisition policies. This could further delay the program and increase costs. FAA is working with partner agencies to identify additional documents; however, officials we spoke with admitted

that not all agency partners have the acquisition officials needed to support SENSR.

Our analysis of all of the FAA-identified risks and associated mitigation plans can be found in exhibit E.

FAA Will Also Face Risks Related to Integrating SENSR Into the NAS and With Critical NextGen Systems

SENSR is a complex program that intends to serve multiple agency missions, and thus it must also integrate into existing and planned air traffic management, law enforcement, national security, and weather systems. However, critical questions remain about the ownership of new systems and data as well as the network necessary to support a new system for tracking aircraft.

Specifically, FAA has not fully analyzed cost risks associated with SENSR's integration with existing and developing NAS programs. The existing radar infrastructure provides data to users and automation systems that air traffic controllers rely on to manage air traffic throughout the NAS. SENSR will be required to fulfill the same role; however, FAA and partner agencies have not identified or developed an integration plan. Moreover, SENSR will need to integrate with systems currently under development. For example, the Next Generation Weather Radar Processor that interprets radar data and provides information to controllers and automation systems will not be deployed until 2020. Our previous work has shown that integration of new systems into the NAS can be a major challenge and result in delays and increased costs.[18] In addition to aircraft surveillance systems, SENSR must integrate with systems for NOAA, DOD, and DHS.

FAA has also not fully analyzed cybersecurity risks or their mitigations for SENSR, which will be crucial in protecting the air traffic control system. The transition from a proprietary, relatively isolated air traffic control system to one that uses newer technologies creates ongoing challenges for FAA and its contractors, who own and operate safety-critical systems for FAA, including its new satellite-based surveillance system ADS-B. To address cybersecurity concerns with the new system, the JPO formed a cross-agency Cybersecurity Team and included a section in the second RFI to solicit vendors' solutions for cybersecurity issues.

[18] *Weaknesses in Program and Contract Management Contribute to ERAM Delays and Put Other NextGen Initiatives at Risk* (OIG Report No. AV2012179), September 13, 2012.

However, the costs for identifying cyber vulnerabilities, preventing them, and mitigating their effects are uncertain.

The SENSR solution must also meet spectrum compatibility requirements to integrate effectively into the NAS. SENSR plans to implement surveillance systems that operate on the same spectrum frequency, 1090 MHz, as safety-critical systems including the onboard Traffic Collision Avoidance System (TCAS)[19] and ADS-B. While SENSR will ideally increase the spectrum efficiency of current allocations, there is a risk of the frequency becoming too congested when ADS-B becomes the primary surveillance system in 2020 and beyond. Frequency congestion can block critical transmissions from safety systems such as TCAS (which detects potential in flight collisions between aircraft). The JPO has established a cross-agency Spectrum Team to consider these risks and included questions on spectrum issues in its second RFI. However, until the JPO selects a technology and develops more detailed plans, it is unclear if or how SENSR will impact congestion on safety-critical frequencies.

Conclusion

The SENSR program is expected to help revitalize our aging radar infrastructure and finance backup capabilities for the ADS-B surveillance system. However, SENSR requires a complex coordination effort with partner agencies to combine their own diverse agency goals into a single program. Moreover, FAA and partner agencies have identified a number of risks that pose significant challenges to the program. While SENSR is still in the early stages, key decisions must be made in the near term that will help FAA successfully advance this ambitious and wide-reaching effort, and sustained management attention will be required to mitigate the program's significant risks.

Recommendations

To improve the coordination, planning, and risk mitigation of the SENSR program, we recommend that the Federal Aviation Administrator:

1. Develop and implement an integrated Schedule, Budget, and Organizational Chart that incorporates all the partner agencies for the SENSR program.

[19] TCAS issues advisories to pilots to take evasive actions when the system detects a potential collision with another aircraft. It is the last line of defense to prevent aircraft collisions.

2. Develop and implement a plan to identify and mitigate risks associated with the integration of SENSR into NextGen programs as well as into systems throughout the NAS.

Agency Comments and OIG Response

We provided FAA with our draft report on February 19, 2019, and received the Agency's formal response on March 25, 2019, which is included as an appendix to this report. In its response, FAA concurred with both of our recommendations and provided appropriate actions with completion dates. Accordingly, we consider both recommendations resolved but open pending completion of the planned actions.

In its response, FAA stated that our audit is premature because SENSR is still in the initial planning and definition phase. However, we were directed by the House Committee on Appropriations to examine the program due to the significant investment—an estimated $12 billion—and the close coordination with agencies outside the Department that is required. FAA also disagreed with a number of statements in this report, which we address as follows:

- First, FAA objects to our finding that the Agency has not yet developed a shared inventory of related Government programs and expertise, but instead is relying on industry for solutions. FAA's position is that potential technical solutions should not be dictated to industry by the Government. We agree that the Government should not dictate solutions. However, as we reported, FAA and its partner agencies (and their contractors) have opportunities to ensure they are effectively leveraging resources, best practices, and lessons learned to prevent duplication of effort. This will help protect the taxpayer's investments in various developmental and capital efforts at multiple Federal agencies on a complex and innovative program.

- Second, FAA disagrees with our conclusion that removal of the "fly-off" competition (or Phase II of the program) may increase the risk that the selected solution may not meet the SENSR program's requirements. FAA argues that this phase was never intended to be a formal test but rather allow industry to mature their technologies and for the Government to evaluate them. FAA has determined that the technologies available at this time are mature enough and that this phase is no longer needed. However, as noted in our report, FAA originally intended for prospective vendors to build and test the four most promising technologies to compare them before making a final investment decision. In accordance with FAA's own AMS, system testing must be commensurate with its

complexity and level of risk. Given FAA's history of lengthy radar-related acquisitions and the complexity of the NAS, the SENSR effort may entail more than a commercial off-the-shelf acquisition. Our main concern is that FAA's testing be robust enough to fully evaluate the proposed technology prior to contract award. This would help ensure the system selected for full scale production and deployment can perform as intended, meet requirements, and be integrated into the NAS without unanticipated cost increases, schedule slips, or performance shortfalls.

- Third, FAA disagrees with our assertion that SENSR could result in unacceptable levels of radio frequency congestion in the 1090 MHz band, the frequency that ADS-B must share with SENSR and other safety critical systems. As noted in our report, the satellite-based ADS-B system will become a key element for tracking aircraft throughout the NAS in 2020 (and as airspace users purchase and install new equipment, as mandated by FAA). As such, there is a risk of the frequency becoming too congested due to the combination of systems relying on it, particularly in crowded airspace on the East Coast. We reported on this very issue in previous audit reports in 2010[20] and 2012[21]—before the SENSR program was established. Further, FAA's own surveillance strategy analysis identified 1090 MHZ congestion as an Agency-level risk that still needs to be addressed.

- Finally, FAA states that a number of risks we reported on have since been removed from their risk registry. We recognize that risks evolve over time on such a complex program like SENSR. The SENSR Program is in its early stages, and risks and their associated mitigation plans will be added or removed as the program advances. However, our report represents only a snapshot of the risks that FAA and its partner agencies were considering and developing mitigations for at the time of our review. Moreover, we are unclear on why some of the risks we reported on have been removed from the risk registry. For example, FAA removed the risk that a partner agency may decide to no longer participate in the SENSR program because the risk "was never formally accepted." However, this risk has already occurred—as noted in our report, NOAA has largely withdrawn from the program. Ultimately, effective risk identification and mitigation will remain critical to managing this innovative program for procuring a new generation of radars.

[20] *FAA Faces Significant Risks in Implementing the Automatic Dependent Surveillance – Broadcast Program and Realizing Benefits* (OIG Report No. AV2011002), October 12, 2010.
[21] *Status of Transformational Programs and Risks to Achieving NextGen Goals* (OIG Report No. AV2012094), April 23, 2012.

Actions Required

We consider all recommendations resolved but open pending completion of planned actions.

Exhibit A. Scope and Methodology

We conducted our work from October 2017 to February 2019 in accordance with generally accepted Government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives, which were to assess FAA SENSR program's (1) progress, including leveraging of work conducted by other agencies, and (2) plan to mitigate program risks, such as integration with NextGen and the NAS.

To assess the SENSR program's progress, including leveraging of work conducted by other agencies, we reviewed the Spectrum Pipeline Plan and compared it to FAA's actual progress. To determine its progress, we reviewed the SENSR program's first and second RFI, Memorandum of Understanding, Memorandum of Agreement, Concept of Operations, and other program documents. We interviewed the Executive Steering Group and JPO to determine the status of the program along with the level of collaboration across the partner agencies and identify opportunities for leveraging of resources. We also identified and assessed whether FAA and partner agencies were following GAO best practices for interagency collaboration.

To assess the SENSR program's plan to mitigate program risks, such as integration with NextGen and the NAS, we reviewed FAA's risk registry to determine the high-impact risks to the program and evaluated the mitigations provided. We also reviewed the cost, schedule, and performance constraints of other surveillance and radar acquisitions for comparison to SENSR. We reviewed the MITRE Strategic Spectrum Study on commercial value of spectrum to help determine the level of risk associated in meeting SENSR's required auction value compared to the estimated cost. We met with officials from Executive Steering Group, JPO, FAA's Surveillance Office, FAA's NextGen Office, and Program Management Office to identify and get their perspective on additional risks and planned mitigations. Finally, we reviewed the enterprise architecture and SENSR program documents to determine which systems SENSR would be consolidating and which would have to interface with SENSR once implemented. We interviewed program officials to determine if they had assessed the risks associated with integrating the new system.

Exhibit B. Organizations Visited or Contacted

FAA Organizations

Interagency Planning Office

NextGen Office

Program Management Office

Spectrum Engineering and Policy Office

William J. Hughes Technical Center

Other Organizations

Department of Defense

Department of Homeland Security

Government Accountability Office

National Oceanic and Atmospheric Administration

The MITRE Corporation

Exhibit C. Table of Existing Surveillance Systems That May Be Replaced by SENSR

Contract Year	Surveillance Systems	Operational Systems
1975	*Airport Surveillance Radar* (ASR-8)	47
1983	*Airport Surveillance Radar* (ASR-9)	125
1984	*Mode-Select* (Mode-S)	134
1988	*Air Route Surveillance Radar* (ARSR-4)	43
1988	*Terminal Doppler Weather Radar* (TDWR)*	44
1988	*NextGen Weather Radar* (NEXRAD)	156
1990	*Low Level Wind Shear Alert System* (LLWAS)**	40
1996	*Airport Surveillance Radar* (ASR-11)	65
1996	*Ground Positioning Navigation* (GPN-30)	81
1996	*Monopulse Secondary Surveillance Radar* (MSSR)	65
1998	*Air Traffic Control Beacon Interrogator* (ATCBI-6)	133
2006	*Common Air Route Surveillance Radar (CARSR)*	80
Total	**Operational Surveillance Systems**	**1013**

Source: OIG analysis of FAA data

*TDWR is included in SENSR program documentation we reviewed along with FAA's Enterprise Architecture in 2016; however, it was removed from the SENSR program Enterprise Architecture in 2017.

**LLWAS is not included in SENSR program documentation we reviewed; however, it is included in FAA's SENSR program Enterprise Architecture in 2017.

Exhibit D. OIG Assessment of SENSR's Application of GAO Best Practices

Best Practice		OIG Assessment
1	Entity defines and articulates a common outcome.	FAA and partner agencies signed a Memorandum of Understanding and Memorandum of Agreement to provide a basis for mission and responsibilities. Further, FAA and partner agencies created a Missions Priorities document that restates the primary goals of SENSR; however, JPO and Executive Steering Group officials we interviewed revealed that partner agencies have not reached a consensus on the program goals and have competing expectations for the objectives of the program.
2	Entity includes all relevant participants with the appropriate knowledge, skills, ability, and authority to contribute and commit resources on behalf of their agency.	While FAA established a JPO and Executive Steering Group and are continuing to staff workgroups, interviews with program officials revealed that hiring skilled staff with the needed experience and expertise has been a challenge. Furthermore, not all partner agencies agree that JPO and Executive Steering Group representatives have the appropriate authority to act on behalf of their agencies. For example, DOD has decided to independently circulate a memo stating the authority of its program leads.
3	Entity identifies and addresses needs by leveraging resources.	FAA and partner agencies established a JPO and Spectrum Pipeline plan as well as leveraged the Multifunction Phased Array Radar (MPAR) technology to receive initial funding and approval for the SENSR program; however, the agency has not taken full advantage of opportunities to leverage resources from the partner agencies, which may result in additional program costs and duplication of effort. For example, partner agencies have not created an inventory of shared research and development activities nor have they developed an integrated budget, organizational chart, or schedule.
4	Entity agrees on roles and responsibilities.	FAA and partner agencies have made some progress in specifying roles as described in the Memorandum of Agreement; however, interviews with other SENSR participants revealed concerns that partner agencies have not developed an integrated organizational chart.
5	Entity establishes compatible policies, procedures, and other means to operate across agency boundaries.	FAA and partner agencies have agreed to use AMS as a framework for acquisition execution of SENSR; however, partner agencies may still require agency specific milestones and documents to satisfy their acquisition policies which could further delay the program and increase costs. Additionally, the OIG has open recommendations relating to the sufficiency of the AMS process that FAA has agreed to address.

Best Practice		OIG Assessment
6	Entity develops mechanisms to monitor, evaluate, and report on results.	The JPO and Executive Steering Group are tasked with addressing critical issues that require the guidance and prioritization of planned activities; however, interviews with program officials suggested that dispute resolution has been a challenge, and OIG has not obtained documented evidence of resolved disputes. It is too early to report on the effectiveness and efforts of the Executive Steering Group.
7	Entity reinforces agency accountability for collaborative efforts through agency plans and reports.	While FAA and its partner agencies developed and submitted the Spectrum Pipeline Plan, Joint Program Office, Executive Steering Group, and working groups, the program has already faced delays in meeting target dates in the Spectrum Pipeline Plan.

Source: OIG analysis of FAA information and GAO's best practices for interagency collaboration

Exhibit E. OIG Assessment of FAA-Identified Risks and Mitigation Strategies

Risk Impact		Risk Probability	Risk Description	OIG Assessment
1	High*	66% - 90%	Environmental reviews may delay deployment if SENSR does not utilize existing infrastructure.	Risk lacks a mitigation strategy.
2	High*	66% - 90%	Lack of expertise and authority of SENSR staff may hinder program and prevent leads from acting on behalf of their agency.	Risk mitigation strategy has been ineffective at addressing risk and not all strategies address cause of challenges.
3	High*	66% - 90%	Partner agencies may require acquisition milestones in addition to the designated Acquisition Management System (AMS).	Risk mitigation is comprehensive, but ultimately dependent upon acquiring acquisition expertise.
4	High*	60% - 80%	Inability to develop Integrated Master Schedule with agency-specific tasks may delay program and require additional costs.	Risk lacks a mitigation strategy.
5	High	60% - 80%	Department of Defense must determine compatibility of non-SENSR systems by 2021.	Mitigation strategy depends on program that has already faced delays.
6	High	60% - 80%	Department of Defense must outline restrictions for existing systems in the 1300-1350 frequencies.	Mitigation strategy may result in increased costs in order to accommodate unplanned analysis.
7	High	60% - 80%	Protests of contract award may stall and significantly delay SENSR schedule.	Risk mitigation plan is comprehensive.
8	High	33% - 66%	Spectrum auction value may not cover 110% of program costs as required by the Spectrum Pipeline Act.	Risk mitigation strategy may not be sufficient and program is at risk of eliminating requirements to reduce costs.
9	High	33% - 66%	Solution Implementation plans to begin before spectrum auction funding is secured.	Risk mitigation strategy may require legislative change, external funding, and elimination of testing to avoid Anti-Deficiency Act Violation.

Risk Impact		Risk Probability	Risk Description	OIG Assessment
10	High	33% - 66%	Inability to develop foundational set of requirements from which future changes will be controlled.	Risk strategy is appropriate, but program officials need to gather consensus on common definitions for requirement characterization.
11	High*	33% - 66%	Evaluation of industry SENSR solutions may take significant time due to complexity of solutions.	Risk strategy is detailed but dependent upon risk outcomes of program requirements and valuation estimates.
12	High*	20% - 40%	FAA and partner agencies must determine ownership of future SENSR solution.	Risk likelihood is understated and mitigation strategy does not outline plan for determining system ownership.
13	High*	0% - 20%	If any partner agencies decide not to participate in the program than the SENSR program may be adversely affected.	NOAA has already largely withdrawn from the SENSR program. While NOAA withdrawing reduces some of the risks to the program, it also reduces the potential benefits, number of agencies to share the future operating and maintenance costs, and may impact what radar solutions can be used for SENSR due to possible interference with existing NOAA radars.

Source: OIG analysis of FAA information

* Based on FAA's response to our draft report in March 2019, these risks have since been closed or their ratings adjusted. However, OIG does not necessarily agree with FAA's updated assessment of these risks, as described in our response to the Agency's comments.

Exhibit F. List of Acronyms

ADS-B	Automatic Dependent Surveillance-Broadcast
AMS	Acquisition Management System
ARSR	Air Route Surveillance Radar
ASR	Airport Surveillance Radar
ATCBI	Air Traffic Control Beacon Interrogator
CARSR	Common Air Route Surveillance Radar
DHS	Department of Homeland Security
DOD	Department of Defense
DOT	Department of Transportation
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
GAO	Government Accountability Office
GPN	ground positioning navigation
JPO	Joint Program Office
LLWAS	Low Level Wind Shear Alert System
MHz	megahertz
Mode-S	mode select
MPAR	Multifunction Phased Array Radar
MSSR	Monopulse Secondary Surveillance Radar
NAS	National Airspace System
NEXRAD	Next Generation Weather Radar
NextGen	Next Generation Air Transportation System
NOAA	National Oceanic and Atmospheric Administration
NTIA	National Telecommunications and Information Administration
OIG	Office of Inspector General
RFI	Request for Information
SENSR	Spectrum Efficient National Surveillance Radar
TCAS	Traffic Collision Avoidance System
TDWR	Terminal Doppler Weather Radar

Exhibit G. Major Contributors to This Report

NATHAN **CUSTER**	PROGRAM DIRECTOR
JAMES **OVELMEN**	PROJECT MANAGER
MELISSA **PYRON**	SENIOR AUDITOR
OLEVIA **BETHUNE**	SENIOR AUDITOR
MICHAEL J. **SCOTT**	SENIOR ANALYST
COLBY **HESS**	ANALYST
GENESIS **TURMAN**	ANALYST
AMY **BERKS**	SENIOR COUNSEL
AUDRE **AZUOLAS**	SENIOR TECHNICAL WRITER

Appendix. Agency Comments

Federal Aviation Administration

Memorandum

Date: March 25, 2019

To: Matthew E. Hampton, Assistant Inspector General for Aviation Audits

From: H. Clayton Foushee, Director, Office of Audit and Evaluation, AAE-1

Subject: Federal Aviation Administration's (FAA) Response to Office of Inspector General (OIG) Draft Report: FAA Has Taken Steps to Advance the SENSR Program

The recently authorized Spectrum Efficient National Surveillance Radar (SENSR) program is a unique opportunity for the FAA, in cooperation with other government agencies, to revitalize the nation's aging surveillance infrastructure. As the acquisition lead agency for the SENSR program, the FAA has successfully established an interagency Joint Program Office (JPO) to manage the unique challenges associated with organizing a multi-agency program and funding source (Spectrum Relocation Fund).

The Agency believes the OIG's audit is premature because the SENSR program is still in the initial planning, program definition and pre-source selection phase, when all aspects of the program are still in the interagency coordination and planning phase.

The FAA has reviewed the OIG draft report and believes there are areas where it could be improved for accuracy. For example:

- The draft report states that the FAA has not established a shared inventory of related programs; instead, it is relying on industry to identify potential solutions. The FAA has and will continue to leverage information from other relevant programs to support the SENSR initiative and development of key program documentation (*e.g.*, Multi-Function Phase Array Radar (MPAR) was used for development of engineering documentation). Our position is that potential technical solutions should not be dictated to industry by the government, and technical solutions proposed by industry will leverage prior relevant research initiatives. In addition, the JPO will continue to assess potential government-furnished information, which may incorporate relevant prior initiatives, and we will provide this information as part of the program execution as appropriate.
- The draft report inaccurately states that FAA adjusted the Phase II "testing and evaluation phase," which may increase the risk that the solution selected may not meet requirements. Phase II was never intended to be a formal test phase to determine if proposed solutions would meet program requirements. Rather, it was conceived to allow industry to

continue to mature their technology and for the government to evaluate technology maturation compared to what was initially proposed. The decision to cancel Phase II was based upon the "Industry Request for Information 1.0" responses that technology maturation was not a key discriminator, rendering Phase II unnecessary. The elimination of this exercise allowed time to be better spent on further advancement of the program. Testing to evaluate performance against requirements will be conducted after contract award during the qualification-testing phase.

- The draft report erroneously states, "There is a risk of the frequency becoming too congested when ADS-B becomes the primary surveillance system in 2020 and beyond." SENSR equipment deployment will be replacing the existing surveillance systems within the 1030-1090 MHz band, not adding to the current quantity of systems within this band. The draft report language inappropriately suggests SENSR could result in unacceptable 1090 MHz congestion.
- The draft report references 13 high risks throughout Exhibit E. However, the report does not reflect that of the 13 identified risks, the FAA acknowledged and is in the process of mitigating five risks. The disposition of the remaining eight risks are as follows:
    - Retired six risks and OIG should remove these from its high-risk count.
    - Dispositioned two risks as watch items. FAA is actively addressing these risks under normal program management activities, and OIG should remove them from the high-risk count.

The FAA concurs with both of the OIG recommendations as written. For recommendation 1, we plan to complete actions by July 31, 2019. For recommendation 2, we plan to complete actions by June 30, 2019.

We appreciate this opportunity to offer additional perspective on the OIG draft report. Please contact H. Clayton Foushee at (202) 267-9000 if you have any questions or require additional information about these comments.

U.S. DOT OIG

Fraud & Safety Hotline

hotline@oig.dot.gov | (800) 424-9071

https://www.oig.dot.gov/hotline

Our Mission

OIG conducts audits and investigations on behalf of the American public to improve the performance and integrity of DOT's programs to ensure a safe, efficient, and effective national transportation system.

OFFICE OF INSPECTOR GENERAL
U.S. Department of Transportation
1200 New Jersey Ave SE
Washington, DC 20590

www.oig.dot.gov