



FirstNet[®]

F Y 2 0 1 8 A N N U A L R E P O R T T O C O N G R E S S



TRANSFORMING PUBLIC SAFETY BROADBAND

APRIL 2019

Submitted to the
United States Senate Committee on
Commerce, Science, and Transportation
and the
United States House of Representatives
Committee on Energy and Commerce



This Annual Report to Congress is issued pursuant to Section 6210 of Public Law 112-96 and reflects the operations, activities, financial condition, and accomplishments of the First Responder Network Authority (FirstNet)¹ for fiscal year 2018.²

¹ Public Law 112-96 established FirstNet as an independent authority within the United States Department of Commerce's National Telecommunications and Information Administration (NTIA).

² Fiscal year 2018 is the period from October 1, 2017 through September 30, 2018.



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LETTER FROM BOARD CHAIR EDWARD HOROWITZ AND ACTING CHIEF EXECUTIVE OFFICER EDWARD PARKINSON

April, 2019



Edward Horowitz



Edward Parkinson

We are proud to report that the First Responder Network Authority (FirstNet) made significant progress in fiscal year (FY) 2018 to ensure Congress's vision of creating a truly nationwide, interoperable broadband public safety network for our nation. Following the decisions of all U.S. states and territories and the District of Columbia to participate in the deployment of the nationwide public safety broadband network (FirstNet network) as proposed by FirstNet, FirstNet network deployment began ahead of schedule. Today, the FirstNet network is operating, and public safety entities are benefitting from the power of the network as they respond to emergencies and in their daily operations.

After the contract was awarded in March 2017, AT&T moved quickly to deploy a network that provides essential communications tools and features for first responders and other public safety personnel. We officially launched the FirstNet core network (FirstNet Core) in March 2018 – ahead of schedule. The FirstNet Core provides a dedicated, secure, resilient network backbone, with the priority and pre-emption capabilities public safety subscribers need. Pursuant to its agreement with FirstNet, AT&T also initiated buildout of the Band 14 radio access network (RAN) nationwide.³ Federal, state, tribal, and local public safety entities also began subscribing to FirstNet service and buying FirstNet devices in FY 2018. As of April 2019, there were more than 7,000 agencies using 570,000 connections on the FirstNet network, and 93 devices were approved and certified for use on the FirstNet network through a partnership with the National Institute of Standards and Technology (NIST).⁴

In addition, FY 2018 was marked by our continued, productive engagement and collaboration with FirstNet stakeholders in federal agencies, states, territories, tribes, and industry. We would like to thank the FirstNet Board and staff for their deep commitment to our mission and tireless efforts to help ensure the FirstNet network meets the needs of public safety. We worked with jurisdictions and organizations across the United States to educate first responders about the benefits of broadband for public safety and the ways it is changing vital public safety communications. We will continue to directly interact with and obtain input from public safety stakeholders in the field so we can maintain our focus on ensuring the FirstNet network meets their communications needs – now and in the future.

³ Band 14 is the dedicated 20 MHz spectrum in the 700 MHz band that Congress assigned to FirstNet to deploy the FirstNet network.

⁴ Under the Middle Class Tax Relief and Job Creation Act of 2012 (Act), the Director of NIST, in consultation with FirstNet and the Federal Communications Commission, is required to ensure the development of a list of certified devices that meet appropriate protocols and standards for access to, use of, or compatibility with the FirstNet network. 47 U.S.C. § 1426(c)(6). This requirement is carried out by the Public Safety Communications Research Division of the NIST Communications Technology Laboratory.

Even in the early stages of deployment, the FirstNet network is showing its value as public safety uses it in a variety of situations, from planned events to response-and-recovery operations. For example, ruggedized FirstNet devices were distributed to first responders working the 2018 Boston Marathon. The devices were outfitted with SIM cards connecting those responders to the dedicated FirstNet Core, which separates public safety traffic from commercial traffic. Because the FirstNet devices had a dedicated capacity and connection, responders on the scene benefited from an improved user experience that supported their lifesaving work. Another example of FirstNet's work on behalf of first responders can be seen in its support of response and recovery operations during the 2018 hurricane season. AT&T deployed FirstNet Satellite Cells on Light Trucks (SatCOLTs) to impacted areas so first responders had connectivity where and when they needed it. FirstNet network service is the beginning of a fundamental evolution for public safety broadband operations – where the operational needs of first responders are now directing communications operations and capabilities, instead of the other way around.

Additionally, we refined FirstNet's strategy and goals, in concert with FirstNet's statutory mission and the Secretary of Commerce's Strategic Goal 3.4 to "Deploy Public Safety Broadband," to guide the organization as we transitioned from network planning to implementation. Not only are we committed to overseeing AT&T's contractual obligations for the FirstNet network, we are also shaping the strategy and goals for the continued investment in the FirstNet network. This investment strategy will allow us to create and maintain a robust set of innovative, connected tools for public safety's use in emergencies, disasters, and daily operations.

FirstNet exists to ensure the building, deployment, operation, maintenance, and improvement of a nationwide broadband network that serves public safety across the nation, from crowded cities to the most rural parts of the country. We made significant strides in delivering the promise of the FirstNet network in FY 2018, and we will continue our efforts to advance and enhance public safety communications in the years to come.

Sincerely,

Edward Horowitz
Chair, FirstNet Board

Edward Parkinson
Acting Chief Executive Officer

EXECUTIVE SUMMARY

FirstNet is providing public safety with the network it asked for and needs to support its life-saving work. This year's report highlights several significant milestones we met in FY 2018, and activities we began in FY 2018 that will continue into FY 2019.

By providing a dedicated and differentiated broadband communications experience, the FirstNet network is strengthening public safety's communications capabilities, enabling it to respond more quickly and effectively. During planned events like the Boston Marathon; and unplanned events like Hurricanes Florence and Michael; the wildfires in California, Oregon, and Washington; and countless other incidents in FY 2018, the FirstNet network helped public safety protect communities and save lives.

In FY 2018, FirstNet focused on three central objectives:

1. Managing our contract with AT&T to ensure the timely delivery of the FirstNet network;
2. Fostering innovation that furthers public safety communications technology; and
3. Acting as a catalyst for advancing the FirstNet network to serve the needs of public safety.

To ensure that the contractual FirstNet network deployment milestones are being met, AT&T is required to submit key performance indicators (KPIs) and other deliverables to FirstNet on a regular basis. FirstNet subject matter experts review these deliverables to confirm that AT&T is indeed delivering as required and within the schedule dictated by the FirstNet network contract. In FY 2018, AT&T satisfied all deployment milestones on time or ahead of schedule.

In addition to overseeing the contract with AT&T, FirstNet worked to drive innovation in the public safety communications marketplace, expand choice, and lower costs for public safety entities. By serving as a conduit between public safety users and the industry that develops new communications tools, FirstNet seeks to attract innovators to this evolving marketplace so that lifesaving tools are affordable and designed with first responders in mind.

Central to our mission is our ability to capture and support the public safety community's communication technology needs, and to be its advocate during the deployment and evolution of the FirstNet network. Throughout FY 2018, we regularly engaged with the public safety community to educate them about the FirstNet network, and to learn first-hand about their expectations and operational needs. Our engagements with public safety will continue to inform and guide decision-making, as it has since FirstNet's inception. Looking to the future, we remain steadfast in our commitment to serve public safety every day.





Keeping attendees safe at large events requires first responders to communicate seamlessly and gather vast amounts of information. At the 2018 Boston Marathon, first responders experienced the FirstNet difference with reliable communications and prioritized access to their dedicated broadband network.

FIRSTNET IN ACTION

Congress created FirstNet to ensure the deployment and ongoing operation of a broadband network that provides interoperable, reliable communications to first responders and other public safety personnel. With all U.S. states, territories, and the District of Columbia opting-in to the FirstNet network, interoperable communications among first responders is a reality for subscribers to the FirstNet network. With the FirstNet network, public safety users can communicate across jurisdictions and disciplines, and with other networks – no matter the state, region, or municipality. The FirstNet network was used in the field during several planned and unplanned events over the past year, and successfully delivered a dedicated and differentiated broadband communications experience for public safety operations.

Planned Event: Boston Marathon⁵

On April 16, 2018, the fifth anniversary of the tragic Boston Marathon bombings, FirstNet and AT&T teams were on hand to distribute 80 FirstNet devices to fire, police, and incident response teams from the cities of Boston and Brookline, Massachusetts, in a live demonstration of the FirstNet network for the Boston Marathon. Thirty of these devices were outfitted with FirstNet SIM cards and connected to the dedicated FirstNet Core.⁶



On the day of the Boston Marathon bombing in 2013, thousands of spectators and residents overwhelmed the local cellular networks, causing signal delays and failed calls. For area first responders on duty, the consequences of poor or no network coverage and capacity were dire – the lack of a reliable network delayed the ability to share the images and videos that ultimately helped identify the perpetrators.

As security preparations were underway for the 2018 Boston Marathon, the FirstNet network was in place to bolster emergency communications for first responders – and to provide much-needed video, image, and data capabilities. These extra capabilities would have provided a very different experience for first responders than they had in 2013.

With the availability of the FirstNet network at the 2018 event, first responders used FirstNet network-ready devices with push-to-talk and Land-Mobile Radio (LMR) integrated applications. The responders also tested the FirstNet Core, which operates with physically separate, dedicated hardware and is built as a highly secure, resilient, and redundant network. The FirstNet Core differentiates the FirstNet network from commercially available networks, which can become overloaded during large-scale events.

FirstNet network users from the Brookline Police Department reported that they noticed the benefits of communicating over FirstNet's reliable, hardened network as compared to the network congestion and loss of quality of service experienced by the Department in the past on commercial networks during large events. In addition, fire and police used location-tracking applications with new capabilities for coordination of response efforts to track personnel and resources. For the first time, the Boston Fire Department was able to see the exact position of individual responders displayed on screens in their communications center and mobile command units, which enabled real-time decisions to dispatch the closest responder, saving valuable time.

We were honored to work with Boston and Brookline's first responders. As more communities adopt FirstNet network service, public safety professionals across the nation will be able to

⁵ Boston Marathon use case adapted from FirstNet.gov blog by Michael Varney, FirstNet Consultation Lead, Northeast: <https://firstnet.gov/newsroom/blog/firstnet-boston-strong-2018-marathon>.

⁶ Subscriber Identification Module (SIM) cards identify the devices on the FirstNet network.



Nov. 7, 2018 - U.S. Coast Guard begins the process of removing damaged boats in the aftermath of Hurricane Michael.

Photo by FEMA/K.C.Wilsey

connect and communicate over their dedicated network – enabling them to do their work every day and in every emergency.

Response and Recovery: Hurricane Season

When it comes to emergency communications during and after hurricanes and other natural disasters, public safety has frequently looked to SatCOLTs to provide communications when fixed terrestrial networks go down. Deployable solutions such as SatCOLTs were identified early on during our consultation efforts with public safety stakeholders across the country as a “must have” solution. The New Jersey early builder project, JerseyNet, also successfully used deployable assets, and their use helped inform the planning for the FirstNet network.⁷

The FirstNet network’s deployable capabilities and the 72 FirstNet-dedicated SatCOLTs, strategically placed throughout the country for first responders, have been delivered and put to use across the nation. In FY 2018, FirstNet deployables were used on nearly 100 occasions, including bolstering communications in the Carolinas after Hurricane Florence, and in Florida after Hurricane Michael.⁸ In California, Oregon, and Washington, FirstNet SatCOLTs were deployed to help firefighters communicate as they fought some of the deadliest wildfires our country has ever seen.

In Florida, after Hurricane Michael, FirstNet SatCOLTs were deployed at the guidance of public safety agencies to boost the connectivity for FirstNet network subscribers in the hardest-hit areas of the state. The SatCOLTs were coordinated in real time through Florida’s Emergency Operations Center in Tallahassee. FirstNet also worked directly with the Florida Governor’s office to identify public safety agencies that were without commercial service and delivered hundreds of FirstNet network-enabled devices to help these first responders help others.

Finally, as required by law, the FirstNet network is interoperable.⁹ FirstNet network users, from all disciplines and levels of public safety, working across states in mutual-aid efforts, had immediate access to the FirstNet network without having to change phones, settings, or devices – boosting the effectiveness of operations. For example, during Hurricane Florence, the Tennessee National Guard used the FirstNet network as their primary means of communicating during its response in the Carolinas. This demonstrated the utility of the nationwide interoperable FirstNet network: immediate use of a network and devices in times of crisis, when and where it is needed.

We are proud to be delivering to public safety agencies the tools they needed to communicate in the harshest conditions in FY 2018. As our partnership with AT&T continues, we look forward to seeing the development and deployment of new technologies to serve the public safety community’s communications needs.



Photo by Florida Association of Public Information Officers

A FirstNet deployable on location in the aftermath of Hurricane Michael.

⁷ New Jersey successfully concluded the JerseyNet Project that provided key lessons learned for the FirstNet network regarding the use of deployable assets. The JerseyNet assets are being transferred to AT&T to be used in the deployment of the FirstNet network across the country (See Appendix D): <https://www.njhomelandsecurity.gov/media/njohsp-successfully-concludes-jersey-net-project-aimed-at-assisting-those-who-save-others>.

⁸ “AT&T-FirstNet says 72 Deployables are Available to Subscribers,” by Kelly Hill, RCR Wireless, Oct. 8, 2018: <https://www.rcrwireless.com/20181008/carriers/att-firstnet-says-72-deployables-are-available-to-subscribers>.

⁹ Middle Class Tax Relief and Job Creation Act of 2012, P.L. 112-96, 47 U.S.C. § 1422.



CONTRACT OVERVIEW

One of FirstNet's primary responsibilities is to manage and ensure successful execution of our contract with AT&T for the building, deployment, and operation of the FirstNet network. Signed in March 2017, this 25-year contract will ensure network evolution and enhanced capabilities over time to meet the communications needs of public safety.

The basis of our relationship with AT&T is found in the contract with AT&T to deliver the FirstNet network and services. Successful execution of the contract will be reflected in the deployment, maintenance, and improvement of the FirstNet network that transforms public safety's operations.

In the short time since we announced the contract, we have seen notable successes, including:

- Public safety's dedicated FirstNet Core launched, giving FirstNet network users a differentiated experience with priority, preemption, and quality of service.
- Nationwide coverage of Band 14 and Non-Band 14 network operations were established, enabling public safety users' access to FirstNet network services. AT&T's "all-band" solution, which allows FirstNet customers to use existing resources on AT&T's network with priority and preemption, was deployed very quickly, making coverage and capacity available where needed.
- Network use is growing quickly. As of April 2019, there were more than 7,000 agencies using 570,000 connections on the FirstNet network.
- 93 devices, 47 of which are Band-14 capable, were vetted and published on the list of devices certified for use on the FirstNet network maintained by the National Institute of Standards and Technology (NIST).
- 72 dedicated Band-14 deployables were delivered on schedule, providing additional, dedicated resources to extend communications during emergencies, major planned events, and response/recovery operations – at no extra cost to FirstNet network subscribers.
- End-to-end encryption solutions were made available for secure transmission of public safety data on LTE-enabled devices.
- The FirstNet network's dedicated Security Operations Center (SOC) went online, providing 24/7/365 security monitoring across the network.
- FirstNet continues to be self-funded through timely fees paid by AT&T per the terms of the contract.
- 20 percent of the initial build-out plan of contracted Band 14 coverage in non-rural areas was achieved, ahead of schedule.
- Significant buildout and progress on rural milestone deployment and FirstNet is monitoring AT&T's performance in delivering key rural milestones.
- AT&T developed rural partnerships across the country, extending the network for first responders in the most remote areas of the country.
- The FirstNet network was deemed one of *Popular Science* magazine's Greatest Security Innovations of 2018¹⁰ and won the Technology of the Year award by Smart Cities Dive.¹¹



¹⁰ <https://www.popsci.com/best-of-whats-new-2018>.

¹¹ <https://www.smartcitiesdive.com/news/technology-of-the-year-firstnet/538682/>.

Contract and Task Orders Overview

The FirstNet contract with AT&T is an indefinite delivery/indefinite quantity (IDIQ) with a 25-year period of performance. Per the contract, AT&T must build, operate, maintain, and upgrade the network for 25 years, while achieving public safety user adoption targets (*i.e.*, AT&T must achieve a minimum number of subscribed devices connected to the network). The contract also guarantees FirstNet's continued financial sustainability through annual payments, to be reinvested in the FirstNet network, over the life of the contract.

The FirstNet Authority has issued five task orders under the contract. The first two task orders required the development and delivery of plans for network deployment in each state and territory and the District of Columbia, and both task orders are already complete. The remaining three task orders are for the continued operation, deployment, and maintenance of the FirstNet network, including the FirstNet Innovation and Test Lab network circuits.

State Plans

As required by contract and consistent with FirstNet's enabling statute, FirstNet and AT&T consulted with stakeholders in each state and territory, and delivered individualized State Plans outlining strategies for deploying Radio Access Networks (RANs) for all U.S. states and territories and the District of Columbia. AT&T also developed a web-based mechanism for delivering the State Plans, called the State Plan Portal (SPP). The SPP remains online for Governors and designated state and territory stakeholders until March 2020.

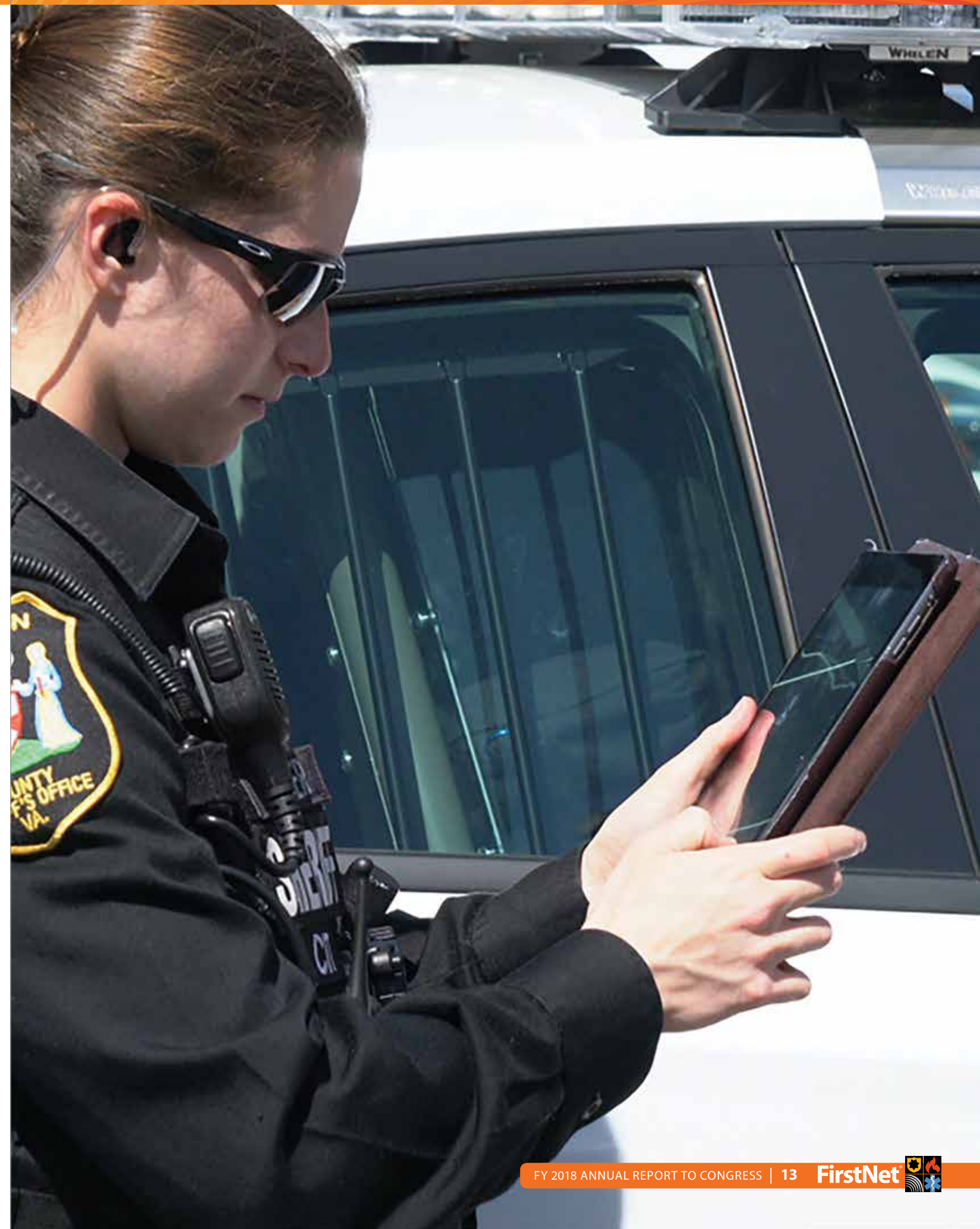
Network Deployment, Operation, and Maintenance

Under the contract, AT&T is required to deploy, operate, and maintain the FirstNet Core. Successful deployment and operation will create a standards-based, interoperable, reliable, forward-looking nationwide broadband network with the potential to redefine the way that the nation's public safety community communicates. AT&T's dedicated network elements and FirstNet's Band 14 spectrum will deliver differentiated features for public safety that include:

- **Services:** The FirstNet network offers specialized services through a dedicated core network, including data and voice services; Quality of Service, Priority, and Preemption (QPP); Identity, Credential, and Access Management (ICAM); and mission-critical services, systems, and operations. These features enable public safety users to be recognized and afforded different treatment than commercial traffic.
- **Applications:** AT&T is supporting an application ecosystem for public safety users on the FirstNet network. Examples of applications currently under development include local control applications, over-the-top services like push-to-talk, and public safety home pages for direct access to FirstNet network services.
- **Devices:** Through AT&T's existing relationships with device and chipset vendors, and through general industry awareness of the FirstNet program, an increasing number of devices and accessories are available to public safety.
- **Architecture and Infrastructure:** The design, operation and maintenance of the FirstNet network encompass the FirstNet Core infrastructure, infrastructure hardening, and security services, which ensure the safety and the ongoing performance of the network.

In addition, the contract provides for state- or territory-specific objectives developed for each of the U.S. states and territories and the District of Columbia to be completed during the first five years of the period of performance. It also provides for ongoing maintenance and enhancements throughout the life of the contract. AT&T will fulfill several requirements for RAN execution, including:

- Building, operating, maintaining and improving the RAN execution in accordance with state/territory contract requirements.



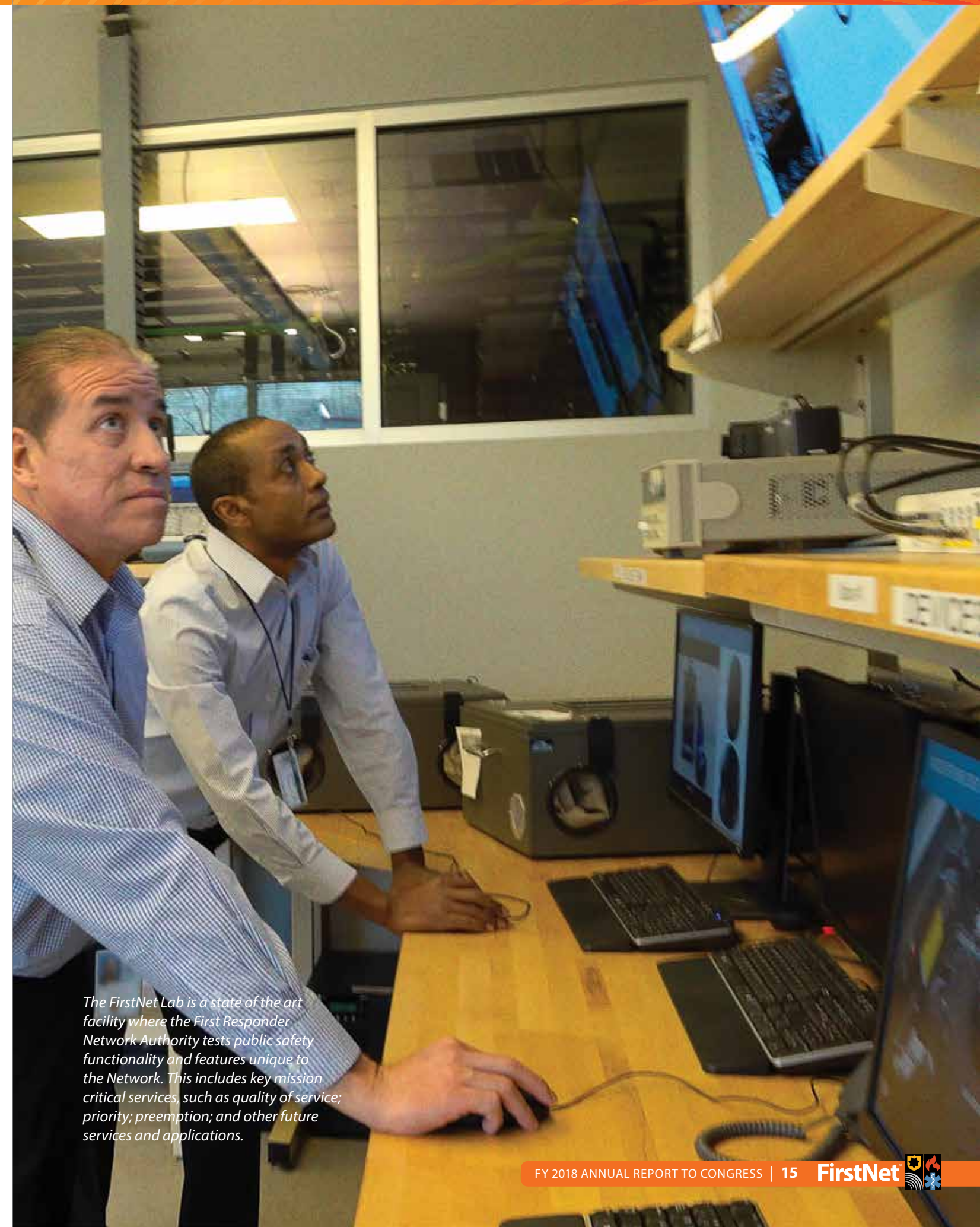
- Providing Band 14 and non-Band 14 coverage and capacity that meets or exceeds targets outlined in for each state/territory and each assessment period.
- Fulfilling any state/territory-specific commitments as required in the contract.
- Evolving the network as features and technologies become available to better serve public safety users.

The contract also provides for the procurement of contractor provided equipment from AT&T to be incorporated into FirstNet's Innovation and Test Lab in Boulder, Colorado. This will ensure the Lab has the same features as the FirstNet network, enabling testing and oversight of the network.



Measures for Success

In addition to key contractual deliverables, FirstNet uses standardized program management tools to track and evaluate AT&T's performance. FirstNet has also established a procurement office and a technical Network Contract Management office to oversee all activities associated with the FirstNet network contract. These entities have developed rigorous contract management and administrative processes and tools used to track network-related contractual activities. As a result, FirstNet is able to minimize risk and improve quality of service, resulting in optimal performance and continuous improvement of the FirstNet network service.



The FirstNet Lab is a state of the art facility where the First Responder Network Authority tests public safety functionality and features unique to the Network. This includes key mission critical services, such as quality of service; priority; preemption; and other future services and applications.

TECHNOLOGY AND INNOVATION

As part of the mission to deploy the FirstNet network, FirstNet serves as a conduit between public safety users and the industries that develop innovative communications tools to advance public safety operations. FirstNet’s efforts help industry recognize the value and potential of the public safety communications market. Additionally, we are working with public safety stakeholders to get their feedback on products and services. In FY 2018, in partnership with AT&T, we deployed the tools described in this section to enhance the service provided to FirstNet network users.

The FirstNet Core launched operations in March 2018. It provides the dedicated network and specialized services that are available to FirstNet network customers, including:

- Nationwide reach and capacity, deployed in multiple geo-redundant locations.
- Quality of Service, Priority, and Preemption (QPP) across all bands (Band 14 and AT&T’s commercial LTE spectrum) for first responders and public safety users.
- Basic network services and public safety-specific capabilities, such as Public Safety Enterprises Network (PSEN) integration, custom Access Point Name (APN), and local control. The FirstNet Core also allows integration of certified public safety cloud applications.
- Services based on Evolved Packet Core (EPC) and IP Multimedia Subsystem (IMS) standard specifications.
- Encryption (in segments and end-to-end), service zones, and external perimeter security. The FirstNet Core provides strong authentication, access control, and flow control, supplemented with ICAM and mobile device management.
- Strict life cycle operations, including configuration management and logging, continuous monitoring (through the FirstNet SOC), vulnerability analysis and detection, and incident response.

AT&T is working to further implement public safety capabilities, such as mission critical push-to-talk, dynamic QPP, and Application Programming Interfaces (APIs) for public safety applications.

Local Control Portal

The Local Control Portal gives authorized FirstNet network users unprecedented visibility into the operations of the FirstNet network and offers better situational awareness so command operators can more effectively plan their operations.

With the launch of the Local Control Portal, we worked to gather direct feedback from FirstNet network users to improve the tool through:

- **Training:** We led focused discussions with AT&T and users on the Local Control Portal design to better understand and use the Portal.
- **Network Status Tool (NST) Recommendations Report:** We created a process with AT&T to make initial updates to NST features and consider significant changes to improve overall functionality.
- **Incident Management Tool/Uplift Request Tool:** This tool allows public safety to provide access to and priority use of the network for themselves and for extended primary users during emergencies. FirstNet provided AT&T with suggestions to update the name, functionality, and operational implications of the Uplift Request Tool to provide clarity and improve this tool’s benefit to public safety operations.



Devices

NIST is required by law to ensure the development of a list of certified devices for use on the FirstNet network. In FY 2018, FirstNet continued working closely with NIST to build on the process established for publishing the list of certified devices, and together with AT&T, collaborated with NIST to publish the initial certified device list in April 2018. Six updates were made to this list throughout FY 2018. The certified device list reflects an effective collaboration among FirstNet, AT&T, and NIST to enable a robust, diverse device ecosystem for FirstNet network users that meets critical device verification requirements.

As of April 2019, the NIST list includes 93 devices, including devices from industry leading mobile device manufacturers, such as Apple and Samsung. The availability of “FirstNet Ready” (Band 14-enabled) devices from a wide range of leading manufacturers is a significant accomplishment for public safety users.

In addition, we continued to collaborate with AT&T on evolving the device, accessory, and Internet of Things (IoT) ecosystems to incorporate the needs of public safety, such as device-to-device communications and mission-critical push-to-talk.

Device-focused market research also continued to be a key area where we were able to support the device ecosystem development. We engaged through vendor meetings and discussions with stakeholders to effectively communicate the needs of public safety and better prepare vendors to support FirstNet customers.

Applications

In FY 2018, we focused on two main areas from an applications perspective. First, we continued to represent the potential market opportunity in public safety applications. Next, we collaborated with AT&T to enhance the Application Developer Program for the FirstNet network. These efforts have encouraged the development of more applications for first responders.

Application Catalog for the FirstNet Network

We continue to work with AT&T to drive improvements and major changes in the FirstNet mobile application ecosystem. For example, to enhance the developer value proposition and encourage vendor participation in the App Catalog for the FirstNet network, we worked with AT&T to overhaul the application submission and review process. Specifically, in September 2018, we:

- Added a new App Catalog submission category (Listed), making it more attractive and convenient for developers to submit apps to the App Catalog review.

- Provided binary code scans to developers at no cost to the developer.
- Simplified the app submission process.
- Updated the content on the FirstNet Developer Portal, adding more resources for developers.

These changes were well received by developers, and we have seen an increase in the number of submissions and applications approved for the App Catalog for the FirstNet network since the changes were implemented.

Developer Portal

The FirstNet Developer Portal is a website targeted at developers of public safety applications. AT&T provides this site in support of Objective 5 of the FirstNet network contract – Applications Ecosystem. The Developer portal plays a crucial role in encouraging new entrants into the marketplace for public safety apps by providing information, education, and technical resources.

In FY 2018, FirstNet coordinated with AT&T to evaluate the application submission, API access, and other processes to provide the clarity that enable app developers to be successful.

An API is a set of routines, protocols, and tools for building software that typically specifies how software components should interact and communicate with one another. The APIs currently available to developers enable them to customize their apps for public safety users on the FirstNet network. These APIs include:

- **First Priority Device Uplift API:** Allows developers to write programs that interact with the FirstNet network and influence the relative priorities of responders to an incident.
- **FirstNet Single-Sign-On for Browser Apps API:** Provides developers the features needed to seamlessly integrate browser apps securely without requiring the user to repeatedly log in to each app separately.

Identity, Credentialing, and Access Management (ICAM)

Public safety users cannot access their devices and equipment in the same way as consumers do. Certain job functions may limit their ability to use fingerprints or other biometric inputs (*e.g.*, a firefighter wearing gloves), or there may be restrictions on how certain devices can be used in the line of duty. Because of the unique needs of public safety users, we have focused on an Identity Management (IdM) approach.

This approach delivers an integrated solution incorporating identity management services at the user, device, and application levels. The solution provides a highly secure system that enables convenient, single-sign-on access to FirstNet network web sites, management portals, and mobile applications. Our priority in working with AT&T is providing a solution that supports federal and state security requirements, and also responds to the needs of users who wish to bring their own credentials to ensure the safety and security of data. We continue to pursue a comprehensive identification solution through product strategy, planning, and testing, resulting in:

- The FBI's Criminal Justice Information Systems (CJIS) team being given approval to partner with AT&T to make CJIS data available to public safety entities via the FirstNet network. This is important for those users who require a secure network to access these databases.
- A robust roadmap of ICAM functionality that supports state, local, territorial, and tribal needs along with those of our federal partners.
- Collaboration with NIST's Public Safety Communications Research Division, and National Cybersecurity Center of Excellence on security and ICAM-related research.



Standardization

As required by Congress, the FirstNet network uses technology based on commercially-available, open standards to achieve interoperability, speed to market, economies of scale, cost efficiency, and other benefits.¹² Using commercial standards makes it easier for device manufacturers to participate in the public safety device market, which increases competition and lowers public safety device costs.

FirstNet is leading the effort to include public safety requirements in standards development. Our efforts are particularly focused on the 3rd Generation Partnership Project (3GPP), which unites seven telecommunications standards development organizations to produce reports and specifications for the creation of 4G Long-Term Evolution (LTE) technology as well as the next generation 5G specifications. In coordination with AT&T, we have been successful at ensuring that 3GPP specifications address the needs of first responders. To date, our focus has been on developing global specifications for mission-critical services and coordination with legacy public safety technologies. The current specifications for mission-critical services were originally targeted for LTE technologies, and we are now working to ensure future support for these public safety services over 5G technologies.

FirstNet's work will ensure capabilities are developed for public safety personnel to safely complete their mission – like QPP capabilities for 4G and 5G that allow prioritization based on a user's role. Other work in FY 2018, and beyond, includes supporting higher positioning accuracy in 5G, including three-dimensional position accuracy (Z-Axis) required by first responders, and continued support for device-to-device (D2D) direct communication. The basic functionality for D2D, which facilitates off-network communication between two devices, exists in 4G; and during 2018, we led an effort with 3GPP to begin bringing this critical service to 5G. We are supporting the current 3GPP work to enhance these capabilities and technologies to provide increased reliability and functionality for public safety users.

To ensure wide adoption of LTE mission-critical push-to-talk, we are working with 3GPP and the Alliance for Telecommunications Industry Solutions (ATIS) to support interworking between LTE based mission-critical push-to-talk and legacy LMR based systems. 3GPP has defined an inter-working function (IWF) between these technologies to facilitate the interoperability. Specification work is required to define interfaces on both sides of the IWF. 3GPP defines the LTE to IWF interface while ATIS defines the LMR to IWF interface. 3GPP completed the architecture specifications in 2018 and the detailed protocol specifications are expected to be done by 2019. The ATIS work is expected to be completed by the end of 2019.

Spectrum Relocation

In the spring of 2016, FirstNet launched the Band 14 Incumbent Spectrum Relocation Grant Program to help eligible public safety entities relocate their affected radios and systems from Band 14 before deployment of the FirstNet network. Aside from clearing the Band 14 spectrum ahead of network deployment, our grant program ensured public safety incumbents were able to continue to operate their communications systems without interruption to service, while transitioning to other narrow-band public safety spectrum allocated by the Federal Communications Commission (FCC).

Relocation grants totaling almost \$27 million were awarded to 10 public safety licensees operating narrowband systems on the FirstNet-licensed Band 14 spectrum under previously issued FCC authorizations. FirstNet elected to establish the Band 14 Incumbent Spectrum Relocation Grant Program to support the incumbent relocation costs, including the retuning and reprogramming of communications equipment.

By August 31, 2018, all 10 grantees had successfully completed Band 14 relocations.

¹² See 47 U.S.C. § 1426.



The AT&T Security Operations Center provides a dedicated team to support the security and operation of FirstNet services.

CONTINUED STAKEHOLDER COLLABORATION

In FY 2018, FirstNet continued engaging all public safety disciplines and levels of government to advocate for their needs and requirements in the FirstNet network. As part of our network planning efforts, FirstNet has engaged more than 140,000 public safety stakeholders and 12,000 agencies representing two million personnel. In FY 2018, FirstNet's Public Safety Advocacy (PSA) team transitioned from advocating for public safety in network planning towards ensuring the FirstNet network is built, deployed, operated, and maintained consistent with the expectations and needs of public safety.

Stakeholder Engagement

FirstNet continues to educate the public safety community to ensure it receives the latest information about its network during implementation. Throughout FY 2018, as the network deployment began and FirstNet network services became available, meetings with public safety stakeholders gave FirstNet an opportunity to introduce our partnership with AT&T and discuss the FirstNet network and services.

In FY 2018, we held more than 1,000 engagements, reaching nearly 63,000 public safety stakeholders. This included outreach and education engagements of various types of public safety entities across the country and at all levels of government (*i.e.*, federal, tribal, state, and local jurisdictions). In particular, we:

- Met with 98 national associations across public safety disciplines (fire, law enforcement, emergency management, and ambulance services).
- Conducted 80 state-level association meetings across public safety disciplines.
- Convened 88 meetings with members of state and local governance bodies that oversee public safety communications in their respective jurisdictions.
- Held more than 150 individual agency-level engagements.
- Conducted four formal tribal consultations (Red Cliff of Wisconsin, Eastern Band of Cherokee of North Carolina, Confederated Tribes of Coleville of Washington, and Nez Perce Tribe of Idaho).
- Provided an after-action review of FirstNet network adoption and usage with the Citizen Potawatomi Nation in Oklahoma.
- Provided technical assistance to Fort Mohave in Nevada, Arizona, and California regarding the Tribal Homeland Security Grant Program grant provided to Fort Mohave by the Department of Homeland Security, Federal Emergency Management Agency.

Public Safety Advisory Committee (PSAC)

The PSAC is a 43-member statutorily-mandated advisory committee representing public safety associations and federal, state, tribal and local governments that advises FirstNet as it carries out its duties and responsibilities. In November 2018, Mr. Todd Early was appointed Chair of the PSAC. Mr. Early serves as Deputy Assistant Director at the Texas Department of Public Safety and also serves as the Texas State Point of Contact for FirstNet.

In FY 2018, the PSAC met monthly by webinar to discuss and provide feedback



on topics timely and pertinent to network buildout, including products and services development. The PSAC held two, in-person meetings throughout the course of the year, which included dialogue with the FirstNet Board, leadership, and staff on their experiences with the FirstNet network and interactions with AT&T.

Also in FY 2018, FirstNet coordinated with the PSAC to obtain advice and recommendations on a public safety association engagement strategy to educate the public safety community about the FirstNet network and collect input. These activities are meant to foster ongoing engagement with the public safety stakeholder community and encourage future collaboration on the development of the FirstNet network to meet public safety's needs.

Additionally, the PSAC's Tribal Working Group provided advice and recommendations on the implementation of the Tribal Consultation Policy, a guiding document that informs FirstNet's direct engagement with tribal nations.

FINANCIAL CONDITION

In FY 2018, FirstNet maintained a strong financial position. As of September 30, 2018, we had a cash balance of \$6.2 billion, which will be used for our ongoing operations, payments under the AT&T contract, and investment in the FirstNet network. We incurred operating expenses in FY 2018 from items such as staff salaries, conducting extensive stakeholder engagement, opening and operating our Innovation Center, and issuing State Plans for review and consideration by each state and territory and the District of Columbia to facilitate the decision-making process of whether to opt into the FirstNet network.

The organization's audited FY 2018 operating results will be published in audited financial statements at a later date.

Collections Data

FirstNet began receiving revenue from the FirstNet network contract with AT&T in FY 2018. The first payment from AT&T was received two weeks after the FirstNet network Coverage and Capacity Solutions task order was executed, and the second payment of \$120.0 million was received approximately two weeks before the end of FY 2018. Future payments from AT&T will be received annually, two weeks prior to the end of each fiscal year, based upon the terms of the FirstNet network contract.

Changes in Assets, Liabilities, and Net Position

FirstNet had \$8.1 billion in total assets as of September 30, 2018, compared to \$6.6 billion for FY 2017 – an increase of \$1.5 billion, or 22.7 percent, offset by a \$1.4 billion, or 114.2 percent increase in total liabilities. As a result, our net position increased \$26.1 million or 0.4 percent.

(\$ in Thousands)

As of September 30:	FY 2018 (Unaudited)	FY 2017 (Audited)
Changes in Net Position		
Total Assets	\$8,056,441	\$6,581,777
Total Liabilities	\$1,461,298	\$12,688
Net Position	\$6,595,143	\$6,569,089

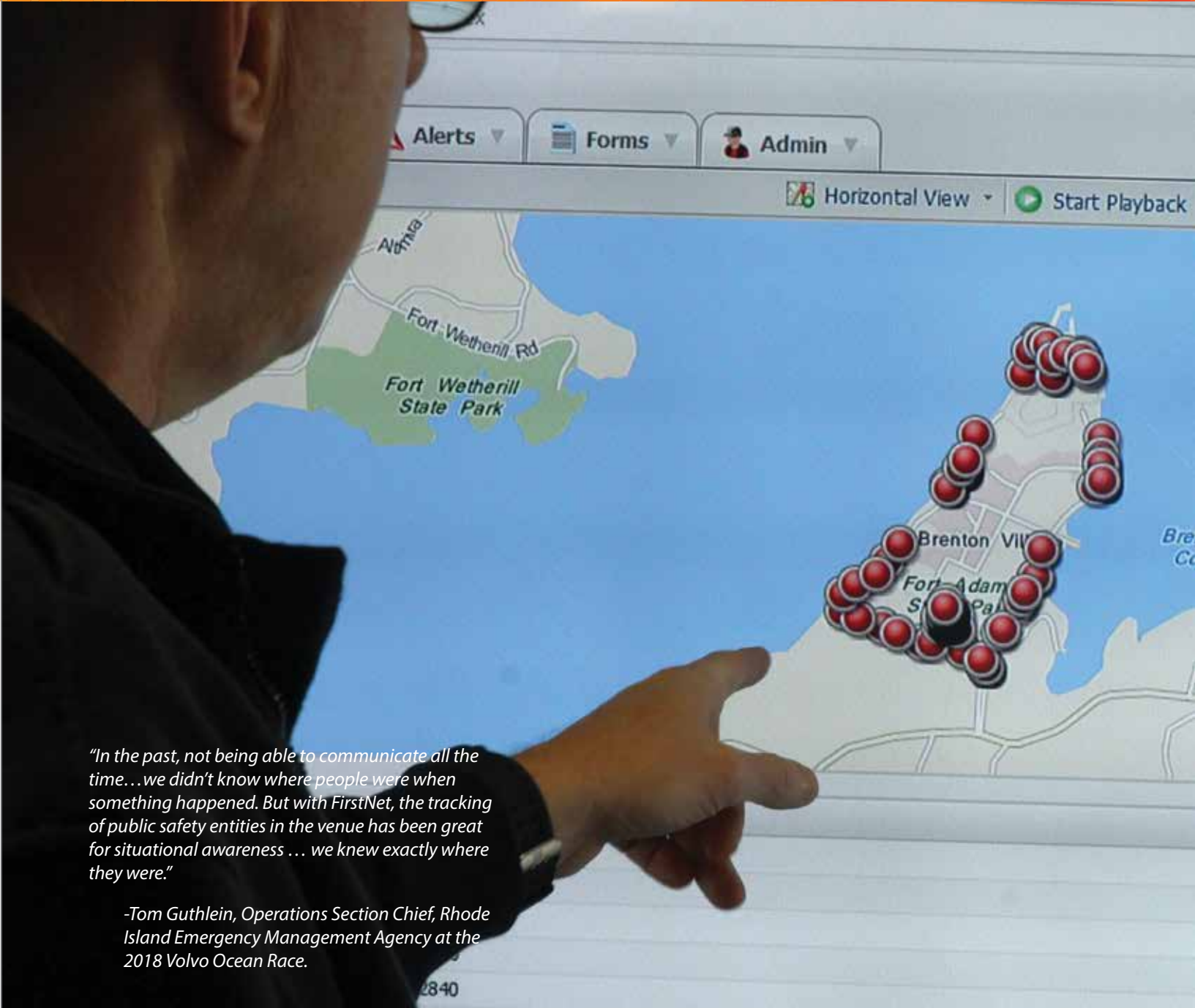
Limitation on Administrative Expenses

47 U.S.C. § 1427(b) limits FirstNet administrative expenses to \$100.0 million in the 10-year period beginning February 22, 2012. The organization spent \$6.3 million on administrative expenses in FY 2018, which reflects a \$2.3 million decrease compared to FY 2017. This decrease was primarily the result of a one-time cost allocation adjustment to record accrued leave liabilities. As of September 30, 2018, FirstNet has available \$61.7 million of the originally allocated \$100.0 million for administrative expenses.

CONCLUSION

As the FirstNet project evolves into its next phase, FirstNet 2.0, we will ensure accountability of AT&T’s contractual commitments to build, operate, maintain, and improve the FirstNet network. FirstNet will continue to advance public safety broadband communications by using our convening power to bring together industry and the public safety community to articulate public safety broadband needs and to drive innovative solutions for the public safety communications marketplace.

We have led FirstNet through its initial stages of deployment nationwide and already made a positive impact on public safety and the communities they serve, but there is much work still to be done. In this coming year, we will add value through our work and make investments to benefit the public safety community within and beyond the FirstNet solution.



“In the past, not being able to communicate all the time...we didn’t know where people were when something happened. But with FirstNet, the tracking of public safety entities in the venue has been great for situational awareness ... we knew exactly where they were.”

-Tom Guthlein, Operations Section Chief, Rhode Island Emergency Management Agency at the 2018 Volvo Ocean Race.

- **Public Safety:** We will continue to engage with public safety to learn and understand their needs and collaborate with them to ensure they reap the operational benefits of the FirstNet network.
- **Innovation:** We will engage with industry and government to learn and understand their trends and drivers.
- **Investment:** We will incorporate public safety’s inputs into our planning as we spur innovation for public safety and invest in capabilities and services that meet their needs – now and in the future.

As we continue our work on behalf of public safety, consistent with Congress’s mandate, the features, service levels, coverage areas, and public safety user adoption of the FirstNet network will continue to evolve and adapt to the ever changing risks and threats that our nation’s public safety professionals face. FirstNet will be there to serve them at every step.

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APPENDIX A: OPT-IN GOVERNORS

The First Responder Network Authority would like to thank the following Governors and their teams for supporting the FirstNet RAN implementation in their state or territory:

- Alabama Governor Kay Ivey
 - Alaska Governor Bill Walker
 - American Samoa Governor Lolo Matalasi Moliga
 - Arizona Governor Doug Ducey
 - Arkansas Governor Asa Hutchinson
 - California Governor Edmund “Jerry” Brown
 - Colorado Governor Hickenlooper
 - Connecticut Governor Dannel Malloy
 - Delaware Governor John Carney
 - District of Columbia Mayor Muriel Bowser
 - Florida Governor Rick Scott
 - Georgia Governor Nathan Deal
 - Guam Governor Eddie Baza Calvo
 - Hawaii Governor David Ige
 - Idaho Governor C.L. “Butch” Otter
 - Illinois Governor Bruce Rauner
 - Indiana Governor Eric Holcomb
 - Iowa Governor Kim Reynolds
 - Kansas Governor Jeff Colyer
 - Kentucky Governor Matt Bevin
 - Louisiana Governor John Bel Edwards
 - Maine Governor Paul LePage
 - Maryland Governor Larry Hogan
 - Massachusetts Governor Charlie Baker
 - Michigan Governor Rick Snyder
 - Minnesota Governor Mark Dayton
 - Mississippi Governor Phil Bryant
 - Missouri Governor Eric Greitens
- Montana Governor Steve Bullock
 - Nebraska Governor Pete Ricketts
 - Nevada Governor Brian Sandoval
 - New Hampshire Governor Chris Sununu
 - New Jersey Governor Chris Christie
 - New Mexico Governor Susana Martinez
 - New York Governor Andrew Cuomo
 - North Carolina Governor Roy Cooper
 - Northern Marianas Governor Ralph Deleon Guerrero Torres
 - North Dakota Governor Doug Burgum
 - Ohio Governor John Kasich
 - Oklahoma Governor Mary Fallin
 - Oregon Governor Kate Brown
 - Pennsylvania Governor Tom Wolf
 - Puerto Rico Governor Ricardo Rosselló
 - Rhode Island Governor Gina Raimondo
 - South Carolina Governor Henry McMaster
 - South Dakota Governor Dennis Daugaard
 - Tennessee Governor Bill Haslam
 - Texas Governor Greg Abbott
 - U.S. Virgin Islands Governor Kenneth Mapp
 - Utah Governor Gary Herbert
 - Vermont Governor Phil Scott
 - Virginia Governor Terry McAuliffe
 - Washington Governor Jay Inslee
 - West Virginia Governor Jim Justice
 - Wisconsin Governor Scott Walker
 - Wyoming Governor Matt Mead

APPENDIX B:
FIRSTNET FY 2018 BOARD¹³



Edward Horowitz (Chairman)
Venture Capital/Technology Executive



Richard Stanek (Vice Chairman)
Sheriff, Hennepin County, MN



Neil E. Cox
Telecommunications/Technology Executive



Kevin McGinnis
Chief/CEO, North East Mobile Health Services



Robert (Tip) Osterthaler
Consultant and Strategic Advisor



Annise D. Parker
Former Mayor, City of Houston, TX



Richard Ross, Jr.
Philadelphia Police Commissioner



Teri Takai
Government Information Technology Expert;
Former CIO, States of Michigan and California



David Zolet
Chief Executive Officer, LMI



Mick Mulvaney
Director of the Office of Management and Budget



Kathleen Kraninger
Office of Management and Budget Designee



Kirstjen M. Nielsen
Secretary of the Department of Homeland Security



Ron Hewitt
Department of Homeland Security Designee



Jeff Sessions
Attorney General of the United States



Christopher M. Piehota
Department of Justice Designee

APPENDIX C:
EARLY BUILDER PROJECTS COMPLETED

The First Responder Network Authority (FirstNet) executed five spectrum manager lease agreements in 2013-2014 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 provided FirstNet with valuable insights into the specific needs and challenges of providing wireless broadband service to first responders.

During FY 2018, we worked closely with each Early Builder project to complete documentation of their key learning conditions (KLCs), as defined in each project’s spectrum manager lease agreement. We also worked with AT&T and each project to successfully migrate their public safety user base, devices, and select network infrastructure to the FirstNet network. The spectrum manager lease agreements for each project were terminated on schedule before July 1, 2018, completing the Early Builder program.

Working closely with each project and the PSAC, we observed and documented lessons learned from the Early Builders and used these lessons to support development of the request for proposal content, network design and deployment considerations, and network policies. Lessons learned were derived both from progress on the KLCs and from observations of each project’s daily activities, successes, and challenges. As of the end of the program, 222 specific lessons learned were documented and communicated throughout FirstNet.

Each project provided significant support and insight in the development of their respective KLC documentation. The following sections summarize each Early Builder project and briefly highlight select lessons learned.

LA-RICS Authority



The LA-RICS project team constructed 63 LTE cell sites and deployed an additional 15 Cell-on-Wheels trailers. During multiple public events, the project team successfully tested and demonstrated usage of the public safety broadband network in support of law enforcement and fire service first responders. At its peak, the LA-RICS network supported more than 1,500 public safety users.

The LA-RICS project, through its extensive network demonstration exercises with its public safety members, demonstrated the need first responders have for accessibility to streaming video – both for situational awareness and for evidence gathering. The project clearly showed the value of dedicated priority Band 14 spectrum to support large public events. We participated directly with LA-RICS during several of the planned events. The scope of the network build (relative to the other Early Builder projects) highlighted the complex-

ity of a “green-field” deployment and associated operational, schedule, and cost risks. We incorporated these observations and risk assessments into the FirstNet network procurement effort. LA-RICS worked closely with AT&T to successfully transfer users and select assets to the FirstNet program.

We would like to acknowledge the contributions of the LA-RICS staff, the Los Angeles County Sheriff’s Department, the Los Angeles County Fire Department, and several other Los Angeles County public safety agencies that provided valuable insights, along with the vendor teams and contractors that supported the project. We also would like to acknowledge the National Telecommunications and Information Administration (NTIA) for its leadership and support on the LA-RICS project.

State of New Jersey (JerseyNet)



The JerseyNet project focused on the design, development, and use of deployable assets implementing five unique equipment configurations to support public safety communications initiatives. Such initiatives included Atlantic City, New Jersey concerts and public events, Urban Search and Rescue, emergency response exercises, and heavily-attended public events such as the Philadelphia Papal visit.

The project was logistically challenging given that three non-contiguous areas of the state were served (*i.e.*, Atlantic City, Camden, and the Route 21 corridor). The project showed the value and importance of focused, continual agency outreach and education, enabling JerseyNet to effectively leverage multiple public agency physical spaces and personnel resources. The project also highlighted unique deployable asset designs that dealt with public-safety-specific use cases. These use cases included rapid response, survivable manned and unmanned network operations, and equipment placement flexibility to maximize service coverage. JerseyNet also provided access to network operational processes and performance data to further understanding of the Band 14 network. Select deployable assets have been transitioned to AT&T and are planned for use within the FirstNet network.

We would like to acknowledge the contributions of the New Jersey Office of Homeland Security and Preparedness, the New Jersey Office of Information Technology, New Jersey Transit, the State Police, the multiple state public safety agencies that provided valuable first responder insights, and the vendor teams and contractors that supported the project. We would also like to acknowledge NTIA for its leadership and support on the JerseyNet project.

¹³ FirstNet Board Members as of September 30, 2018 – A current list of FirstNet Board members is located at www.firstnet.gov/Board.

Adams County, Colorado (ADCOM911)



ADCOM911 deployed 19 Band 14 LTE cells to provide public safety network coverage throughout the county, with more than 90 devices in active daily use before network decommissioning. The project highlighted unique methods to design coverage, including use of geographic information systems to chart historical 911 calls and unit dispatch. This methodology enabled the team to uniquely highlight areas where coverage was required to effectively support public safety.

In concert with the New Mexico project, ADCOM911 demonstrated the ability to remotely host core network elements, a methodology presently deployed by AT&T in support of the dedicated FirstNet Core. The ADCOM911 project team also highlighted the added complexity of standard operational protocols, such as change management, under an operational LTE network environment. These observations resulted in operational policies and reporting currently in use within FirstNet.

We would like to specifically acknowledge the contributions of ADCOM911 leadership and team members, and all Adams County Public Safety agencies that participated in this project. We would also like to acknowledge NTIA for their leadership and support on the ADCOM911 project.

State of Texas



The Texas project team, including the Texas Department of Public Safety and Harris County Central Technology Services, supported by a 2011 U.S. Department of Homeland Security Port Security grant and the Harris County, Texas, General Fund, provided Band 14 LTE coverage to the majority of Harris and Brazos Counties. The Texas Public Safety Broadband Network was used to support public safety wireless broadband communications at many large public events, including the Houston Rodeo and Livestock Show and NFL football games at Houston's NRG Stadium, including Super Bowl LI. The project also relied on the network during the support and recovery from Hurricane Harvey, providing valuable operational insights to FirstNet.

The project clearly highlighted the value of dedicated LTE network service, along with operational considerations vital to its success. These included user training to coordinate the use of both broadband and traditional public safety networks, along with procedural enhancements to best leverage and

coordinate use of new applications enabled by the broadband network. The Texas team also supported testing of LTE-specific operational features, including extended mode coverage and network performance analytics, highlighting unique challenges of Band 14 usage such as external interference identification and mitigation scenarios. The project supported a greater understanding of complexities of user and agency migration to the FirstNet network.

We would like to acknowledge the contributions of the Brazos County Sheriff's Office, Harris County Central Technology Services, and the vendor teams and contractors that supported the project. We also would like to acknowledge the Texas Department of Public Safety for their leadership and support on the project.

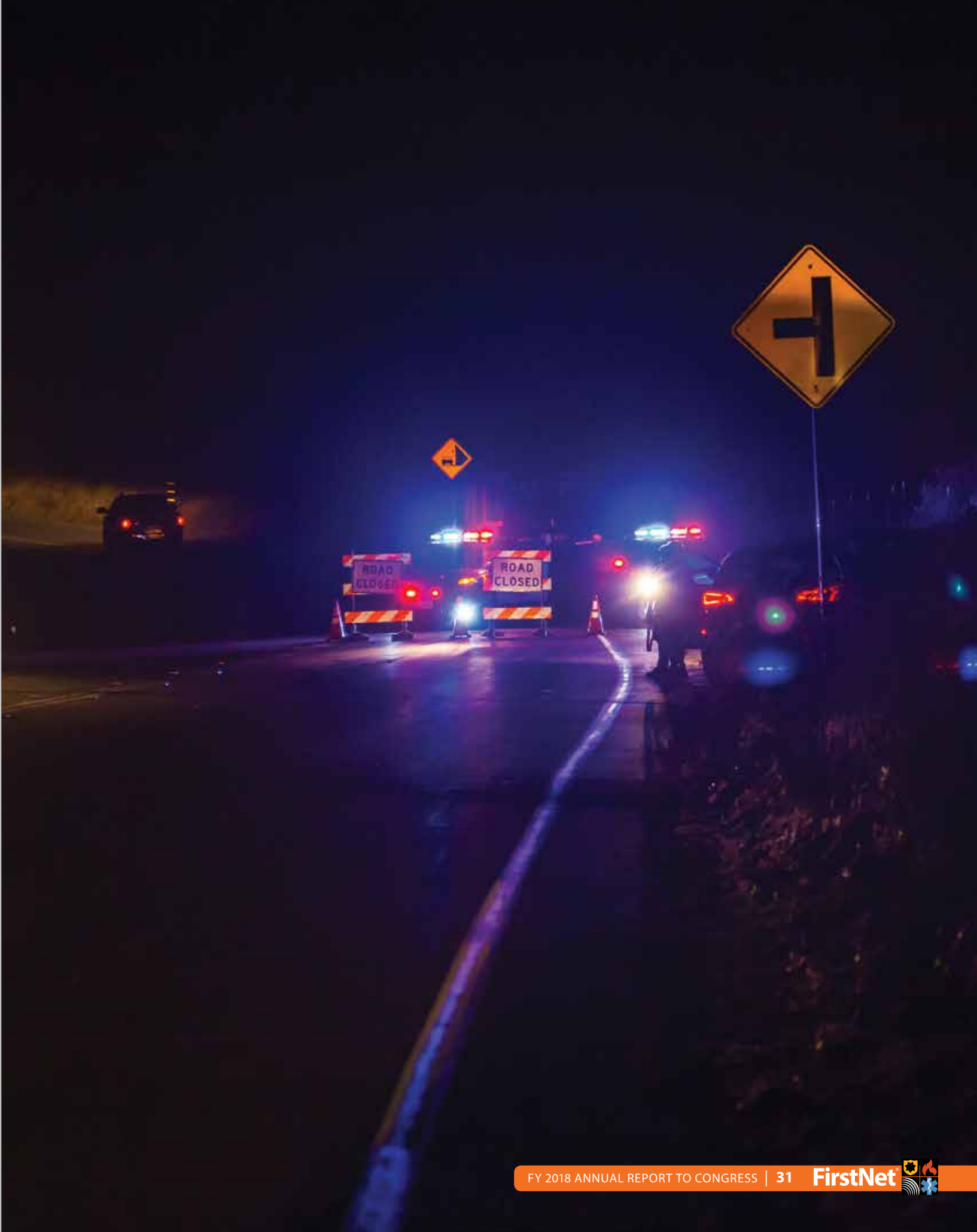
State of New Mexico



The New Mexico project team completed public safety broadband network construction, including construction of sites adjacent to the Mexican border. The New Mexico LTE Public Safety Broadband Network continued to support public safety communications requirements during large public events. During these events, the project shared insights relative to device form factors, desired applications functionality, and unique public safety use cases.

The project provided valuable insights into several aspects of Band 14 network deployment and operations. Specifically, the New Mexico team shared logistical and regulatory challenges in structuring interstate support and purchasing agreements relative to core hosting. Further, the state shared lessons learned about the importance of network monitoring and operational support to quickly address service impairments. The project also enabled FirstNet to better understand potential spectrum coordination challenges near the international border. Additionally, the project team worked closely with state-based federal agencies to coordinate network access and establish interoffice agreements. These agreements provided insight into the expectations and procedural complexities to leverage non-agency owned assets.

We would like to acknowledge the contributions of the New Mexico Department of Information Technology, the Albuquerque Police Department, the New Mexico State Police, Dona Ana County, and the El Paso Sector of U.S. Customs and Border Protection. We also would like to acknowledge NTIA for its leadership and support on the New Mexico project.





IN MEMORIAM



Ed Reynolds
Founding Member, FirstNet Board

