United States Government Accountability Office

Testimony

Before the Committee on Commerce, Science, and Transportation, U.S. Senate

PUBLIC SAFETY COMMUNICATIONS

Preliminary Information on FirstNet's Efforts to Establish a Nationwide Broadband Network

Statement of Mark L. Goldstein, Director, Physical Infrastructure Issues

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Why GAO Did This Study

Public safety officials rely on thousands of separate radio systems to communicate during emergencies, which often lack interoperability, or the ability to communicate across agencies and jurisdictions. The 2012 act created FirstNet to establish a nationwide, interoperable, wireless broadband network for public safety use. In doing so, the act established numerous responsibilities for FirstNet, provided $7 billion from spectrum auctions proceeds for the network's construction, and required FirstNet to be self-funding beyond this initial allocation. As part of the effort, FirstNet is working with five "early builder projects" that have permission to build local and regional interoperable public-safety broadband networks.

This statement is based on preliminary information from GAO's ongoing review of FirstNet. This statement addresses (1) FirstNet's progress carrying out its responsibilities and establishing internal controls, (2) how much the network is estimated to cost and how FirstNet plans to become self-funding, and (3) what lessons can be learned from the early builder projects. GAO reviewed relevant FirstNet documentation and public-safety network cost estimates recommended by agency officials and experts; surveyed the state-designated FirstNet contact in 50 states, 5 territories, and the District of Columbia; and interviewed FirstNet officials and public safety and wireless industry stakeholders selected for their telecommunications and public safety experience, among other things.

What GAO Found

GAO's ongoing work has found that the First Responder Network Authority (FirstNet) has made progress carrying out the responsibilities established in the 2012 Middle Class Tax Relief and Job Creation Act (the 2012 act) but lacks certain elements of effective internal controls. FirstNet has made progress establishing an organizational structure, planning the nationwide public-safety broadband network, and consulting with stakeholders. Nevertheless, stakeholders GAO contacted cited upcoming issues, such as deciding the level of network coverage, which will be difficult for FirstNet to address as it continues to carry out its responsibilities. With respect to internal controls, FirstNet has begun establishing policies and practices consistent with federal standards, but it has not fully assessed its risks or established Standards of Conduct. Given that FirstNet faces a multitude of risks to achieve its complex objectives, fully assessing risks would help FirstNet respond to risks in a proactive way. Developing standards of conduct would help FirstNet address conduct and performance issues in a timely manner.

A nationwide public-safety broadband network is estimated to cost billions of dollars, and FirstNet faces difficult decisions determining how to fund the network's construction and ongoing operations. Various entities have estimated the cost to construct and operate such a network from $12 to $47 billion over the first 10 years. The actual cost of FirstNet's network will be influenced by FirstNet's (1) business model, especially the extent of commercial partnerships; (2) use of existing infrastructure; (3) efforts to ensure network reliability; and (4) network coverage. For example, the cost of the network will likely increase if FirstNet does not utilize commercial partnerships and at least some existing infrastructure. The 2012 act provides FirstNet $7 billion to establish the network. To become self-funding, FirstNet is authorized to generate revenue through user fees and commercial partnerships, the latter of which can involve secondary use of the network for non-public safety services. However, GAO's ongoing work suggests that FirstNet faces difficult decisions in determining how to best utilize these revenue sources. For instance, widespread network coverage can attract more users, and thus user fee revenue, but is expensive to construct and maintain, especially in rural areas.

FirstNet has taken steps to collect and evaluate information and lessons from the five "early builder projects" that are developing local and regional public-safety networks, but could do more to ensure that it properly evaluates and incorporates these lessons. For example, FirstNet has asked the projects to report on the experiences of their networks' users and has assigned contractors to collect and log lessons. However, preliminary results indicate that FirstNet does not have a plan that clearly articulates how it will evaluate those experiences and lessons. GAO has previously found that a well-developed evaluation plan for projects like these can help ensure that agencies obtain the information necessary to make effective program and policy decisions. Given that the early builder projects are doing on a local and regional level what FirstNet must eventually do nationally, an evaluation plan can play a key role in FirstNet's strategic planning and program management, providing feedback on both program design and execution and ensuring FirstNet has not missed opportunities to incorporate lessons the projects have identified.

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Chairman Thune, Ranking Member Nelson, and Members of the Committee:

I am pleased to be here today to discuss our ongoing work on the First Responder Network Authority (FirstNet). The 2012 Middle Class Tax Relief and Job Creation Act (the 2012 Act) created FirstNet as an independent authority within the Department of Commerce's National Telecommunications and Information Administration (NTIA).[1] FirstNet is tasked with establishing a nationwide, interoperable, wireless broadband network specifically for public safety (hereafter, the public safety network). We are currently finalizing a report on FirstNet's efforts; as such, the findings that I am reporting to the Committee today are preliminary in nature.

Communication systems are essential for public safety officials—especially first responders such as police, firefighters, and paramedics—to gather and share information during emergencies. Today, first responders rely on thousands of separate, incompatible, and often proprietary land mobile radio (LMR) systems for their mission-critical voice communications. Oftentimes these LMR systems lack "interoperability"—the capabilities that allow first responders to communicate with their counterparts in other agencies and jurisdictions—which has been a long-standing concern. For example, during the terrorist attacks of September 11, 2001, and also during Hurricane Katrina in 2005, the lack of interoperable public safety communications hampered rescue efforts. To supplement these LMR systems, many first responders also use commercial wireless networks for data transmissions. While FirstNet's public safety network will not initially improve the interoperability of voice communications among first responders, the network is expected to support important data transmission (such as security-camera video feeds). For mission-critical voice communications, public safety entities will likely continue to rely on their LMR systems for many years.

The 2012 act established numerous responsibilities for FirstNet, allocated billions of dollars for the network's construction, and set aside radio

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[1]Pub. L. No. 112-96, § 6204(a), 126 Stat. 156, 208 (2012).

frequency spectrum on which it will operate.[2] Public safety users of the network, and potentially other "secondary" users,[3] may be charged fees to use the network, much as they currently pay to use commercial wireless networks. To inform its work, FirstNet has been consulting with numerous federal, state, local, and tribal jurisdictions, and is working with five "early builder projects" that received federal funding to deploy local and regional public-safety broadband networks similar to what FirstNet is required to establish on a national scale. FirstNet also has to develop a business plan that supports the upfront and ongoing costs of the network.

My statement today presents preliminary information from our ongoing review—requested by this Committee—of FirstNet. My statement will address (1) the extent to which FirstNet is carrying out its responsibilities and establishing internal controls for developing the public safety network, (2) how much the network is estimated to cost to construct and operate and how FirstNet plans to become a self-funding entity, and (3) what lessons can be learned from local and regional public-safety-network early builder projects.

For our ongoing work, we reviewed FirstNet documentation—such as its Requests for Information (RFI) and FirstNet board meeting materials—and compared FirstNet's efforts with requirements established in the 2012 act.[4] We also compared FirstNet's efforts to establish internal controls

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[2]Radio signals travel through space in the form of waves. These waves vary in length, and each wavelength is associated with a particular radio frequency. The radio frequency spectrum is the part of the natural spectrum of electromagnetic radiation lying between the frequency limits of 3 kilohertz (kHz) and 300 gigahertz (GHz).

[3]The 2012 act allows FirstNet to establish agreements that allow access to the public safety network through entities involved in the construction, management, or operation of the network, on a secondary basis for services other than public safety, such as individual commercial customers using the network much as they currently use existing commercial networks. Pub. L. No. 112-96, § 6208(a)(2)(B), 126 Stat. 156, 216, 208.

[4]We did not review FirstNet's progress against every responsibility established for it in the 2012 act, because it is not possible for FirstNet to have made progress on some responsibilities.

with criteria established in the federal Standards for Internal Control.[5] We reviewed cost estimates for a nationwide public-safety broadband network from the Congressional Budget Office, the Federal Communications Commission (FCC), and academics.[6] We reviewed documentation related to how FirstNet plans to collect and evaluate lessons learned from the early builder projects—such as Spectrum Manager Lease Agreements and Key Learning Conditions Plans—and assessed these plans against key features of a well-developed evaluation plan for pilot projects identified by our previous reports.[7] To obtain stakeholder views, we surveyed all 50 states, the District of Columbia, and 5 U.S. territories (hereafter, states) and received 55 responses, for a 98 percent response rate.[8] We interviewed FirstNet and NTIA officials and a variety of other stakeholders, such as officials from state and local public safety entities, commercial wireless carriers, subject matter experts, public safety associations, federal agencies including FCC and the Department of Homeland Security, and government officials in Sweden responsible for establishing a public-safety communications

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[5]GAO, *Standards for Internal Control in the Federal Government*, GAO/AIMD-00-21.3.1 (Washington, D.C.: Nov. 1999). The most recent version of these standards was issued in September 2014. GAO, *Standards for Internal Control in the Federal Government*, GAO-14-704G (Washington, D.C.: Sept. 10, 2014). These new standards become effective October 1, 2015, but an entity's management may elect early adoption. According to FirstNet officials, as the Department of Commerce proceeds with the rollout of these revisions, NTIA and FirstNet will also adopt these new standards. Although these new standards are not yet effective and FirstNet is not required to abide by them, given that they will be effective soon and that FirstNet is still in the process of developing its internal control system, doing so according to these new standards would prevent FirstNet from having to re-design any elements of its system later this year.

[6]We identified these cost estimates through interviews with agency officials and subject matter experts. We did not perform a full data reliability assessment of the numbers in these estimates because the purpose of the estimates within the scope of our review was to provide illustrative examples.

[7]See, for example, GAO, *Tax Administration: IRS Needs to Strengthen Its Approach for Evaluating the SRFMI Data-Sharing Pilot Program*, GAO-09-45 (Washington, D.C.: Nov. 7, 2008). GAO-09-45 identified key features of an evaluation plan through the consultation of social science and evaluation literature, along with published GAO guidance.

[8]We emailed the survey to the FirstNet Single Point of Contact in each state. We administered the survey from October 2014 through November 2014. We did not receive a response from Puerto Rico.

network in their country.[9] We also interviewed officials from the five current early builder projects (Los Angeles, CA; Adams County, CO; New Jersey; New Mexico; and Harris County, TX) and three projects that were canceled (Charlotte, NC; Mississippi; and San Francisco, CA).

Our ongoing review is being conducted in accordance with generally accepted government auditing standards. We discussed the information in this statement with FirstNet officials to obtain their views. As our work is ongoing, we are not making recommendations for FirstNet at this time; we plan to further analyze information related to these issues and provide this Committee with a final report later this year. At this Committee's request, we also plan to review FirstNet's efforts to satisfy key technical requirements of the network in the future.
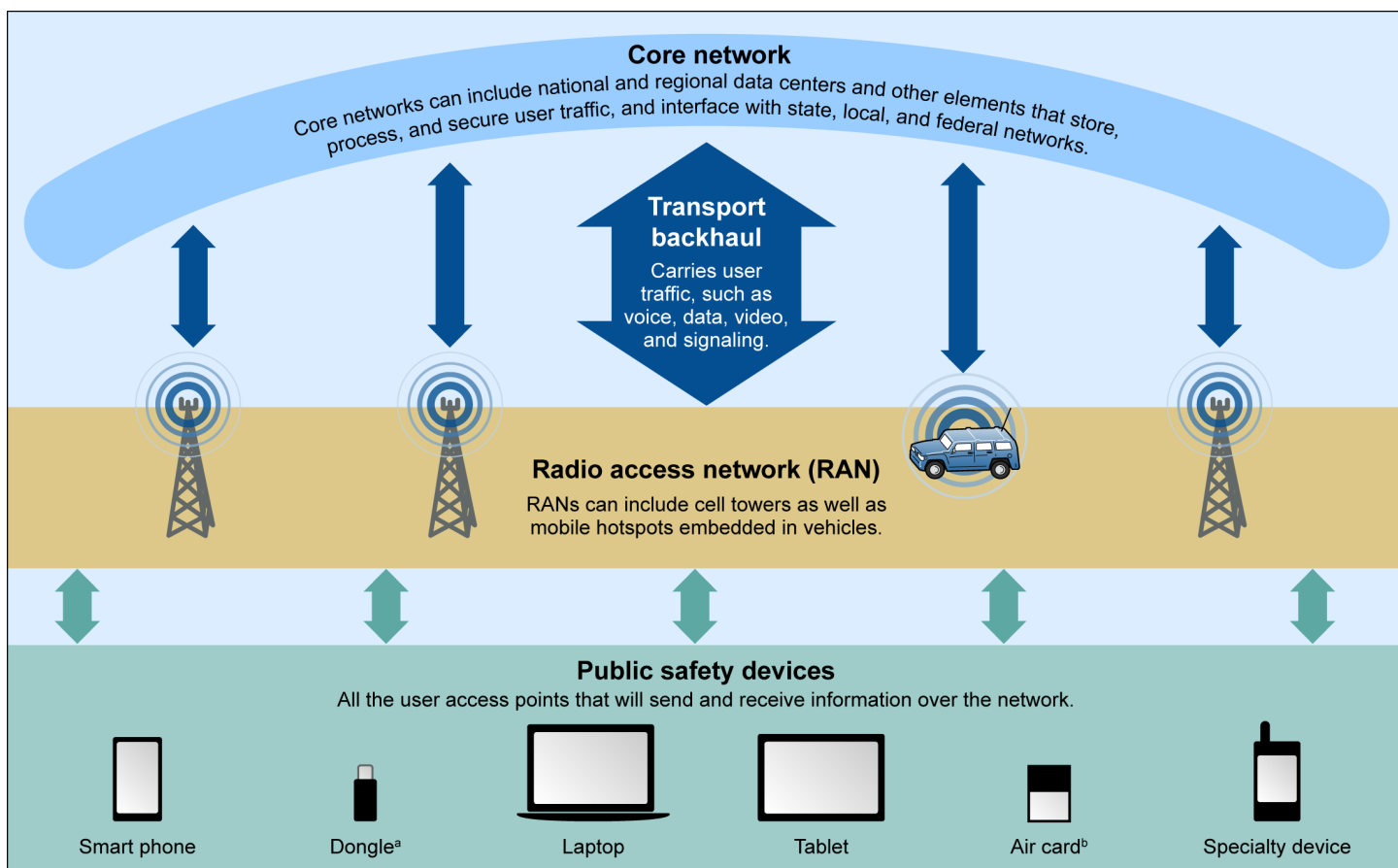
Background

The 2012 act established numerous responsibilities for FirstNet, most of which relate directly to developing the public safety network. For example, in establishing the network, FirstNet must

- issue open, transparent, and competitive Requests for Proposals (RFP) to private sector entities for the purpose of building, operating, and maintaining the network;

- enter into agreements to use, to the maximum extent economically desirable, existing commercial, federal, state, local, and tribal infrastructure;

- promote competition in the public-safety equipment marketplace by requiring that equipment for the network be built to open, non-proprietary standards; and

- develop the technical and operational requirements for the network, as well as the practices and procedures for managing and operating it.

[9]We selected stakeholders by considering their involvement in the early builder project jurisdictions, experience with operating and using wireless communications systems and public-safety communications systems and devices in particular, familiarity with FirstNet and its mission, and—to obtain a cross-section of public safety disciplines—their public safety role.

In establishing the infrastructure for the public safety network, the 2012 act requires FirstNet to include the network components depicted in figure 1.[10]

Figure 1: Key Elements of First Responder Network Authority's Public Safety Network

Core network
Core networks can include national and regional data centers and other elements that store, process, and secure user traffic, and interface with state, local, and federal networks.

Transport backhaul
Carries user traffic, such as voice, data, video, and signaling.

Radio access network (RAN)
RANs can include cell towers as well as mobile hotspots embedded in vehicles.

Public safety devices
All the user access points that will send and receive information over the network.

Smart phone   Dongle[a]   Laptop   Tablet   Air card[b]   Specialty device

Source: GAO. | GAO-15-380T

[a]Generally, "dongles" are small devices that plug into computers and serve as an adapter or as a security measure to enable the use of certain software.

[b]Generally, "air cards" are wireless adapters for sending and receiving data in a cellular network.

[10]Pub. L. No. 112-96, § 6202(b), 126 Stat, 156, 206.

In developing the public safety network, FirstNet must work with a variety of stakeholders. The 2012 act required FirstNet to be headed by a 15-member board with 3 permanent members and 12 individuals appointed by the Secretary of Commerce.[11] The 2012 act also required FirstNet to establish a standing public safety advisory committee to assist it in carrying out FirstNet's responsibilities and consult with federal, regional, state, local, and tribal jurisdictions on developing the network.[12] For state, local, and tribal planning consultations, FirstNet is required to work with the Single Points of Contact (SPOC) who have been designated by each state.[13] Specifically, SPOCs are the individuals responsible for working with FirstNet in their states, and FirstNet will work through these individuals to gather requirements from key stakeholders in each state. The 2012 act requires FirstNet to notify the states when it has completed its RFPs for building, operating, and maintaining the public safety network.[14] Once a state receives the details of FirstNet's plans, it has 90 days either to agree to allow FirstNet to construct a Radio Access Network (RAN) in that state or notify FirstNet, NTIA, and FCC of its intent to deploy its own RAN.[15] The 2012 act required FCC, the entity responsible for managing and licensing commercial and non-federal spectrum use—including spectrum allocated to public safety—to grant FirstNet the license to the public safety spectrum that the act set aside for the network.[16] FCC has also conducted spectrum auctions, as required by

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[11]The 3 permanent members are the Secretary of Homeland Security, the Attorney General, and the Director of the Office of Management and Budget. The appointed members are required to have public safety experience or technical, network, or financial expertise. Pub. L. No. 112-96, § 6204(b)(2)(B), 126 Stat. 156, 209.

[12]Pub. L. No. 112-96, § 6205, 126 Stat. 156, 211.

[13]Pub. L. No. 112-96, §6206(c)(2)(B), 126 Stat. 156, 214.

[14]Pub. L. No. 112-96, § 6302(e)(1), 126 Stat. 156, 219.

[15]A state that "opts out" of FirstNet's network has an additional 180 days to send FCC an alternative plan for constructing, operating, and maintaining its RAN. The plan must demonstrate that the state's proposed RAN would comply with certain minimum technical requirements and be interoperable with FirstNet's network. FCC shall either approve or disapprove the plan. In addition, a state that opts out is required to apply to NTIA for an agreement to use FirstNet's spectrum.

[16]Specifically, the 2012 act required FCC to reallocate the "D Block," a previously commercial spectrum block located in the upper 700 megahertz (MHz) band, to public safety and to grant a license to FirstNet for the use of both the existing public-safety broadband spectrum in the upper 700 MHz band and the D Block. Pub. L. No. 112-96, §§ 6101 and 6201, 126 Stat. 156, 205 and 206.

the 2012 act, so that auction proceeds could be used to fund FirstNet. The 2012 act provides $7 billion from these proceeds to FirstNet for buildout of the network, and requires FirstNet to become self-funding beyond this initial $7 billion by generating revenue through user fees and other sources.[17]

Efforts to establish local and regional public-safety networks are also ongoing, and predate the 2012 act. From 2009 to 2011, FCC granted waivers from its public-safety spectrum rules to 22 jurisdictions to allow early deployment of local and regional public-safety broadband networks.[18] Of those 22 jurisdictions, 8 projects received federal funding to deploy their networks.[19] After FCC granted FirstNet its public-safety broadband spectrum license in November 2012, the jurisdictions had to secure a Spectrum Manager Lease Agreement with FirstNet to continue deploying their networks. By August 2014, FirstNet secured these agreements with five original waiver jurisdictions, all of which had received federal funding to deploy their networks: Los Angeles, CA; Adams County, CO; New Jersey; New Mexico; and Harris County, TX; in this statement, we refer to these jurisdictions as early builder projects. Three other original waiver jurisdictions that received federal funds were unable to reach an agreement with FirstNet for various reasons and, thus, were canceled: Charlotte, NC; Mississippi; and San Francisco, CA. FirstNet has not yet determined if or how the early builder project

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[17]The $7 billion is reduced by the amount needed to establish FirstNet, as well as the amount provided to states to help them prepare for the network and, if they choose to opt out of FirstNet's network, to construct their own RANs. NTIA was allowed to borrow $2 billion from the U.S. Treasury to support FirstNet's work prior to the deposit of auction proceeds into the newly created Public Safety Trust Fund, and must reimburse the Treasury from funds deposited into the Public Safety Trust Fund once the spectrum auctions are complete. Pub. L. No. 112-96, §§ 6207 and 6208, 126 Stat. 156, 215.

[18]*Requests for Waiver of Various Petitioners to Allow the Establishment of 700 MHz Interoperable Public Safety Wireless Broadband Networks*, Order, 25 FCC Rcd 5145, (2010); *Requests for Waiver of Various Petitioners to Allow the Establishment of 700 MHz Interoperable Public Safety Wireless Broadband Networks*, Order, 25 FCC Rcd 6783, (2011).

[19]Seven projects received funding through the Broadband Technology Opportunities Program (BTOP), which is a federal grant program to promote the expansion of broadband infrastructure. NTIA was authorized to award BTOP grants through the American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115 (2009). One project, located in Harris County, TX, obtained a grant for its project from the Federal Emergency Management Agency.

networks will be incorporated into its nationwide network, and has noted that various factors could affect this determination.

FirstNet Is Making Progress Meeting Responsibilities but Lacks Certain Elements of Effective Internal Controls

FirstNet Is Making Progress Carrying Out Statutory Responsibilities

Our ongoing work indicates that FirstNet has made progress carrying out its statutory responsibilities in three areas—(1) establishing its organizational structure, (2) planning the public safety network, and (3) consulting with stakeholders—but could face challenges in each of these areas.

Establishing its Organizational Structure

As a newly created entity within the federal government, FirstNet has taken a number of steps to establish its organizational structure and hire staff. As required by the 2012 act, the Secretary of Commerce appointed FirstNet's inaugural Board Members in August 2012 and, in February 2013, established the Public Safety Advisory Committee (PSAC).[20] In April 2013, the FirstNet Board selected an Executive Director to lead its day-to-day operations.[21] Since then, FirstNet has hired, and continues to hire, other senior management personnel to lead its organizational units (such as a Chief Counsel and Chief Administrative, Financial, and Information Officers), Directors and organizational chiefs to further lead and perform its work, and other general staff. As of February 2015, FirstNet had over 120 employees.

[20]Pub. L. No. 112-96, §§ 6204(b) and 6205(a)(1), 126 Stat. 156, 209 and 211.

[21]FirstNet originally called this position "General Manager" but has since changed the position to "Executive Director." FirstNet's first Executive Director resigned in April 2014. As of February 2015, the position was still vacant and FirstNet's Deputy Executive Director is serving as Acting Executive Director.

Stakeholders we spoke with and surveyed for our ongoing work expressed concern that organizational issues have slowed FirstNet's progress, and could continue to do so. In particular, in response to our survey, numerous SPOCs either noted that FirstNet's placement within NTIA could create "bureaucratic" obstacles or that FirstNet should be more independent from NTIA. However, FirstNet officials told us that while FirstNet has leveraged its relationship with NTIA in administrative and legal matters, it exercises strong independence in decisions that are directly program-related. Numerous stakeholders we surveyed and interviewed were also concerned about the pace of FirstNet's hiring, noting that the federal hiring process is too slow, has not allowed FirstNet to hire staff quickly enough, and has delayed FirstNet's progress. For example, FirstNet hired State and Local, Tribal, and Federal Outreach Leads in June and August 2014, almost 2 years after FirstNet's Board Members were appointed, and is still in the process of hiring staff for key positions. According to FirstNet officials, FirstNet faces challenges hiring as quickly as it would like to due to government hiring procedures, but is seeking direct hire authority from the Office of Personnel Management.

Planning the Public Safety Network

To plan the public safety network and help ensure that its approach is open and transparent and meets the 2012 act's requirements, FirstNet intends to follow the Federal Acquisition Regulation (FAR) process for its comprehensive network services procurement.[22] This process will culminate in one or multiple RFPs for "network solution(s)"—that is, proposals for the building, deployment, operation, and maintenance of the public safety network. To help it draft the RFP(s), FirstNet has sought comments through an October 2012 Notice of Inquiry, 13 RFIs issued between April 2013 and September 2014, and a September 2014 Public Notice. [23] Through these items, FirstNet has sought comment on various technical aspects of the network, devices and applications for public safety, and its interpretations of the 2012 act's requirements. FirstNet received almost 600 comments to these Notices and RFIs. FirstNet confirmed in February 2015 that it expects to issue a draft RFP and a second Public Notice by the end of March 2015. FirstNet has also

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[22]The FAR is a substantial and complex set of rules governing the process by which executive branch agencies purchase goods and services. Its purpose is to ensure purchasing procedures are standard and consistent, and conducted in a fair and impartial manner.

[23]79 Fed. Reg. 57058 (Sept. 24, 2014).

received technical input from a variety of stakeholders, such as FCC, the PSAC, the National Public Safety Telecommunications Council (NPSTC), and the Public Safety Communications Research (PSCR) program.[24]

While many stakeholders we surveyed and interviewed for our ongoing work noted that FirstNet's progress has been too slow, some also noted that they were satisfied with FirstNet's progress given the complex nature of FirstNet's tasks and that it is a government entity subject to federal rules and regulations. Some also said that FirstNet's progress has improved recently, especially as FirstNet has hired more staff. However, numerous stakeholders we interviewed cited upcoming difficulties. For example, they noted that deciding the level of network coverage and security, working out agreements for use of existing infrastructure, and navigating state regulations will be difficult issues to address moving forward.

Consulting Stakeholders

FirstNet has initiated a process to consult with the SPOC in each state and FirstNet officials have conducted outreach to other stakeholders. FirstNet began its formal state consultation process in April 2014; as part of this process, FirstNet plans to hold an initial consultation meeting in each state. Initial state consultation meetings began in July 2014—when FirstNet conducted its first consultation with Maryland—and FirstNet expects these initial meetings to continue through 2015, with additional rounds to follow. As of February 25, 2015, FirstNet has conducted initial consultation meetings with 14 states and Puerto Rico. Additionally, from October 2013 to February 2015, FirstNet officials visited 39 states and territories while participating in 187 events, such as public safety, industry, and government (including federal, state, local, and tribal) conferences. FirstNet also launched a public website in March 2014, where it regularly posts updates, presentations, board meeting minutes, a list of upcoming speaking engagements, and other information.

The majority of stakeholders we surveyed for our ongoing work were generally satisfied with the level of FirstNet's consultation and outreach, but others were dissatisfied and said that they would like more new information. Specifically, in response to our survey, 54 percent of SPOCs said they were either "moderately" or "very" satisfied with FirstNet's

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[24]NPSTC is a federation of organizations whose mission is to improve public safety communications and interoperability through collaborative leadership. PSCR is a joint National Institute of Standards and Technology and NTIA effort.

overall level of consultation, coordination, and communication with their state, including the level of input FirstNet has sought from their state, and 22 percent said they were either "moderately" or "very" dissatisfied.[25] Numerous stakeholders we surveyed and interviewed said that they would like more new and detailed information and that they would like FirstNet to focus more on certain aspects of the public safety network during outreach. However, in response to our survey, many SPOCs also acknowledged that the level of new and detailed information exchanged will likely increase once they hold their initial state consultation meeting with FirstNet.

FirstNet Has Not Assessed Risk or Established a Complete Control Environment

Internal controls are the plans, methods, policies, and procedures that an entity uses to fulfill its mission, strategic plan, goals and objectives. An effective internal control system increases the likelihood that an entity will achieve its objectives. For our ongoing review, we assessed FirstNet's policies and practices against two components of an effective federal internal control system: Risk Assessment and Control Environment.[26] For those two components, we found that FirstNet lacks certain elements that contribute to the proper implementation of effective internal control systems. While FirstNet has stated that it is relying on the Department of Commerce and NTIA's internal controls where it has not developed its own, it is important for FirstNet to implement its own controls, as the Commerce Office of Inspector General (OIG) noted as early as February 2014 in a memo on the management challenges facing FirstNet.

Risk Assessment

According to federal internal control standards, management should assess risks facing the entity as it seeks to achieve its objectives. Specifically, entities should first clearly define their objectives then identify and analyze risks from both internal and external sources. Analyzing risks generally includes estimating the risk's significance, assessing the likelihood of its occurrence, and deciding how to respond to it. Risk assessments inform an entity's policies, planning, and priorities, and help

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[25]Twenty-two percent were "neither satisfied nor dissatisfied." These percentages do not equal 100 due to rounding and because one SPOC responded "do not know."

[26]We chose these two components because risk assessment provides the basis for developing appropriate risk responses and control activities, and the control environment is the foundation for an internal control system.

entities develop responses to the risks they face, so that they can achieve their objectives.

Our preliminary results indicate that, although FirstNet has set objectives and taken some steps to assess risks it has not yet fully assessed risks it may face in accomplishing its objectives. Specifically, FirstNet has set three key objectives and has further delineated how it will accomplish these objectives in a "roadmap" that identifies additional long-term and short-term objectives and milestones.[27] To support its development of this roadmap, FirstNet created a "risk register" that identifies some risks related to its financial sustainability as well as possible counter-measures.[28] However, FirstNet officials told us in November 2014 that they had not yet fully assessed risks because they were in the process of defining risk factors and, again in December 2014, because they were in the process of conducting a legal compliance risk assessment of certain key risk areas. In December 2014, FirstNet officials also said that they intend to perform periodic risk assessments in various areas to manage risks on an iterative basis. However, as of February 2015, FirstNet has not yet completed these risk assessment activities; therefore, we were unable to evaluate them and it remains unclear how effective FirstNet's efforts will be in helping it to identify and respond to obstacles to fulfilling its responsibilities.

As FirstNet performs these assessments, we believe that it will be important for FirstNet to incorporate all of the elements of risk assessment detailed in the federal internal control standards. An internal control system that is not based on complete risk assessments (that is, assessments that incorporate these elements) could lead to FirstNet responding to risks in a reactive manner and could hinder FirstNet's ability to achieve its objectives while maximizing use of its available resources. We are concerned that the complexity of FirstNet's objectives, makeup of its board, and challenges it will face becoming self-funding illustrate the multitude of potential risks FirstNet faces. For example, as we point out later in this statement, various factors could hinder whether

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[27]Due to the sensitive information about FirstNet's procurement activities contained in this roadmap, FirstNet has not publicly released the full version. The executive summary is available on FirstNet's website at http://www.firstnet.gov/content/march-board-directors-meeting.

[28]Due to the sensitive information about FirstNet's procurement and cost estimating activities contained in this risk register, FirstNet has not publicly released it.

public safety entities adopt the public safety network—and thus how much user fee revenue FirstNet can collect—which could pose risks to FirstNet's ability to become self-funding.

Control Environment

The control environment is the foundation for an internal control system and provides the basic structure that helps an entity achieve its objectives. To help set this environment, according to federal internal control standards, an entity should, among other things, demonstrate a commitment to integrity and ethical values, such as by setting a positive "tone at the top," providing and evaluating adherence to ethical and behavioral guidance, and removing temptations for unethical behavior.

Our preliminary results indicate that, although FirstNet has taken a number of steps to establish an effective control environment, it has not yet finished doing so. FirstNet has held ethics briefings, counseling, and training; distributed ethics documents; and instituted a Board Member Vendor Interaction Policy to establish processes for interacting with vendors with a potential interest in FirstNet's procurement. However, as of February 2015, FirstNet had not yet developed Standards of Conduct, which is an important form of ethical and behavioral guidance. According to FirstNet officials, FirstNet intends to develop Standards of Conduct but has not yet done so because, as a "startup" entity, building up the organization while making progress meeting statutory responsibilities is a balancing act affected by FirstNet's priorities and resources.

Nonetheless, absent Standards of Conduct, we are concerned that FirstNet may not be able to address deviations in conduct and performance and take corrective actions in a timely manner. Indeed, FirstNet itself established a special committee in May 2013 to review ethical concerns raised by one of its Board Members. Similarly, in a December 2014 report, the Department of Commerce OIG identified concerns with FirstNet's financial disclosure reporting and contracting practices, among other things.[29] The report highlighted that the FirstNet Board, out of necessity, includes members with significant ties to the telecommunications industry that make strategic decisions regarding FirstNet's operations and, thus, are at increased risk of encountering conflicts of interests. We believe that establishing and evaluating

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[29]Commerce OIG, *First Responder Network Authority: FirstNet Must Strengthen Management of Financial Disclosures and Monitoring of Contracts*, Final Report No. OIG-15-013-A (Washington, D.C.: Dec. 5, 2014).

adherence to Standards of Conduct may help FirstNet ensure that all its personnel are held accountable for their actions and that stakeholders maintain trust in its ability to be a good steward of public funds.

FirstNet Faces Difficult Decisions in Determining How to Pay for a Nationwide Public Safety Network Estimated to Cost Billions

Cost of a Public Safety Network Estimated to Be at Least $12 Billion over the First 10 Years

Various entities have estimated the cost to construct and operate a nationwide network for public safety from a low of $12 billion to a high of between $34 and $47 billion, over the first 10 years. As shown in table 1, a variety of entities have developed cost estimates for a public-safety broadband network, although they have used different assumptions about the network's scope. Key assumptions influencing these estimates include whether the network is constructed, operated, or financed in partnership with commercial entities, and the number of sites needed to provide the network's coverage. Our ongoing work has found that differences among these estimates are difficult to identify since some of the estimates do not explicitly state all of their assumptions.

Table 1: Selected Cost Estimates for Constructing a Public-Safety Broadband Network

Source	Year of Estimate[a]	Commercial Partnership	Coverage (Percent of Population)	Sites	Cost per Site (thousands)	Up-Front Deployment Costs (Billions)[b]	Total Costs, First 10 Years (Billions)[c]
Cyren Call Communications Corporation	2007	Yes	99	37,000	No estimate	$18[d]	**No estimate**
Eisenach	2007	Yes	99	33,700	$600,000	No estimate	**$20**
Federal Communications Commission	2010	Yes	99	44,800	$140,625[e]	$7	**$12-16**
		No	99	44,800	$350,446[e]	$16	**$34-47**
Hallahan and Peh[a]	2010	Yes	99	19,400	$500,000	$10	**$18**
		No	99	22,200	$500,000	$11	**$20**
Congressional Budget Office	2011	Yes	95	45,000	No estimate	No estimate	**$12**

Sources: Sachs, Elizabeth, on behalf of Cyren Call Communications Corporation, *In the Matter of Public Safety Network in the 700 MHz Broadband*, Ex Parte Presentation to Federal Communications Commission, June 3, 2007; Eisenach, Jeffrey, *Due Diligence: Risk Factors in the Frontline Proposal*, June 28, 2007; Federal Communications Commission, *A Broadband Network Cost Model: A Basis for Public Funding Essential to Bringing Nationwide Interoperable Communications to America's First Responders*, OBI Technical Working Paper No.2, May 2010; Hallahan, Ryan, and John M. Peha, *Quantifying the Costs of a Nationwide Public Safety Wireless Network*, Telecommunications Policy, 34 (2010); and Congressional Budget Office, *Cost Estimate: S. 911 Public Safety Spectrum and Wireless Innovation Act*, July 2011. | GAO-15-380T

[a]The figures are presented here as they were reported at the time of publication; that is, we did not adjust these figures for inflation.

[b]Estimates vary in scope, with some estimating the total cost and some only considering costs associated with the installation and operation of cell sites and not the costs of the backbone network components, or the costs of network planning and administration.

[c]The total costs include both the up-front deployment costs plus ongoing costs, such as maintenance and operations, over the first 10 years.

[d]This estimate is described as including "cumulative capital expenditures." It is not clear whether this only includes up-front deployments costs or also some (or all) maintenance and operations over the first 10 years.

[e]This is an average cost across all proposed sites. The Federal Communications Commission estimated different costs for sites in urban, suburban, and rural areas.

Various Factors Will Influence Cost of FirstNet's Public Safety Network

Our preliminary analysis indicates that cost estimates notwithstanding, various factors will influence the cost of constructing and operating FirstNet's public safety network, including (1) the business model used, especially the extent of commercial partnerships; (2) use of existing infrastructure; (3) efforts to ensure network reliability; and (4) network coverage.

Extent of Commercial Partnerships

FirstNet's business model, especially the extent to which it partners with commercial carriers or other private enterprises, will influence the cost to construct and operate the public safety network. The 2012 act gives

FirstNet the authority to engage in a variety of commercial partnerships.[30] In a partnership, public safety and commercial users could share the network's infrastructure and spectrum, with public safety given priority to all network capacity during emergencies.[31] Some public safety stakeholders we spoke with maintained the need for FirstNet to work with commercial partners in building and operating the network for it to be financially sustainable. One study also calculated that the value of serving both commercial and public safety users is greater than the additional costs to serve commercial users.[32]

Use of Existing Infrastructure

The use of existing infrastructure will influence the cost to construct and operate FirstNet's public safety network. Under agreements to share existing wireless-network infrastructure, FirstNet may be able to make use of, for example, cell towers, antennae, cabling, radio-processing equipment, backup power facilities, and the links between towers and the nearest communications hub, to the extent economically desirable to do so. According to FCC estimates, capital costs would be 2.5 times greater without this form of sharing. However, the use of existing infrastructure can have limitations. For instance, negotiating access to existing infrastructure can be a time-consuming process—especially with government-owned or controlled facilities and where multiple owners must be contracted with—ultimately slowing down network deployment. For our ongoing work, we spoke with Swedish officials about the public-safety communications network in their country, and they told us that they sought to use existing infrastructure to save costs when constructing their network, but faced problems in their largest cities convincing tower owners to allow the government to rent the towers.[33] Furthermore, there may be a risk when public safety relies on infrastructure owned by commercial operators, particularly if it has to rely on a single provider in any given location that can then charge high fees.

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[30]Pub. L. No. 112-96, § 6206(c)(3), 126 Stat. 156, 214.

[31]"Priority" transmission of calls and data is provided through special enhancements embedded in telecommunications networks to identify transmissions made by authorized users as higher priority than those made by other users. These enhancements automatically place the transmission higher in the queue over those made by other users.

[32]Hallahan, Ryan and John M. Peha, *The Business Case of a Network that Serves both Public Safety and Commercial Subscribers*, Telecommunications Policy, 35 (2011).

[33]This interoperable network in Sweden is called the "Rakel" network and is primarily used for voice communications.

| Efforts to Ensure Network Reliability | FirstNet's approach to ensure the public safety network is safe, secure, and resilient (that is, the overall reliability of the network) will also influence the cost to construct the network. FirstNet is required by the 2012 act to "ensure the safety, security, and resiliency of the network,"[34] and NPSTC has provided guidance to FirstNet as it constructs and implements the network.[35] If FirstNet implements all of NPSTC's best practices, it will significantly add to the cost of building the network. For example, transmission sites, such as cell towers, should have back-up power sources when used for public safety communications, according to NPSTC. Existing commercial sites, however, generally do not have such backup, primarily to reduce costs in extremely competitive markets. |

| Network Coverage | The public safety network's coverage will also influence the cost to construct and operate it. The 2012 act requires FirstNet to establish a "nationwide" network, but does not define the level of coverage that constitutes "nationwide."[36] Generally speaking, increasing the area covered by the network, as well as the extent to which coverage penetrates buildings, increases the amount of infrastructure needed, and thus the cost of the network. It may be relatively affordable, for example, to cover large segments of the population concentrated in relatively small areas. Providing coverage outside dense metropolitan areas can be particularly expensive. One study has shown that a nationwide public-safety broadband network could generate much more revenue than the network costs in urban areas, but less revenue than costs in rural areas.[37] |

FirstNet Faces Difficult Decisions about User Fees and Commercial Partnerships in Determining How to Become Self-Funding

Our preliminary analysis suggests that, although FirstNet has various revenue options that it is authorized to use to become self-funding, it is unclear how FirstNet will use those authorities. As the cost estimates above illustrate, FirstNet's network will likely cost tens of billions of dollars to construct and initially operate. To meet the costs of building and maintaining the network, the 2012 act authorizes FirstNet to generate revenue through user fees and commercial partnerships, the latter of

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[34]Pub. L. No. 112-96, § 6206(b)(2)(A), 126 Stat. 156, 212.

[35]NPSTC, *Defining Public Safety Grade Systems and Facilities* (Littleton, CO: May 22, 2014).

[36]FirstNet sought input into this matter in its September 2014 RFI.

[37]Hallahan and Peha, 2011.

which can involve secondary use of the network for non-public safety services.

User Fees

FirstNet can generate revenue by charging public safety entities a user fee to gain access to the network. According to stakeholders we spoke with and surveyed for our ongoing work, demand for FirstNet's public safety network is significant,[38] but the following factors could hinder adoption of the network and thus FirstNet's ability to collect user fee revenue:

- **Fee size.** If FirstNet's user fee is too high, it could hinder public safety adoption, and if it is too low, it could bring in too little revenue. Numerous stakeholders we spoke with noted that FirstNet's cost would play a role in whether they adopt the public safety network and that user fees must be competitive with existing commercial services. While low user fees would be attractive to public safety entities and therefore may increase adoption, they would also bring in a relatively smaller amount of revenue per user. As a FirstNet Senior Program Manager reported in December 2014, there is a trade-off with low user fees between adoption and the network's financial sustainability. Some stakeholders also noted that the cost of equipment and devices needed to access the network could limit adoption, especially since public safety entities are continuing to invest in their LMR networks.

- **User base.** While a large user base can potentially bring in significant user fee revenue, it could be challenging to manage. The 2012 act established that FirstNet's primary customers will be entities that provide "public safety services."[39] How FirstNet interprets "public safety services," as established in the 2012 act, will expand or contract the potential sources of revenue.[40] As one public safety official we spoke with noted, the network has more value to public safety entities when there are more users on it, because entities will all be able to communicate with each other. A large user base, however, can require priority and preemption rules, if certain users are

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[38]More than 75 percent of survey respondents noted that the network would be "very useful" to emergency management, emergency medical services, fire services, and law enforcement public safety entities in their state.

[39]Pub. L. No. 112-96, § 6001(26),126 Stat. 156, 204.

[40]FirstNet proposed some interpretations of these definitions in its September 2014 Public Notice.

to have privileged access to the network. According to some public safety officials we spoke with, such rules can be difficult to establish among public safety entities.

- **Coverage.** Widespread network coverage can attract more users, and thus user fee revenue, but is expensive to construct and maintain. Some of the public safety entities we spoke with said that the network's coverage would play a role in whether they adopt the public safety network, noting in particular that the coverage should be at least as good as existing commercial services. One public safety entity we spoke with said that existing commercial coverage is inadequate, while two other entities said that commercial service can become unusable during large events because of the number of users on the network. However, as noted above, providing extensive coverage can be very costly. Indeed, a few SPOCs noted in survey responses that providing rural coverage in their states will be challenging, with one commenting that "it is inconceivable that FirstNet will be able to deploy a terrestrial network in the vast areas that are unpopulated or sparsely populated."

- **Reliability.** Although FirstNet is required to construct a resilient network, practices to ensure this can be costly. Some public safety officials we spoke with said that the network's reliability would play a role in whether they adopt the public safety network. A few officials specifically said that if the network did not reliably work when first utilized by public safety, adoption would suffer, since public safety has a low tolerance for unreliable technology. However, as noted above, ensuring reliability requires significant capital expenses.

Commercial Partnerships

Our ongoing work also found that FirstNet can generate revenue through commercial partnerships, but the extent of commercial interest in these partnerships, and thus the value of this authority for FirstNet, is unknown.[41] Under the 2012 act, FirstNet can receive payment for the use of the public safety network's capacity by non-public safety users as well as use of the network's infrastructure.[42] The value of secondary access to

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[41]One study showed that, theoretically, the revenue to be derived from secondary use of the spectrum is much greater than fees from users of a public safety network. See Hallahan and Peha, 2011.

[42]Pub. L. No. 112-96, § 6208(a)(1), 126 Stat. 156, 215. FirstNet tentatively concluded in its September 2014 Public Notice that multiple commercial partners could coexist and utilize FirstNet spectrum in a given area.

the network's capacity depends in part on the availability of the spectrum, which itself will be determined by the capacity available given the network's design. According to one major carrier we spoke with, no business is likely to enter into a partnership with FirstNet because its public-safety user base has not been defined, and thus the network capacity available to secondary (commercial) users is unknown. According to this carrier, the risk would be too high for a commercial entity to enter into an agreement without knowing exactly how the entity will be able to use FirstNet's network. If public safety preempts all commercial traffic, then the commercial entity will struggle to generate income from this venture and may lose favor with its customers. However, another major carrier we spoke with maintained that FirstNet will have to partner with at least one commercial carrier to be financially sustainable and that given the significant investments in Long Term Evolution (LTE) infrastructure made by commercial carriers, FirstNet would do well to utilize some of this infrastructure through commercial partnerships. Although the historic Advanced Wireless Services spectrum auction FCC concluded in late January 2015 could indicate significant demand for spectrum capacity among commercial carriers, the extent of carriers' interest in partnering with FirstNet is not fully known. While there may be some benefits in partnering with FirstNet, companies may also prefer to compete directly with FirstNet with their own public safety products.

Although Early Builder Projects Are Providing Lessons, FirstNet Has Not Developed a Plan to Evaluate Them

Early Builder Projects Have Learned Lessons As They Develop Public Safety Networks

As part of our ongoing work, we spoke with officials from the five early builder projects and the three canceled projects to determine what lessons they have learned that may be useful to FirstNet as it develops the nationwide public safety network. Specifically, the officials identified lessons about (1) governance, (2) financing the network, (3) conducting outreach, and (4) planning for network deployment:

Governance	Early builder project officials described governance challenges that FirstNet may face as the governing entity for the nationwide network. For example, officials from one project told us some public safety entities may not have a clear understanding of FirstNet's goals and plans. The officials told us localities are willing to participate in the public safety network, but FirstNet will face difficulty in establishing timely technical decisions and effective policies that keep pace with local enthusiasm to participate. The officials said FirstNet can address this challenge by setting expectations about what the network will provide, including the specific intent, purpose, and planned capabilities.
Financing the Network	Officials from the early builder projects also learned lessons related to financing a new public safety network that could be applicable to FirstNet. For example, officials from one project told us they will face sustainability challenges due to the limited number of users that will be able to utilize their network. According to the officials, their project will not be able to charge their users enough to make the operations sustainable without pricing the users out of the services. The officials told us a possible way to address this challenge would be to expand the service to public safety entities in neighboring metropolitan areas and airport service areas that have established broadband infrastructure.
Conducting Outreach	Early builder project officials cited lessons they learned for conducting outreach while developing their public safety networks. According to officials working with one of the projects, network coverage will be a challenging outreach topic and FirstNet must be prepared to explain the coverage strategy for each state. The officials said most public safety officials in their state are aware that network coverage is typically provided through a myriad of approaches such as permanent infrastructure, mobile "deployables," and satellites.[43] However, the officials noted, until FirstNet sets clear expectations on those approaches, state stakeholders for the public safety network may face difficulties holding constructive conversations about which coverage solutions are the most feasible.

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[43]Mobile deployables can also be referred to as "deployable networks." A deployable network typically includes "deployable assets" such as "Cells on Wheels" that provide localized wireless network service to areas where coverage is minimal or compromised. These assets typically provide fully functional service via vehicles such as trailers, vans, and trucks.

Planning for Network Deployment	Officials from the early builder projects as well as the canceled public safety projects also described lessons they learned about planning their network's deployment that could benefit FirstNet. An official from one of the canceled projects said his team faced several challenges including local zoning conditions that impacted project schedule and cost, a newly-passed city code that required towers to withstand higher wind loads which increased costs, and commercial competitors lowering their subscription rates to compete with the planned public safety network. Officials from an ongoing project told us their project initially identified network build-out sites but learned that environmental assessments would need to be completed for each site, which would threaten the project's planned schedule. To address the challenge, the project narrowed its build-out site pool to exclude marsh lands and other areas with obstructive tree lines and include publicly-owned sites such as police and fire stations. With the publicly-owned sites identified, project officials worked with their state's legislature to pass an exemption to state environmental reviews. The official from the project told us that an important lesson learned is to thoroughly understand all of the process steps and risks prior to plan execution.
FirstNet Has Processes in Place to Identify Early Builder Project Lessons but Has Not Developed a Written Evaluation Plan	Our preliminary results indicate that FirstNet has taken steps to collect and evaluate information and lessons learned from the early builder projects, but could do more to ensure that the information and lessons are properly evaluated. Specifically, FirstNet has taken steps to identify the data and information it will collect from the early builder projects. As noted above, FirstNet entered into agreements with the projects that permit their use of FirstNet's spectrum. Under these agreements, in exchange for spectrum use, the early builders agree to conduct specific activities on their networks, also known as key learning conditions; develop a Key Learning Conditions Plan with FirstNet;[44] and provide FirstNet with quarterly reporting on their project's use of FirstNet's spectrum, progress achieving project milestones, and in some cases, the experiences of their network users. In October 2014, FirstNet provided the projects with quarterly report templates, instructions, and timing for completing the reports. Additionally, FirstNet intends to gain knowledge from the projects

[44]FirstNet told us the plans identify the key learning condition activities, including roles and responsibilities and the information, lessons, reports, and other deliverables expected under the agreements. Plans have been drafted for the five early builder projects. The plan for the project in Adams County, Colorado is pending completion.

through contractors who have been assigned to each project to collect and log formal and informal lessons, and through weekly meetings FirstNet officials told us they hold. Finally, in April 2014 FirstNet authorized the PSAC to establish an Early Builder Working Group.

Although FirstNet has taken these steps, we are concerned that it lacks a detailed data-analysis plan to track the performance and results of the early builder projects. For the early builder projects, their performance and results are captured in the observations and lessons learned reported to FirstNet and identified by consultants. We have previously found that a well-developed evaluation plan for projects like the early builder projects can help ensure that agencies obtain the information necessary to make effective program and policy decisions.[45] Such a plan should include, among other things, a detailed data-analysis plan to track performance and evaluate the project's final results. Even though FirstNet staff and contractors remain in close contact with the projects, without a plan to track those projects, it is unclear how FirstNet intends to evaluate the projects' observations and lessons and determine whether or how the lessons are addressed. As a result, we believe that FirstNet could miss opportunities to leverage key lessons related to governance, finance, outreach, and network deployment. Given that the early builder projects are doing on a regional and local level what FirstNet must eventually do on a national level, a complete evaluation plan that includes a detailed data-analysis plan could play a key role in FirstNet's strategic planning and program management, providing feedback on both program design and execution. Furthermore, such a plan could provide FirstNet officials the opportunity to make informed midcourse changes as it plans for the public safety network, and facilitate transparency and accountability for FirstNet's decision-making.

Chairman Thune, Ranking Member Nelson, and Members of the Committee, this concludes my prepared remarks. I am happy to respond to any questions that you or other Members may have at this time.

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[45]GAO-09-45.

GAO Contact and Staff Acknowledgments

If you or your staff have any questions about this testimony, please contact Mark L. Goldstein, Director, Physical Infrastructure Issues at (202) 512-2834 or goldsteinm@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. GAO staff who made key contributions to this statement include Sally Moino (Assistant Director), Susan Baker, Melissa Bodeau, Kyle Browning, David Hooper, Kristen Kociolek, Josh Ormond, Nalylee Padilla, Kelly Rubin, Grant Simmons, Andrew Stavisky, and Michael Sweet.