

FY 2016: ANNUAL REPORT TO CONGRESS









Dynamic Advances and Innovation in Public Safety Broadband Communications

Submitted to the

United States Senate Committee on Commerce, Science, and Transportation *and the*

United States House of Representatives Committee on Energy and Commerce





"In today's world, we have to rely on a very robust system to allow us to have connectivity all of the time to allow us to care for our patients, no matter what the circumstances."

Dr. Jeff Elder, Director of New Orleans Emergency Medical Services, Louisiana



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LETTER TO CONGRESS FROM FIRSTNET'S CEO



Mike Poth, Chief Executive Officer, February 2017

I am delighted to inform you that FirstNet continues to make remarkable progress towards making the FirstNet network a reality.

In last year's Annual Report to Congress, we highlighted the incredible amount of consultation data our public safety partners in the 56 states, territories, and the District of Columbia (States)³ collected in planning for this network. We used this data to inform our Request for Proposal (RFP) for a private sector partner and released our comprehensive and innovative objectives-based RFP in January 2016. After receiving proposals on May 31, 2016, we began the process of selecting the best private sector partner to serve public safety. We anticipate completing the selection process in 2017.

We are very proud to announce the completed construction and grand opening of our Innovation and Test Lab in Boulder, Colorado. We look forward to exploring and testing the next generation of public safety devices, applications and services for the FirstNet network ... everything from wearable technologies to components of the Internet of Things (IoT) ecosystem.

This year, we also deepened our consultation and outreach efforts with the States, tribes and federal agencies. We coordinated more than 140 consultation events with State Single Point of Contacts (SPOCs) to gather information and hold collaborative exchanges with public safety representatives. The information collected during these meetings will guide the development of the State Plan that will be presented to each State Governor. Our intent is to deliver a plan that will reasonably meet each State's unique needs, while ensuring nationwide interoperability, and maximum urban and rural geographic coverage for public safety. Additionally, we continue to work closely with our Public Safety Advisory Committee (PSAC), as this expert group of advisors informs us on public safety's ever evolving communication needs.

We remain dedicated to being good financial stewards. Congress allocated \$7 billion for FirstNet to stand up the organization and deploy the FirstNet network. As demonstrated in this year's financial report, we are well-positioned to make this nationwide broadband network financially sustainable.

We continue to build the best team of people to serve public safety. I'm proud to say every person in the organization is here for the mission and many of our employees, including myself, have a public safety background. We reflect on the important directive Congress has given us every day.

We are confident that with your continued support, and by working closely with our stakeholders and private sector partner, we will achieve the mission Congress entrusted to us.

Sincerely,

Mike Poth

Chief Executive Officer

³ All references to States are inclusive of states, territories, and the District of Columbia unless otherwise indicated.

"A system like FirstNet will be huge in our ability to get data back and forth without worrying about the public's need for data exchange."

- Chief Francis E. Bradley Sr., Hualapai Nation Police Department, Arizona



EXECUTIVE SUMMARY

This Annual Report reflects FirstNet's operations, activities, financial condition, and accomplishments during FY 2016.

Our most significant accomplishments of this past year were the launch and timely achievement of several milestones of our acquisition process. In January 2016, we released our objectives-based RFP to identify a private sector partner for the FirstNet network deployment, operation, and maintenance. FirstNet, the States, and the public safety community worked together to gather broad-based data from the States and public safety to inform the RFP. We accepted competitive proposals through May 31, 2016, and expect to complete the evaluation process in 2017.

We have focused our dedicated and extraordinarily talented team on organizational development to grow and enhance our operational capabilities prior to the selection of a private sector partner. We currently have a staff of 202 professionals, many of whom previously served or currently serve in public safety roles. We made functional organizational structure changes to capitalize on the diverse and plentiful strengths of our team and modified our goals and the concept of our organizational structure to adapt and better meet the needs of public safety as we begin working with our partner. To better leverage this talent, we created a collaborative, open

Our entrepreneurial outlook and publicprivate partnership approach positively impact our ability to meet our goals.

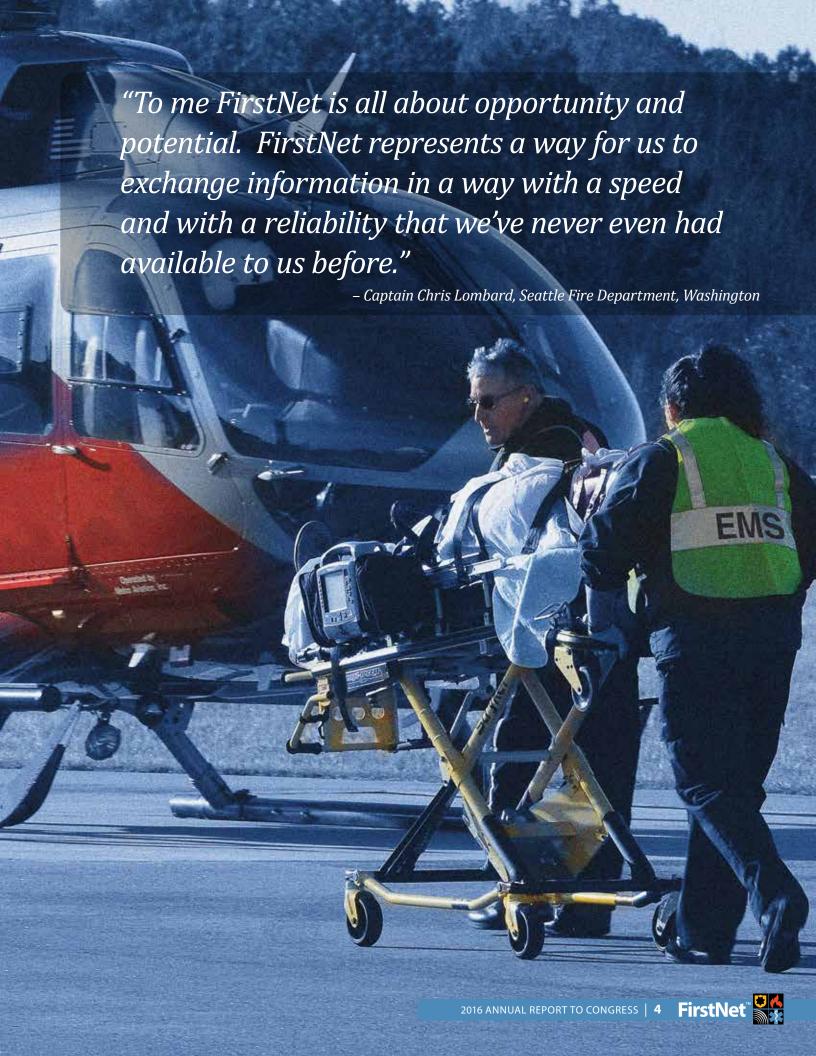
workspace in our Reston, Virginia office and opened the Innovation and Test Lab in Boulder, Colorado. With these initiatives, we have transitioned from a planning organization to an operational one focused on network implementation, the delivery of reliable broadband services to our nation's first responders and other public safety personnel, and creation of a robust, innovative community driven to explore and advance innovative technologies, devices, applications (apps) and services for public safety.

Throughout the year, we continued our consultation activities to ensure the network meets public safety's evolving communication needs. Our leadership and staff participated in more than 130 association events with the 43-member PSAC, more than 140 consultation events with the SPOCs, and more than 83 tribal meetings. All of our diverse approaches to talking with and listening to our stakeholders - including almost daily touchpoints with SPOCs; expansive outreach

to all 56 States; in-depth outreach to tribal nations; extensive engagement at public safety, state, local and tribal association conferences; and ongoing task team work with the PSAC - have built strong relationships and helped us truly understand what public safety needs from this landmark broadband communications initiative.

On February 2, 2016, TJ Kennedy, FirstNet's President, testified before the U.S. House of Representative's Energy and Commerce Subcommittee on Communications and Technology. On June 21, 2016, Mike Poth, FirstNet's Chief Executive Officer, testified before the U.S. Senate Committee on Commerce, Science and Transportation Subcommittee on Communications, Technology, Innovation, and the Internet. We look forward to keeping Congress informed of our dynamic schedule, progress, and achievements in 2017.

Our entrepreneurial outlook and public-private partnership approach positively impact our ability to meet our goals. We are flexible and resourceful, and continue to evolve with a focus on achieving our mission in the most expeditious, efficient and fiscally responsible manner. With continued support from public safety, the States, Congress, and the private sector, our nation's responders will soon experience the numerous benefits of the FirstNet network.





FIRSTNET BOARD

Our Board⁴ is a team of 15 dedicated, highly skilled and incredibly motivated individuals with a cross-section of expertise who are committed to making the FirstNet network a success. A majority of the Board is selected by the Secretary of Commerce (using a staggered three year term structure) and these 12 members have extensive public safety, technical, network, and/or financial expertise. The remaining Board representatives include the Secretary of Homeland Security, the Attorney General, and the Director of the Office of Management and Budget as ex officio members.

Board members and our leadership talk and exchange information on a regular basis to ensure the team is meeting our strategic goals and key milestones. The Board holds quarterly public Board meetings to track the ongoing development and deployment of the network.

We look to our public safety Board members from the fire service, law enforcement, emergency medical services (EMS), as well as our Board members representing local and State government

⁴ See Appendix B for a full list of the Board members.

"FirstNet is committed to establishing a nationwide public safety broadband network enhancing our communications capabilities and increasing effectiveness, and ultimately, the safety of our neighborhoods."

- Sheriff Richard Stanek, Hennepin County, Minnesota and FirstNet Board Member



to ensure that our network solutions and engagement with local government stakeholders are appropriately focused. They also provide guidance on public safety communications issues from the administrative and operational perspectives, based on their collective experience as local government leaders.

Similarly, we look to our Board members with telecommunications experience, all of whom have led the deployment of large communications networks, for guidance on technology, public-private partnerships, policy and process, customer care, and all of the other facets of managing a nationwide wireless broadband network.

The Board, with its complementary public safety and telecommunications knowledge, understanding, and proficiency, facilitates our independent agency's dual emphasis on meeting public safety needs and participating in an innovative and sustainable public-private partnership in order to inspire the private sector to do what it does best in deploying this mission critical network.

"FirstNet is really going to allow us to take advantage of the emerging technologies. I think it's going to be a huge improvement in emergency response and protecting the public."

– Joe Sastre, Director Emergency Management, Groton, Connecticut



DEVELOPING THE FIRSTNET NETWORK

In this section we provide an overview of the RFP process, network features, and organizational efforts to ensure the success and sustainability of the network.

RFP Release and Evaluation

The January 2016 release of the RFP marked a major milestone in our network deployment effort. We adopted an objectives-based (instead of a requirements-based) approach to leverage the private sector's vast experience in deploying, operating, and maintaining expansive broadband networks. In addition, we engaged with public safety entities, States, and the private sector for nearly four years to obtain the detailed information that was included in the RFP.

We asked potential partners to explain how they would meet the 16 key objectives and specifically encouraged submission of the most cost-effective and innovative models to achieve all objectives.⁵



- 1. geographic coverage that includes not only high population density areas, but offers robust rural coverage and mobile infrastructure to address emergencies;
- **2.** a deployment schedule consistent with our desired milestones for rapid deployment that incorporates improvements and upgrades as technology evolves;
- 3. payment milestones over the twenty-five year term of the contract; and
- 4. network and organizational designs that ensure technical reliability and maintainability.

By the deadline of May 31, 2016, we received multiple proposals and initiated the evaluation process that we expect to conclude in 2017.

Network Features

Radio Access Network (RAN)

The RAN includes cellular towers and other equipment on or near them that help provide service in a coverage area and allow public safety devices to connect to the network. We created a nationwide coverage objectives map using public safety incident response information submitted by States. This map depicts our understanding of specific locations where public safety incidents occur and therefore, where responders need to have coverage.

Core Network

The Core is the FirstNet network's central control and traffic connection point. It connects all RANs to provide access to network services and applications so public safety can experience the benefits of the network, including, interoperability and true priority and preemption. In other words, public safety should have the same network experience, regardless of where they are in the country, and will always be "at the front of the line" to access texting, video, voice, apps and other services.

Our technology team generated network architecture recommendations and addressed the Core



FirstNet's RFP contained the following 16 objectives: Build, Deploy, Operate & Maintain the NPSBN; Financial Sustainability; First Responder User Adoption; Device Ecosystem; Applications Ecosystem; Accelerated Speed to Market; User Service Availability; Service Capacity; Cyber Security; Priority Services; Integration of Opt-out State RANs; Integrate Existing Commercial/Federal/State/Tribal/Local Infrastructure to Support NPSBN Services; Life-cycle Innovation; Program and Business Management; Customer Care and Marketing; and Facilitate FirstNet's Compliance With the Act & Other Laws.

This information was provided to potential partners as part of the nationwide RFP.



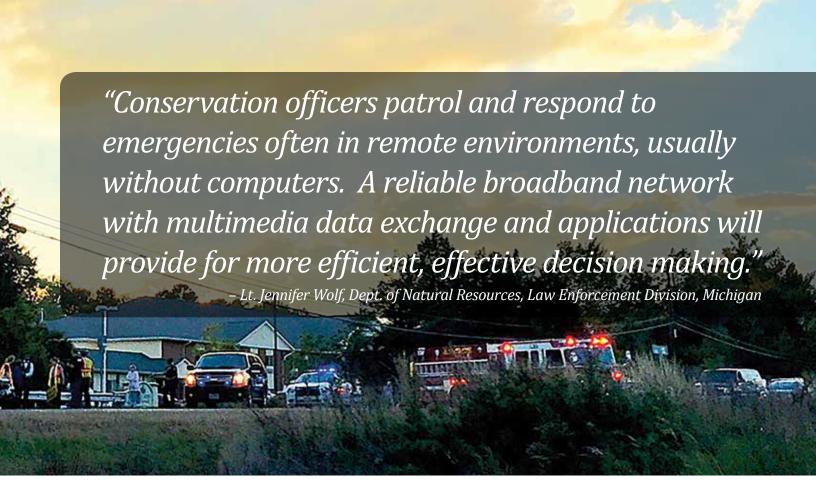
and our development of draft network policies. Once we have a private sector partner in place, network policies will be finalized and design review and rigorous testing will begin to ensure the network functions as intended.

Device Ecosystem

Public safety stakeholders articulated their need for next generation devices. Through our various public safety forums, we learned more about those desired features and characteristics and relayed them to private sector network operators and device manufacturers. We are engaged in device-focused market research efforts to drive innovation by the private sector device manufacturers and help ensure that public safety will have access to devices that work for them and platforms that can withstand the rigors of public safety work, such as heat, water, and physical force. In parallel with the market research, we developed a list of network approved devices. This approved device list will continue to evolve with new technology but ensures that public safety has devices that are reliable and capable of performing in demanding conditions.

Applications Ecosystem

Today's communications devices rely heavily on apps to provide comprehensive communications solutions. We expect that the FirstNet network will be a catalyst for the development of public safety grade apps that will make field operations more streamlined and safer for both the first responders and their communities, such as user-friendly aerial video feeds and weather alerts to firefighters' smartphones during wildland fires and "one stop shop" incident apps that allow responders to view video, see other responding units, read the incident history, and obtain weather and traffic reports. Our strategy is to enable and encourage the creation of these new public safety grade apps while maintaining support for existing commercial apps in order to establish a wide range of resilient, reliable, secure and easy-to-use apps for public safety. We envision an app development ecosystem that provides a strong and simplified development environment, with tools and resources for testing, review, and distribution of the targeted public safety grade apps.



During State consultation meetings, public safety expressed a need for apps that are secure and reliable. We worked proactively to address the public safety data and apps security. In coordination with the National Institute for Standards and Technology (NIST) Public Safety and Communications Research (PSCR) Division, we focused efforts on initiatives to assess available technologies that enable the secure coexistence of public safety and commercial apps on a single device. A better understanding and testing of these technologies will help support public safety's need to allow multiple users to use a single device, and public safety's ability to bring their own devices (BYOD) to the network, which is common in volunteer public safety agencies.

Cybersecurity

Hackers, terrorists, and others continue to seek ways to infiltrate information systems and devices as technology evolves. Therefore, in the RFP, we emphasized the importance of having a robust end-to-end and ever-evolving cybersecurity model that would allow public safety to continue to securely communicate during major events.

Recognizing that cybersecurity for the FirstNet network is a collaborative effort among public safety end users (who need effective security protocols that are not burdensome or impractical on an incident scene), federal/state/local/tribal agencies (which are charged with safeguarding much of the data) and the private sector (which offers evolving cybersecurity technologies and best practices) to manage both the human and technology influences and impacts , we are working with all of these entities to conduct research and assess the viability of options. Recently, we collaborated with NIST on the Mobile Single Sign On (SSO) project — an effort that allows public safety to continue working mid-mission without having to separately log in to multiple applications.

Innovation and Test Lab

Along with our partners at PSCR and elsewhere, we worked closely to design and build the Innovation and Test Lab (Lab) in Boulder, Colorado. Our staff, stakeholders, and private sector partner will use the Lab to test all equipment, applications, and devices that touch the network. Public safety-focused features and functionality, like quality of service (QoS), priority access and Push-to-Talk (PTT), will be tested and independently validated in the Lab prior to deployment on the network.

The Lab was completed ahead of schedule and under budget. It will allow FirstNet to be a proactive player in our public-private partnership by allowing FirstNet and public safety to test new public safety innovations and validate that they meet the mission critical needs of our nation's responders while driving new innovation into the ecosystem as quickly as possible.

We will also use the Lab to explore and drive future technical innovations with potential applicability for public safety, such as three dimensional indoor location software (critical for locating first responders and citizens in multi-floor residential and commercial buildings) and unmanned aerial vehicles (UAVs; also known as drones) for improved situational awareness before, during and after incident response.

Network Policies

We are currently drafting and refining network policies, which will govern the operation, management, and use of the network, including cybersecurity; how applications, devices, and equipment interact with the network; and other technical issues. States choosing to assume responsibility for deploying, operating, and maintaining their RAN (i.e., Opt-Out) will be required to adhere to these policies to ensure nationwide interoperability, reliability, and cyber-secure integration of their RAN with the FirstNet Core. These important network policies, which will be further refined and finalized in conjunction with our private sector partner once selected, will ensure a seamless nationwide network that allow voice, video, and data communications to enable public safety to accomplish their mission even if it crosses jurisdictions and involves many agencies.

Spectrum Relocation Grant Program

To be proactive, in March 2016, we launched a spectrum relocation grant program designed to provide funding to transition Band 14 incumbents to non-Band 14 spectrum so that FirstNet spectrum will be fully cleared when the network is deployed. The relocation program provided approximately \$26.8 million in assistance for public safety entities to relocate their current communications systems to non-Band 14 spectrum bands. It is expected that all public safety incumbents on Band 14 will be relocated without disruption before the end of 2017.

Standards Development Organizations



As required by Congress, we plan to use technology based on commercially open standards to achieve interoperability, speed to market, economies of scale/cost efficiency, and other benefits. Utilizing commercial standards should lead to an increase in the number of vendors with the ability to build devices for public safety, thereby increasing competition and lowering public safety device costs. We believe it is imperative to keep costs down and competition up so that we drive these open standards and ensure that they always think of public safety needs as new standards are created and updated.

We have a vital role in representing the voice of public safety in standards development organizations (SDOs). FirstNet works with the 3rd Generation Partnership Project (3GPP), which provides complete system specifications for cellular telecommunications technologies.⁷ Where appropriate, we will continue to work with SDOs to bring mission critical voice capabilities to public safety.

⁷ See about 3GPP, 3GPP, http://www.3gpp.org/about-3gpp (last accessed Jan. 23, 2017).



CONSULTING WITH FIRSTNET'S STAKEHOLDERS

In this section we provide a summary of our extensive consultation and outreach efforts to public safety, State, local, federal, and tribal stakeholders to improve our understanding of public safety's needs and share information about FirstNet initiatives.



State Single Point of Contact Meetings

We continue to work closely with SPOCs to understand and outline each State's needs and to that end, facilitated 56 SPOC kick-off meetings in the first part of the year. These meetings provided us and the States an opportunity to coordinate consultation and outreach activities for the upcoming year, and generally included the SPOC and their management team. In some instances, the kick-off meetings were expanded to include members of the State's FirstNet governance body or public safety entities who may become FirstNet network users. We were afforded the opportunity to continue data gathering to help inform our understanding of future end user needs. Additionally, we held two semi-annual SPOC meetings, each of which brought together nearly 200 attendees from States. These meetings were an opportunity for the States to network with each other, share best practices, hear from FirstNet's leadership, provide feedback, and discuss topics in depth with our staff.



Governance Body Meetings

Many States have standing committees that govern emergency communications in their State. This year we briefed 46 of these individual State governance bodies, many of which consist of public safety communications subject matter experts and State leadership. During the governance body meetings, our staff and the States exchanged information, evaluated ways to eliminate information gaps, and mapped the State's decision-making process to determine how best to deliver State Plans and other information to Governors across the country.



Consultation Task Team Meetings

We hosted 16 State and regional Consultation Task Team (CTT) meetings to gather technical information from operational public safety representatives regarding potential implementation and management of quality of service, priority and preemption (QPP). The regional meetings enabled States to discuss issues that were uniquely attributable to their geography and share best practices for resolving technological challenges.

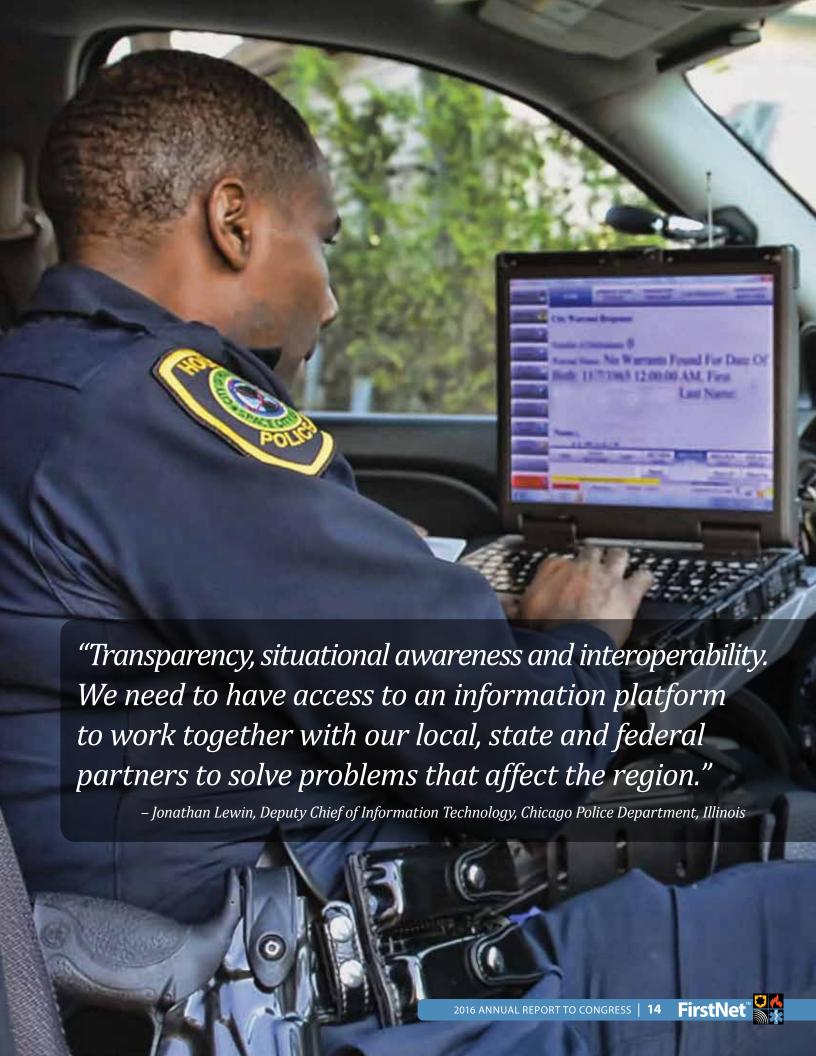


We worked in coordination with the SPOCs to schedule meetings with Governors, the Governors' Chiefs of Staff, policy advisors, and other officials to provide briefings on our progress in identifying a private sector partner, the State Plan, and the Governor's decision process.



Metropolitan Engagements

We facilitated 8 metropolitan engagements with public safety leaders to share information about network planning, timelines, and deployment. Meeting attendees discussed the State's needs, network management, and procurement issues and inquired about network user data management, applications, and user training. Local and regional leaders in attendance often included police chiefs, fire chiefs, emergency management directors, sheriffs, elected officials, statewide interoperability coordinators (SWICs), and chief information officers (CIOs).



We focused on increasing our understanding of the challenges facing public safety in rural areas.

Rural Engagements

We focused on increasing our understanding of the challenges facing public safety in rural areas. At each of our consultation meetings, we reiterated how our rural milestones will help ensure that rural public safety communications capabilities are deployed throughout the project's planned 5-year lifecycle. Recognizing that deploying permanent infrastructure in rural areas may present challenges at the outset, our RFP requested innovative solutions to deliver service to areas that lack connectivity (e.g., vehicular network systems). We also took advantage of opportunities to participate in events dedicated to the needs of rural communities, including:

- Competitive Carriers Association Meetings;
- National Organization of State Offices of Rural Health 2016 Annual Meeting;
- National Rural Electric Cooperative Association Meeting;
- National Rural EMS Conference;
- NTCA the Rural Broadband Association Meeting; and
- Rural Wireless Summit.

We continue to incorporate public safety's communication needs in rural areas as we move through our network design initiatives.



Tribal Government Engagements

We continued our efforts to engage federally recognized tribes. This work included meeting with tribal elected leaders and public safety officials on tribal lands. Our staff participated in conference calls, in-person meetings, tribal association conferences and gatherings, tribal government meetings, and other events to ensure tribes had the most up-to-date information on FirstNet. A recurring theme of each meeting was to better understand the individual tribal cultures and their broadband communications needs. Several tribal meetings are highlighted below:

<u>Alaska.</u> Our staff conducted outreach in Southwest, Southcentral, and Southeast Alaska. Activities included meetings with the Governor's senior advisor for rural business and intergovernmental affairs, the Alaska Native Claims Settlement Act Regional Association, regional healthcare providers, tribal leadership from the Central Council Tlingit & Haida, and traveling to Kodiak Island to meet directly with three remote villages.

Arizona. Our staff participated in a three-day outreach opportunity across the Navajo Nation, which spans northeastern Arizona, northwestern New Mexico, and southeastern Utah. The Navajo Nation meetings helped State representatives better understand the Navajo Nation's public safety communications challenges. During the meetings, attendees discussed connectivity disparities and challenges in geo-fencing and street addressing, participated in Navajo Nation chapter meetings, heard from public safety officials regarding geographic challenges and fiscal constraints, and listened to community members and tribal elders who lost family members due to sub-standard public safety services.

<u>Maine</u>. The state single point of contact (SPOC) facilitated a meeting with the two largest tribal public safety programs. At this meeting the tribes stressed their desire to obtain access to the FirstNet network. To amplify the importance, the state government has deemed every tribal nation a critical coverage objective.

Vehicular network systems refer to, "equipment that can be present in traditional first responder vehicles and provide range extension for the terrestrial network, as well as standalone network support when out of range." Jeff Bratcher, CTO Blog: Vehicular Network System (VNS), FirstNet (Oct. 21, 2015), https://www.firstnet.gov/newsroom/blog/cto-blog-vehicular-network-system-vns (last accessed Jan. 23, 2017).



140
Formal Consultations





8
Metropolitan
Engagements

Montana. We facilitated two separate trips to Montana to better understand tribal challenges. The seven tribes spread throughout the state of Montana each ensured a tribal representative was available to meet with our staff.

New York. Our staff traveled 1,100 miles in four days to meet with four tribes on tribal lands. All together, we have engaged with seven out of eight tribes in the state. Four of these have public safety programs and interest in FirstNet coverage and adoption. These tribes are in close proximity to, or cross, the U.S.-Canadian border. Their combined participation will enhance seamless statewide and international interoperability.

<u>South Dakota</u>. Our staff traveled in excess of 1,350 miles to met with eight of nine tribes head-quartered in the state. Most of these tribes have well-established public safety departments but nearly non-existent connectivity. The roads traversing this vast rural expanse also have very sparse wireless coverage.

<u>Utah.</u> Our staff participated in Utah's tribal leadership annual meeting. Topics discussed during the annual meeting included coverage objectives, reservation public safety personnel, identifying calls for service, and overall connectivity capabilities.

Our full-time tribal team is comprised of representatives from federally recognized tribes who deeply understand the challenges facing tribes today. We are committed to working with tribes across the country to provide the most current information to tribal leaders.

National and State Association Outreach

As we continue on the path to network deployment, engagement with national and State public safety stakeholder associations remains an essential focus. We participated in more than 130 association events at the State, local, and national levels. Below are highlights from our participation at some of these events:

International Association of Chiefs of Police (IACP). The IACP held its Annual Conference and Exhibition October 24-27, 2015 in Chicago, Illinois. We participated in 16 speaking engagements during the conference, building upon a central theme focusing on technology driving innovative change in the delivery of public safety services. Our staff, FirstNet Board members, and PSAC representatives spoke on key topics associated with leveraging new technology, network priority and preemption, and public safety-grade resilient devices.



Major Cities Chiefs Association (MCCA), Police Executive Research Forum (PERF), and the FBI National Executive Institute Associates (NEIA). We participated in the joint meeting of MCCA, PERF, and the FBI NEIA from May 24-27, 2016 in New York, New York. During the MCCA plenary session, attended by approximately 50 police chiefs, our CEO, Mike Poth, provided an update on our progress and the importance of public safety leaders being prepared for the FirstNet network. The police

PSAC Member Organizations







































chiefs from Atlanta, Georgia and Montgomery County, Maryland shared how valuable they found the recent FirstNet metropolitan engagements and leadership briefings, and they encouraged other chiefs to consider hosting similar meetings in their own cities. We also learned about the advanced data applications being used by the New York City Police Department that will benefit from the prioritized capacity of the FirstNet network.

<u>U.S. Conference of Mayors (USCM)</u>. We attended the USCM Annual Meeting, which was held June 24-27, 2016 in Indianapolis, Indiana. At this meeting, our President, TJ Kennedy, presented to the Criminal & Social Justice Committee on the process and timeline for network deployment and encouraged mayors to prepare for future service adoption.

<u>National Sheriffs Association (NSA) Annual Conference.</u> The NSA held its Annual Conference and Exhibition June 24-29, 2016 in Minneapolis, Minnesota. We presented to the Emerging Technology Committee, providing an overview of our history, the Governors' decision on

State Plans, and the PSAC's ongoing activities in support of the network. In addition, Colonel Michael Edmonson, Superintendent of the Louisiana State Police and the FirstNet SPOC for Louisiana, provided use case examples of why public safety needs the FirstNet network, describing their network limitations and downtime during flooding and other natural disasters.

Association of Public Safety Communications Officials (APCO) International. Our participation in state-level APCO events culminated with the APCO-International Annual Conference and Expo August 14-17, 2016 in Orlando, Florida. FirstNet CEO, Mike Poth, provided the keynote address at APCO's Distinguished Achievers Breakfast, where he addressed nearly 1,100 attendees about the valuable contributions FirstNet will make to the future of public safety communications. In the FirstNet town hall meeting FirstNet's leadership and staff provided an overview of milestones achieved and fielded audience questions. FirstNet also hosted an Early Builders roundtable with panelists from

the FirstNet Early Builder projects that comprise the PSAC's Early Builders Working Group. Representatives from Adams County, Colorado, the Los Angeles-Regional Interoperable Communications System, and Texas shared their experiences and key lessons learned.



FirstNet attended many public safety and technology conferences in 2016, including APCO's annual conference and the IAFC Fire Rescue International.











































International Association of Fire Chiefs (IAFC) Fire Rescue International (FRI). IAFC hosted its annual Fire-Rescue International (FRI) conference August 17-20, 2016 in San Antonio, Texas. Nearly 10,000 people from around the world attended the conference. Our Board members and staff spoke at 15 committee meetings, focusing their discussions on the future of firefighting and how the FirstNet network can help shape that future. They also answered questions from attendees on QPP, location-based services, cybersecurity, and network hardening. Additionally, our Board members met with the IAFC Board of Directors, whose members continue to express support for the network.

Public Safety Advisory Committee (PSAC)

The PSAC is tasked with providing recommendations to assist FirstNet in deploying the FirstNet network. Specifically, the PSAC includes public safety, state, local, and tribal organization representatives⁹ and offers FirstNet subject matter expertise and recommendations from an operational perspective. We provide administrative and logistical support to the PSAC to help ensure its effective coordination with our consultation and technical staff.

The PSAC spent much of the year working on Identity, Credential, and Access Management and Local Control.

<u>ICAM.</u> The PSAC's ICAM Task Team created a preliminary ICAM framework describing different levels of interoperability enabled

by efficient ICAM processes. The initial stage allows public safety agencies and users to gain access to the FirstNet network. The ICAM Task Team recommended that the barrier to entry to this initial stage be kept low for agencies and public safety users by leveraging existing public safety policies and procedures. The Task Team determined that as the ICAM framework progresses beyond this initial stage, resulting in greater access to public safety data, the responsibilities of the agencies and users will increase commensurate with their greater access to the data.

<u>Local Control</u>. The PSAC Local Control Task Team developed recommendations surrounding the governance and use of the QPP framework, focusing on local control issues. The Task Team determined that QPP should rarely be controlled manually, and should the need arise, such control should be coordinated through a FirstNet network operations center.

We look forward to our continued partnership with the PSAC in 2017.







See PSAC Committee Membership, FirstNet, http://www.firstnet.gov/consultation/public-safety-advisory-committee/committee-membership (last accessed Jan. 29, 2017).

FINANCIAL CONDITION

In this section, we provide an overview of our FY 2016 financial condition.

One of our most important efforts in FY 2016 was working to ensure a strong financial condition to help make the FirstNet network sustainable for public safety. As of September 30, 2016, we had a cash balance of \$6.68 billion, which will be used for our ongoing operations and to stand up the FirstNet network. Congress authorized \$7 billion for the network. We incurred operating expenses in FY 2016 from hiring staff, conducting extensive consultation and outreach, opening the Innovation and Test Lab, and developing and executing a comprehensive RFP process to identify the future nationwide network partner.

The organization's operating results highlighted in the table below, and the narrative that follows, summarize our unaudited FY 2015 and FY 2016 Financial Statement that will be published at a later date.

Selected Financial and Operating Data – (Unaudited) (\$ in Thousands)

			Percentage Change
As of September 30:	FY 2016	FY 2015	FY 2016 vs FY 2015
Financial Data			
Operating Revenues	-	-	n/a
Operating Expenses	84,088	49,020	72%
Net Deficit	(83,990)	(50,368)	67%
Capital Contributions Received	6,840,508	6,840,508	0%
Total Assets	6,714,840	6,797,840	(1)%
Net Position	6,703,324	6,787,314	(1)%
Operating Data			
Administrative Expenses Subject			
To Statutory Limitation	\$8,944	\$5,598	60%

Operating Results

We continued to operate pre-revenue and reported an operating deficit of \$84.1 million and a net deficit for the year of \$84.0 million. This increase in deficits is directly related to activities preparing the organization to obtain a private sector partner and stand up the FirstNet network for public safety.

Limitation on Administrative Expenses

The organization spent \$8.9 million on administrative expenses in FY 2016. As of September 30, 2016, we have available \$76.6 million of the originally allocated \$100 million for administrative expenses.

Changes in Assets, Liabilities and Net Position

The organization had \$6.71 billion in total assets as of September 30, 2016, compared to \$6.80 billion for FY 2015 – a decrease of \$83.7 million or 1 percent. The \$365.0 million portion of the proceeds that were sequestered in prior years and reflected as Restricted Cash on the FY 2015 balance sheet became available for use by FirstNet in early FY 2016.

Our net position decreased \$84.0 million or 1 percent. Cumulative Results of Operations decreased \$50,368 thousand, or 127 percent, reflecting continuing operating deficits until a private sector partner is selected and the FirstNet network generates revenue. As per the FirstNet enabling statute, certain revenue generated must be reinvested back in to the network.

Altogether, our financial condition is strong, and we stand ready to ensure delivery of a reliable, secure, and financially sustainable FirstNet network that meets the needs of public safety. With our commitment to maintaining a strong financial condition, public safety personnel will gain access to innovative next generation technology, enabling them to better serve their communities.



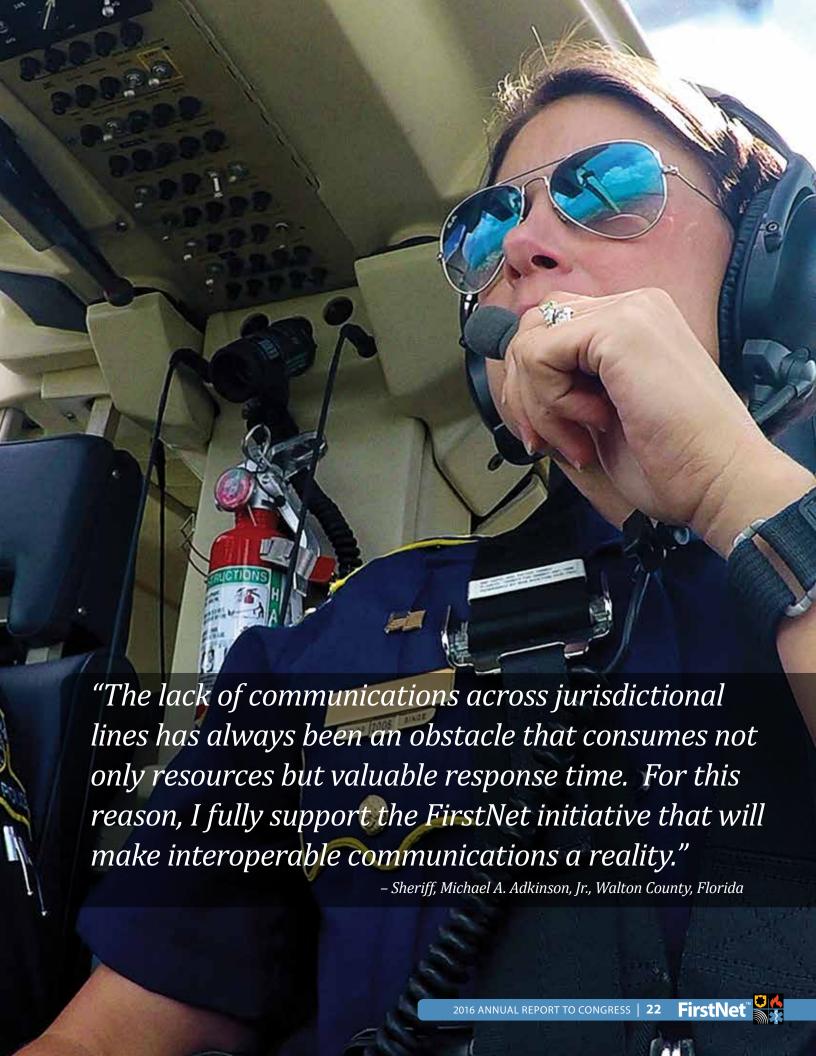
CONCLUSION

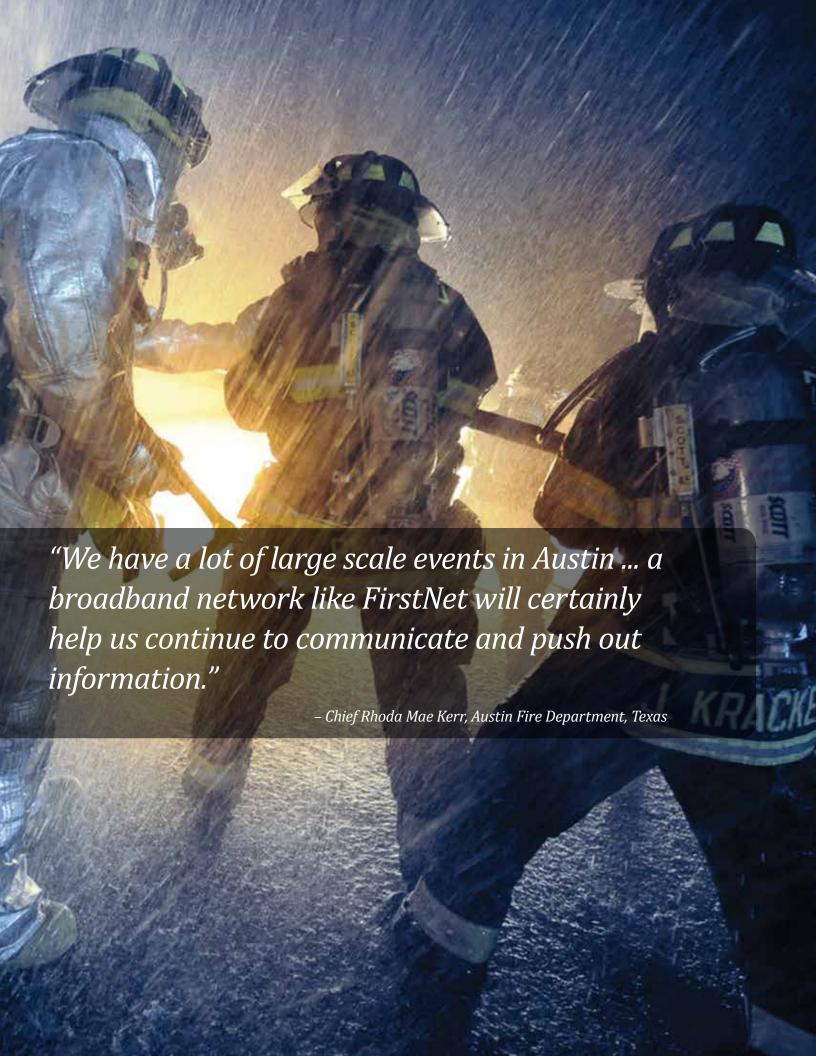
We achieved multiple goals in our mission to deliver the FirstNet network to public safety. This collective effort focused on three areas: 1) working towards the identification of a private sector partner through the RFP process, 2) consultation and outreach, and 3) preparing for network implementation and operations. Our consultation staff had a productive year, reaching a diverse group of our stakeholders across the country to gain an enhanced understanding of their needs and expectations for the FirstNet network. Moreover, our organization as a whole has transformed to ensure we are ready to implement a notable and world class public private partnership. Our commitment to deliver essential broadband capabilities to the public safety community underlines all of our efforts.

We are on the path to enter an innovative public-private partnership that will improve and modernize public safety broadband communications like our nation has not seen before. Our recent accomplishments have moved the FirstNet network closer to deployment, which ultimately will provide advanced communication technologies to public safety personnel to help them save lives and secure communities across the country.

We are excited about our work in 2017 to stand up the public-private partnership and prepare for implementation and deployment. We will continue to engage with public safety, the States, tribal, and federal stakeholders to solicit input and feedback. We are preparing to deliver our comprehensive, tailored 56 State Plans to all of the States once we select our private sector network partner. We are optimistic that our public-private partnership will deploy the FirstNet network successfully, and public safety will soon have an opportunity to experience the network's benefits and capabilities in metropolitan, suburban, and rural areas nationwide.







APPENDICES

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APPENDIX A: FIRSTNET BOARD MEMBERS (FY 2016)



Susan Swenson (Chairwoman) Telecommunications / technology executive Term expires: August 2019



Jeh Johnson Secretary of the United States Department of Homeland Security Term: Ex-Officio (Designee - Suzanne Spaulding)



<u>Jeffrey Johnson (Vice Chairman)</u> Fire Chief, retired; CEO Western Fire Chiefs Association Former Chair, State Interoperability Council, State of Oregon Term expires: August 2019



Kevin McGinnis Chief/CEO, North East Mobile Health Services Term expires: August 2018



Barry Boniface Private equity investor and telecommunications executive Term expires: August 2016



Loretta E. Lynch Attorney General of the United States Term: Ex-Officio



Chris Burbank Chief of Police, Salt Lake City UT (retired) Term expires: August 2017



Annise D. Parker Former Mayor, City of Houston, TX Term expires: August 2018



Neil E. Cox Telecommunications / technology executive Term expires: August 2018



Ed Reynolds Telecommunications executive (retired) Term expires: August 2017



Shaun Donovan Director of the Office of Management and Budget Term: Ex-Officio



Richard W. Stanek Sheriff, Hennepin County, Minnesota Term expires: August 2017



<u>Iames H. Douglas</u> Former Governor, Vermont Term expires: August 2017



Teri Takai Government information technology expert; former CIO, states of Michigan and California Term expires: August 2019



Edward Horowitz Venture capital / technology executive Term expires: August 2018

APPENDIX B: STATE AND LOCAL IMPLEMENTATION GRANT PROGRAM (SLIGP)

Information provided by the National Telecommunications and Information Administration (NTIA)

SLIGP is a formula-based, matching grant program administered by U.S. Department of Commerce NTIA, which awarded grants totaling \$116.56 million to 54 states and territories ("recipients"). The program is designed to assist regional, State, local, territorial, and tribal government entities as they plan for the FirstNet network. SLIGP funding priorities include establishing a governance structure to consult with FirstNet, developing procedures to ensure local and tribal participation in the consultation process, creating a process for education and outreach regarding the FirstNet network, identifying potential public safety users of the network, developing staffing plans that include local and tribal representation, and preparing a comprehensive plan describing the public safety needs that they expect FirstNet to address as part of their existing Statewide Communications Interoperability Plans (SCIP). The table below shows the federal funds awarded to each recipient.

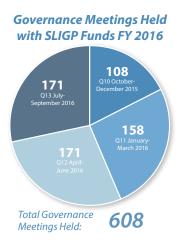
Recipient	Federal Funds Awarded	Recipient	Federal Funds Awarded
Alabama	\$2,044,932	Montana	\$1,816,415
Alaska	\$2,005,869	Nebraska	\$1,510,750
American Samoa	\$502,930	Nevada	\$1,972,666
Arizona	\$2,911,147	New Hampshire	\$879,887
Arkansas	\$1,595,711	New Jersey	\$2,711,928
California	\$5,676,786	New Mexico	\$1,899,423
Colorado	\$2,500,989	New York	\$4,867,212
Connecticut	\$1,406,257	North Carolina	\$3,203,088
Delaware	\$724,613	North Dakota	\$1,167,975
District of Columbia	\$636,722	Ohio	\$3,638,690
Florida	\$4,916,040	Oklahoma	\$1,924,814
Georgia	\$3,306,657	Oregon	\$2,148,448
Guam	\$529,300	Pennsylvania	\$3,955,098
Hawaii	\$872,075	Puerto Rico	\$1,432,624
Idaho	\$1,490,242	Rhode Island	\$755,863
Illinois	\$4,067,403	South Carolina	\$1,853,522
Indiana	\$2,354,504	South Dakota	\$1,238,103
Iowa	\$1,656,258	Tennessee	\$2,361,340
Kansas	\$1,800,790	Texas	\$5,859,404
Kentucky	\$1,852,548	U.S. Virgin Islands	\$515,628
Louisiana	\$1,928,721	Utah	\$1,782,235
Maine	\$1,045,904	Vermont	\$710,941
Maryland	\$1,985,361	Virginia	\$2,756,850
Massachusetts	\$2,162,120	Washington	\$2,642,591
Michigan	\$3,347,017	West Virginia	\$1,121,498
Minnesota	\$2,389,660	Wisconsin	\$2,294,933
Missouri	\$2,477,551	Wyoming	\$1,350,593
		Total Awarded	\$116,560,626

SLIGP Phase 1 Activities

SLIGP Phase 1 provides funding for recipients to develop or enhance their governance, conduct education and outreach to all relevant stakeholders, prepare for consultation with FirstNet, identify potential users of the Network, and update their SCIP.

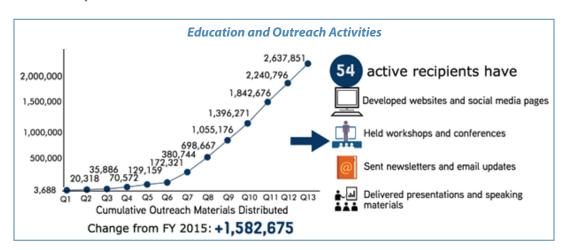
Governance

SLIGP funding priorities for governance activities include establishing a governance structure or expanding existing structures to ensure local and tribal representation, and preparing to consult with FirstNet. Recipients have taken different approaches to governance, electing to use existing structures, add subcommittees or working groups, or create entirely new governance bodies. In FY 2016, encompassing Quarter 10 (Q10) through Quarter 13 (Q13) of the grant period, recipients held a total of 608 governance meetings supported by SLIGP funds. Recipients increased the number of governance meetings held each quarter during the fiscal year. The increase per quarter may be due to heightened outreach surrounding FirstNet's RFP process and FirstNet's consultation activities focused on attending one or more governance meetings in each state and territory.



Education and Outreach

SLIGP funding priorities for education and outreach include developing an outreach plan to engage critical stakeholders across recipient states and territories. Outreach activities may also support identifying potential network users. As of September 30, 2016, SLIGP recipients have developed and distributed nearly 2.7 million outreach materials through websites, workshops, conferences, webinars, newsletters, emails, presentations, recipient-specific branding and logos, handouts, and social media sites like Twitter, Facebook, and YouTube. The graphic below summarizes recipient outreach activities.



FirstNet Consultation

Consultation with FirstNet is another key activity under SLIGP Phase 1. Recipients elected to use SLIGP funds to engage in FirstNet 2016 consultation activities and develop meeting materials, including kickoff meetings, sponsoring stakeholders to participate in Consultation Task Team (CTT) meetings, reserving meeting space and covering attendee time and travel expenses for FirstNet's presentations at governing body meetings, and participating in Executive Consultation meetings with high-level staff in the Governor's office.

SLIGP Phase 2 Activities

In accordance with the Special Award Conditions (SAC) attached to the SLIGP awards, 50 percent of each award was held in reserve for FirstNet-determined data collection activities. During FY 2015, NTIA announced the opening of SLIGP Phase 2 consistent with FirstNet's official request for States and territories to begin data collection activities. By April 2016, the SLIGP Program Office and the NIST Grants Management Division (GMD) had approved all 53 submitted budget modification packages allowing these recipients to access their full award funds.

SLIGP Phase 2 allows recipients to continue their Phase 1 activities (described above), as well as to conduct activities that support the FirstNet-determined data collection categories of coverage objectives, users and their operational areas, capacity planning, current providers and procurement, and State Plan decision process. Recipients reported their progress in each data collection category using the following stages:

- Stage 1: Process Development
- Stage 2: Data Collection
- Stage 3: Analyzing/Aggregating Data
- Stage 4: Data Submitted to FirstNet
- Stage 5: Iterative Data Collected
- Stage 6: Iterative Data Submitted to FirstNet

Q13 of the grant period, encompassing July-September 2016, was the final reporting period coinciding with FirstNet's deadline for data collection submissions of September 30, 2016. The chart below displays the number of recipients that reported each stage in each data collection category, summarizing nationwide progress as of Q13. As the chart notes, most recipients reported collecting and/or submitting iterative data to FirstNet in all categories except State Plan Decision, in which most recipients reported developing processes and collecting initial data.

Data Collection Activities

Data Collection Category	Stage 1 (Process Development)	Stage 2 (Data Collection)	Stage 3 (Analyze Data)	Stage 4 (Data Submitted to FirstNet)	Stage 5 (Iterative Data Collection)	Stage 6 (Iterative Data Submitted to FirstNet)
Coverage	2	3	5	19	20	19
Users and their Operational Areas	3	3	6	18	22	16
Capacity Planning	3	4	4	4	16	15
Current Providers and Procurement	7	7	8	25	19	4
State Plan Decision	19	13	8	4	8	0

SLIGP Monitoring Activities

To best enable recipients and NTIA to be good stewards of federal funds, the SLIGP Program Office monitors recipient progress toward SLIGP priorities through quarterly reporting and progress calls, site visits, and in-person engagements such as Single Point of Contact (SPOC) meetings.

Quarterly Reporting and Progress Calls

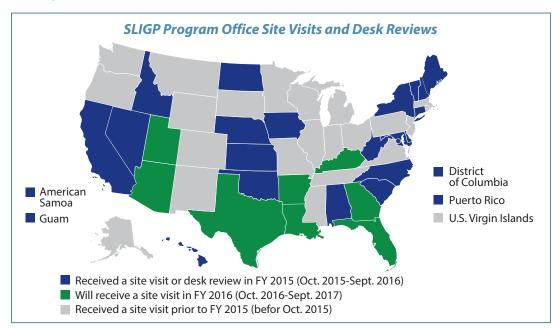
Each quarter, SLIGP recipients are required to submit a Performance Progress Report (PPR) to the Program Office detailing their progress against program milestones, staffing and contractual support, and expenditures. NTIA reviews recipients' PPRs, provides requests for clarification, and assists with any revisions. In conjunction with the PPR review process, NTIA conducts quarterly progress calls with each recipient to follow up on items reported in the PPR, answer

any grants management questions, and discuss program successes and challenges that occurred during the quarter.

Site Visits and Desk Reviews

Through site visits, NTIA meets with recipient staff face-to-face to monitor for grant compliance, address any grants management concerns, and discuss progress relating to program priorities in greater detail than during the quarterly progress calls. NTIA conducted 22 site visits and two desk reviews to recipients in FY 2016 and plans to conduct eight site visits in FY 2017.

By the end of FY 2017, NTIA will have completed at least one site visit or desk review to every SLIGP recipient. The adjacent graphic shows completed site visits in FY 2016 and planned visits in FY 2017.



APPENDIX C: EARLY BUILDER SUPPORT AND LESSONS LEARNED

FirstNet executed five spectrum manager lease agreements (SMLAs) to allow Early Builders to deploy long-term evolution (LTE) on FirstNet's licensed Band 14 spectrum for public safety. In return, each Early Builder project provides FirstNet with valuable insights into the specific needs and challenges of providing wireless broadband service to first responders. The five Early Builder projects continue to progress and provide important lessons that support and influence FirstNet's efforts toward FirstNet network deployment.

Working closely with each project and the PSAC, FirstNet has used lessons learned from the Early Builders for the RFP content, network design and deployment considerations, as well as future network policies. Lessons learned are derived both from progress on the key learning conditions (KLCs) as defined in each project's SMLA and from observations of each project's daily efforts and activities. Today, we have documented 191 specific lessons learned and shared them with FirstNet staff. Select lessons learned and their impact on FirstNet efforts are summarized as follows:

<u>Use of Public Assets</u>: The Early Builders had mixed success in utilizing public assets for site locations and network connectivity. The Los Angeles Regional Interoperable Communications System (LA-RICS) experienced significant challenges in the use of public assets, specifically at fire stations, and was forced to abandon a significant number of locations. Across several Early Builder projects, public assets may also have restrictions on private or commercial access, potentially hindering use in a public-private partnership. Service Level Agreements (SLAs) vary across projects and, in some cases, are not in place. It will be important to define and establish SLAs that drive high network reliability. Although there will likely be scenarios where the use of public assets will benefit the FirstNet network, FirstNet has identified reliance on public assets as a risk to deployment timelines, along with potential operational impacts to a public-private partnership model.

<u>Staffing and Operational Readiness:</u> Some Early Builders also manage and maintain State or county land mobile radio (LMR) networks. The level of complexity in the management of an LTE network exceeds that of an LMR network. The projects have employed different management strategies, with some hiring staff with prior LTE experience, and others relying on vendor-provided support. FirstNet has observed that staff departures (both at the project and vendor levels) can negatively impact network performance. FirstNet will consider appropriate staffing levels and qualifications to minimize staffing risks and single points of failure.

Network Visibility and Data Analytics: LTE networks can provide significant performance data indicating the health of the network and the user experience. Most Early Builder projects did not focus on the availability of and access to relevant network data. While all projects have network status (i.e., network element failure) alarming, the level of performance reporting is limited or not available for select Early Builders. FirstNet addressed this potential issue in the procurement documents and will also include them in relevant network policy documents.

<u>Coordination and Operational Processes</u>: Effective support of public safety networks and users requires coordination beyond that typically required for commercial and legacy public safety networks. Agencies and users have limited time and accessibility for device delivery and installation and associated training. Vehicle installation has been a notable challenge across several projects. Relative to operational processes, FirstNet noted the criticality of coordination of network changes (upgrades or modifications) so as not to impact active network users (whose usage patterns differ from the general public). These observations have influenced FirstNet's RFP and policy documents.

<u>Application Interoperability:</u> Each Early Builder has successfully demonstrated the value of Band 14 service to public safety. Specifically, dedicated priority to public safety users, especially at

major public events, notably helped first responders compared to prior support using commercial networks. Further, each Early Builder has demonstrated various applications to access functionality not generally available to public safety. In some cases, applications did not operate on different devices or, due to proprietary implementations, were not fully interoperable. These observations underscored the importance of device and application certification, both of which were addressed in the procurement effort and internal FirstNet organization.

The following sections summarize Early Builder project progress along with KLC status.



LA-RICS Authority

The LA-RICS project team has completed 63 LTE sites and deployed an additional 14 Cell-on-Wheels (COW) sites. During the Rose Parade in Pasadena, California in January 2016, the project team successfully tested and demonstrated usage of the public safety broadband network (PSBN) in support of law enforcement and fire service first responders assigned to the event. The LA-RICS project team is also preparing a proposal that describes their expansion plan to utilize the remaining National Telecommunications & Information Administration (NTIA) Broadband Technology Opportunities Program (BTOP) grant funds made available to them through FY 2020.

The LA-RICS project, through its extensive network demonstration exercises with its public safety members, has demonstrated the priority first responders put on its accessibility to streaming video for both situational awareness and evidence gathering. Fixed video cameras and mobile video units (both in-vehicle and body worn) have been tested at every event and throughput monitoring and network settings have been closely analyzed. Additionally, the LA-RICS team has learned significant lessons from the launch of the LA-RICS PSBN as it relates to quality of service, priority and preemption (QPP). Ensuring the proper network configurations have been established, as well as ensuring access to network tools allowing for controls that set network configurations have become a priority to the project.

FirstNet expects the LA-RICS PSBN to become fully operational in 2017, at which time the project will serve a significant number of public safety users from LA-RICS member agencies.

LA-RICS		
Key Learning Conditions (KLC)	Highlights of Progress Made on KLCs	
Establish partnerships with utilities and secondary responders	Potential secondary use partnership identified and usage needs are being assessed.	
Explore QPP techniques	Limited QPP functionality available in LA-RICS network. FirstNet working with LA-RICS to identify capability and a relevant testing plan.	
Evaluate network monitoring tools used to alert operators of congestion	Evaluation has been completed, and documentation is in process.	



State of New Jersey (JerseyNet)

The JerseyNet project team began operational service using five unique configurations of deployable assets to support in-state public safety communications initiatives. Such initiatives included Atlantic City, New Jersey concerts and public events, Urban Search and Rescue (USAR) and airport emergency exercises, and the PGA Championship in Springfield, New Jersey. The JerseyNet network supports more than 400 active users, and the project focuses on operational readiness preparation, enabling end-to-end network monitoring, and completing key operational and user training initiatives.

This project has revealed that consistent outreach to agencies is necessary to ensure understanding and acceptance of the PSBN, and first responder training on devices and applications is essential. In addition, the JerseyNet team observed that the use of unlicensed microwave can expedite deployment, but also increases operational risk if deployed without a redundant solution.

FirstNet expects the JerseyNet project to continue to add active users and enhance and optimize operational processes and procedures in 2017.

New Jersey		
Key Learning Conditions (KLC)	Highlights of Progress Made on KLCs	
Demonstrate and document the use and capabilities of rapidly deployable assets	Deployable assets fully deployed and tested. Project supports field exercises and operational events documenting capabilities of the deployable assets and operational lessons learned.	
Conduct emergency management exercises and training activities with deployable assets	User and operational training activities and materials now in place. State outreach activities include and leverage deployable assets to demonstrate service.	
Document best practice Network Operations Center (NOC) notification approaches, including trouble ticketing, prioritization, reporting, and ticket close-out.	Network operations visibility enabled via the project NOC. Trouble ticketing, priori- tization, reporting, and close-out processes established and implemented.	

Adams County, Colorado (ADCOM911)

The Band 14 LTE network covering Adams County, Colorado has 19 LTE sites deployed and serves 490 activated devices, with more than 76 devices in active daily use. The ADCOM911 project team completed an upgrade to the LTE core, adding redundancies and additional features to the network. Additionally, a broadband test center was constructed for on-site device testing at an ADCOM911 facility.



The project has highlighted the need for dedicated technical personnel in managing daily operations of the LTE network and driving continual improvement. The ADCOM911 project team has also observed that scheduled network maintenance times for public safety can differ from commercial standards due to differences in peak usage and user needs, meaning that, in some cases, maintenance windows may be during daytime hours.

The ADCOM911 team is working to identify and add public safety users to the PSBN in 2017, and is positioned to support real-world testing and to provide hands-on experience with new devices and services.

ADCOM911	
Key Learning Conditions (KLC)	Highlights of Progress Made on KLCs
Provide a real-world test system to include a hosted and redundant core node for another LTE PSBN project. Examine the complexity of remotely hosted core deployments and intersystem operations.	New core node hardware implemented adding redundancy and LTE features. Connectivity tested and verified between ADCOM911 and State of New Mexico LTE PSBN.
Conduct device testing and document processes needed to adequately test and certify devices before adding to a public safety network. Develop and conduct user training and capture recommendations about deploying devices to users from a user standpoint.	Broadband test center constructed for on-site device testing at ADCOM911 Facility. Project team continues to provision and add public safety users to the ADCOM911 LTE PSBN.
Develop and document operational processes for managing and maintaining a PSBN. Document how project ensures effective visibility of end user performance and effective management of user service issues.	Network performance and utilization reports developed and provide insight into application use, data consumption by agency, and user service issues.



State of Texas

The Texas project team, supported by a 2011 U.S. Department of Homeland Security (DHS) Port Security grant and the Harris County, Texas General Fund, is working to provide LTE coverage to the majority of Harris and Brazos Counties with 37 Band 14 LTE sites. The network currently supports law enforcement wherever the LTE PSBN is available, including more than 100 user devices, averaging 60 devices in active daily use. The Texas PSBN was used to support several public safety communications initiatives, including providing wireless broadband for first responders at the Houston Rodeo and Livestock Show and NFL football games at Houston's NRG Stadium.

FirstNet worked closely with the Texas project team to enable the detection of interference sources potentially impacting Band 14 LTE operations. The results demonstrated that interference monitoring should be part of all future FirstNet and private sector partner processes. It was also observed that the adoption of smartphones is highly dependent on Push-to-Talk (PTT) applications, but since PTT applications are not standardized and interoperable, their use presents an interoperability risk.

The Texas team is actively driving toward network operationalization and launch of service in 2017, and will continue to log performance statistics from its LTE core and provide this data to FirstNet for use in analyzing and recommending changes to improve PSBN performance.

Texas	
Key Learning Conditions (KLC)	Highlights of Progress Made on KLCs
Develop operational training materials.	Training will leverage ongoing development of authentication and user access management (known as ICAM), along with local control for local agency training development.
Identify and demonstrate operational advantages the PSBN provides public safety during special events during scenarios where the commercial networks can experience capacity limits.	Harris County leveraged the 3-week long Houston Rodeo to explore various devices, applications, and use cases for evaluation. Super Bowl LI in Houston will also be used to test improvements in special event applications and operations.
Develop data analytics using user and network usage statistics.	Significant network and user performance reporting developed and being used to improve the user experience.
Document the operational planning necessary to transition users off of a local core network to the FirstNet network.	Planning continues but contingent on the timing of the FirstNet NPSBN procurement and partnership.
Evaluate and document the technical performance and operational benefit of an extended LTE coverage feature for rural areas.	The majority of test cases are complete and network data analysis and test reports are being generated.



State of New Mexico

The New Mexico project team has completed PSBN construction, including construction of sites adjacent to the Mexican border. The New Mexico LTE PSBN supported many in-state public safety communications initiatives, including the New Mexico State Fair, the Albuquerque International Balloon Fiesta, and the Zozobra Festival in Santa Fe, New Mexico. The New Mexico team also conducted an exercise with Department of Homeland Security (DHS) Customs and Border Protection (CBP) to demonstrate multi-jurisdictional and situational awareness capabilities enhanced through use of the PSBN. Additionally, the New Mexico RAN, which is utilizing a remote LTE core located at the ADCOM911 Early Builder site, has been performing well for over a year.

Events supported by the New Mexico project have demonstrated that special events require the use of both handsets and vehicular modems, due to a large number of users operating on foot and

away from vehicles. Additionally, the team found that using smartphones while driving during vehicle operations, such as pursuits or patrols, can be unwieldy and dangerous, demonstrating the need for developers of situational awareness applications to develop features that ensure driver safety, such as using mapping technology for live tracking.

The New Mexico team is working to secure new users and usage on the network in 2017. Additionally, the New Mexico team's experience identifying and addressing cross-border interference challenges will be a key learning opportunity for FirstNet.

New Mexico	
Key Learning Conditions (KLC)	Highlights of Progress Made on KLCs
Develop and document processes and lessons learned from identification of and response to cross-border interference issues experienced along southwest border.	New Mexico has constructed RAN sites next to the Mexican border near Las Cruces, New Mexico. Project is conducting evaluation of operations along the border.
Explore and document lessons learned surrounding use of New Mexico PSBN by federal and local government users.	User outreach continues and various agencies in process of procuring devices. Operations coordinated with local public safety agencies during New Mexico State Fair and Balloon Fiesta. Joint exercise conducted with CBP using PSBN to support border operations.
Document lessons learned from integration and operation of the New Mexico RAN with a remote core located outside of the state.	New Mexico team is supporting its RAN using a remote core located at the ADCOM911 Early Builder project in Colorado. Evaluation and documentation of remote core operational complexities in progress.

APPENDIX D: COLLABORATING WITH THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST) PUBLIC SAFETY COMMUNICATIONS RESEARCH (PSCR) PROJECTS

FirstNet funded a variety of PSCR research tasks to cultivate innovative public safety communications solutions. These research tasks included end-to-end Quality of Service, Priority and Preemption (QPP); a Band 14 implementation and characterization study; Identity, Credential, and Access Management (ICAM); application data isolation; and static and dynamic application security validation tools and methods.



PSCR's end-to-end QPP research project focused on:

- Advancement of QPP capabilities and standards through analysis of existing standards, technology, identification, and research of the mechanisms that support Dynamic and Local QPP on the FirstNet network;
- Advanced LTE Bearer Initiation and Management, via analysis of existing standards and technology, verification of network capabilities, investigation of "push notification" capabilities and advantages, and documenting possible methods of implementing an emergency button on public safety user equipment; and
- QPP Mobility Configurations, including research into mobile virtual private network (VPN) technology and multi-hop QPP mechanisms and studies seeking to advance mobile VPN and QPP capabilities between different radio and network domains.

Other PSCR research projects included:

- A Band 14 Implementation Characterization Study including research into Band 14 channel properties and external influences on excess network capacity, including measurement, modeling, and analysis of the FirstNet network implementation and coexistence with other systems, including commercial LTE and public safety LMR;
- ICAM, to include research into public safety mobile Single Sign On (SSO) solutions built from commercially available products;
- Application Data Isolation, including research of available commercial off-the-shelf (COTS) products that provide data isolation and enforce secure configuration settings on public safety mobile devices; and
- Static and Dynamic Application Security Validation Tools and Methods including research into available products and testing methods for potential mobile applications to vet public safety-specific features.

FirstNet will apply these research advancements to the communications technologies and engineering utilized in the deployment of the FirstNet network. Given that a public safety grade LTE network is not available commercially today, this research is essential to ensuring the FirstNet network can deliver true priority to public safety users with the resiliency, dependability, and adaptability first responders require.

Additionally, FirstNet staff actively participated in the NIST Public Safety Technology Acceleration Program summits that were focused on mission-critical voice (MCV), location-based services (LBS), and data analytics. NIST will leverage these efforts in FY 2017, along with \$300 million in public safety research funding, to initiate grants, prize challenges, and potential cooperative agreements with industry and academia to accelerate the creation of critical public safety technology to meet public safety's evolving needs.



"To have a very robust public safety network available to us, like FirstNet, that prioritizes our needs and preempts others is vitally important."

– Chief Brian Fennessy, San Diego Fire-Rescue Department, California









ADDITIONAL INFORMATION

Please visit our website for additional resources at www.firstnet.gov

For further information or questions, please contact FirstNet Office of Government Affairs at governmentaffairs@firstnet.gov

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