



FIRSTNET STATE PLAN REPORT FOR MARICOPA COUNTY



ARIZONA DEPARTMENT OF ADMINISTRATION

FEBRUARY 2018



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WHAT IS FIRSTNET

BACKGROUND

Enacted in 2012, the Middle Class Tax Relief and Job Creation Act¹ (the Act) in Title VI created the First Responder Network Authority² (FirstNet) and authorized it to enter into a public/private partnership to design, implement and operate a nationwide public safety broadband network (NPSBN). The Act allocated 20 MHz of prime radio spectrum in the 700 MHz band, known as “Band 14”, to be utilized in building and operating the network. Over the following five years, FirstNet worked with the public safety community to develop the objectives to be met by the NPSBN. Those objectives ultimately served as the basis for the publication of a request for proposal³ (RFP) to solicit a private-sector partner to build and operate the NPSBN. On March 30, 2017, FirstNet announced it had awarded the national contract to AT&T, giving AT&T the license to the Band 14 spectrum and charging it with the construction of the NPSBN. This report is intended to share information provided by FirstNet and its selected partner, AT&T, that provides insight into what the network means to public safety.

ABOUT FIRSTNET

The Act created FirstNet as an independent authority within the National Telecommunications and Information Administration (NTIA)—under the U.S. Department of Commerce—to provide emergency responders with the first nationwide, high-speed, broadband network dedicated to public safety. FirstNet is headquartered in Reston, Virginia, and has staff located across the United States.

A Board of Directors oversees FirstNet. The composition of the Board was established by the Act and consists of ex officio members (the Secretary of Homeland Security, the Attorney General of the United States and the Director of the Office of Management and Budget) and 12 individuals appointed by the Secretary of

Commerce. Appointed members represent the collective interests of the states, localities, tribes and territories, with a view toward geographic and regional representation. At least three members are required to have served as public safety professionals, and others should have knowledge and technical and/or financial expertise regarding broadband communications and public safety communications.



¹ <https://www.congress.gov/112/plaws/publ96/PLAW-112publ96.pdf>

² <https://www.firstnet.gov/>

³ https://www.fbo.gov/index?s=opportunity&mode=form&tab=core&id=7806696f4340f16474647ccc57805040&_cview=0



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FirstNet established a Public Safety Advisory Committee (PSAC) that consists of members representing all disciplines of public safety, as well as state, territorial, tribal, and local governments. As described by FirstNet the PSAC is intended to “... assist FirstNet in carrying out its duties and responsibilities.”

Specifically, the PSAC:

“Offers FirstNet guidance, information, and subject matter expertise from a public safety perspective to ensure that user needs, requirements, and public safety operational capabilities are included in the network

Provides subject matter expertise on concepts (e.g., policies, procedures, technologies, operational methods developed by FirstNet

Advises FirstNet through the creation of initial documents, plans, or reports related to the build-out, deployment, and operation of a nationwide public safety broadband network (NPSBN). The PSAC reports include subject matter related to shared intergovernmental responsibilities or administration.”

THE FIRSTNET REQUEST FOR PROPOSALS

FirstNet released its RFP on January 13, 2016. Responses were received by May 31, 2016, and AT&T was identified as the single responsive proposer in November 2016. Following resolution of a protest of the procurement—filed by a disappointed proposer in the U.S. Court of Federal Claims—FirstNet awarded the contract to AT&T on March 30, 2017.



STATE PLAN PROCESS

The following information appears on the FirstNet website and explains the process that was implemented regarding the state plan:

“Members of the FirstNet outreach and design teams will work closely with the designated single officer or governmental body to develop and deliver a network deployment plan that meets their needs. FirstNet will then provide the Governor of each State or territory with a notice of the completion of the request for proposal process; the details of the proposed plan; and the funding level for the state or territory. Upon receipt of the plan, a Governor will have 90 days to choose whether to participate in the plan provided by FirstNet or conduct its own deployment of a radio access network. If a Governor decides to opt out, then he/she is required to notify FirstNet, NTIA, and the FCC. After providing the notification, the Governor



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has 180 days to develop and complete requests for proposals for the construction, maintenance and operation of the RAN within the State. The State is required to submit an alternative plan to the FCC that is interoperable with the NPSBN and complies with the minimum technical interoperability requirements under the Act.”⁴

FirstNet accelerated the sharing of information with the states by issuing plans on June 19, 2017, through a State Plan Portal. In Arizona, there were seven working groups established consisting of state and local government representatives, aided by consultants, to review the contents of the Arizona state plan. Content in the hundreds of pages was examined—from the perspectives of operations, security, infrastructure, fiscal, procurement, policy and legal—to determine whether the objectives of Arizona were met for an interoperable broadband wireless network for public safety. Feedback from the working groups was aggregated and submitted to FirstNet/AT&T. To the extent allowed by the terms and conditions imposed by FirstNet on access to the plan contents, information is being shared with each county in Arizona.

FirstNet/AT&T incorporated feedback to the extent that they deemed feasible, and then informed all governors that the state plans were considered to be finalized on September 29, 2017. This notification commenced the 90-day clock established by the Act, in which time governors must make their final decisions concerning “opt-in/opt-out,” i.e., by December 28, 2017.

On August 15, 2017, Governor Doug Ducey “opted in” and authorized FirstNet to proceed with deployment of the NPSBN in Arizona. On January 19, 2018, the Northern Mariana Islands officially “opted-in” to the FirstNet/AT&T deployment plan making them the final state/territory to do so. In light of all states and territories opting-in, FirstNet/AT&T will now be the sole operator of all facets of the NPSBN across the country.

BASIC SERVICES TO BE PROVIDED BY FIRSTNET

In June 2017, FirstNet and AT&T announced the method by which the NPSBN will be deployed. To speed the provisioning of service to public safety entities, AT&T announced that Quality of Service, Priority and Preemption (QPP) will be applied to its legacy Long-Term Evolution (LTE) networks in use for the provisioning of commercial wireless services. The importance of this surprise announcement cannot be understated, as it was anticipated the NPSBN radio spectrum would only be comprised of the 20 MHz of band 14 spectrum. By enabling the QPP features on its entire legacy network, consisting of in excess of 100 MHz of bandwidth in most areas, exclusive of band 14, AT&T is offering public safety the ability to access data intensive applications as never seen before. This will allow public safety to derive critical information to make them more efficient at their jobs which will ultimately be of tremendous

⁴<https://www.firstnet.gov/consultation/state-decision-on-firstnet-ran-plans>



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benefit to the citizens they serve and significantly increasing positive outcomes. QPP is one of the basic functions required to ensure that critical public safety communications are not impaired during emergencies when network usage is unusually heavy.

The primary purpose of FirstNet's NPSBN will be to provide enhanced data communications that only are feasible because of the broadband capabilities of the LTE network. Voice-over-LTE telephony, text messaging (SMS and MMS⁵), video streaming using "over-the-top" applications, and other basic applications also will be supported. Other advanced applications will be supported through an applications store. Applications developers will be encouraged to develop compatible applications using application programming interfaces (API) and related tools.

It is expected that, once deployed, the NPSBN will generate a torrent of data that isn't possible with today's legacy narrowband systems, data that will exponentially increase situational awareness, which in turn will improve emergency response and keep first responders and the public safer.

The following is a hypothetical example of how a bank robbery might play out from an emergency-response perspective, after the NPSBN becomes fully operational:

- The bank's alarm system is tripped, which puts into motion several events. One involves triggering a protocol that results in real-time video streams from the bank's internal surveillance system and the city's fixed surveillance system flowing into a public safety answering point (PSAP); a telecommunicator pushes this video out to law enforcement officers within a geofenced area surrounding the bank's location, so that they can see what is happening both inside and outside the bank.
- Multiple patrons send text messages to 9-1-1, and several of them transmit video or images; in some, the perpetrators are clearly visible, and the telecommunicator pushes these out to the officers at the scene, while engaging facial-recognition software to identify the perpetrators.
- A patrol car equipped with an automatic license plate reader (ALPR) system receives a hit on a stolen car parked outside the bank; this information is relayed to the telecommunicator, who then informs the officers at the scene.
- The city's gunshot-alerting system informs the telecommunicator that shots have been fired inside the bank, information that is relayed to the officers at the scene.

⁵ Short message service; multimedia messaging service.



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- A police helicopter hovers over the bank and live streams additional video into the PSAP, some of which is shared with officers at the scene via the NPSBN.

All of the data inputs described above will raise situational awareness in the PSAP to levels that were unimaginable only a short time ago given the limitations of today's public safety communications systems—such is the power of the NPSBN.

This is only the beginning—in time, the use of sensors and the Internet of Things (IoT) in public safety will increase significantly, in large measure because of the NPSBN. It is predicted that law enforcement officers will wear Google Glass-type devices that enable them to capture images and video, and receive situational awareness information. They also will wear sensors that alert PSAPs when a bullet has impacted their protective vest or when an officer has drawn his weapon; firefighters will wear sensors that monitor their biometric data (e.g., heart rate, respiration, body temperature) so that incident commanders know when to pull them off the line, and others that monitor the air levels in their SCBA⁶ tanks or the ambient air to alert them when they have entered a hazardous environment and need to don their breathing masks. All of this data will traverse the NPSBN.

INTERNET OF THINGS (IOT) FOR PUBLIC SAFETY

One of the key areas for data sources a network such as the NPSBN will open to public safety is the internet of things (IoT), and more specifically, what is being called the internet of things for public safety (IoTPS). The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. Figure 1 below represents an illustrative depiction of the IoT.

⁶ Self-contained breathing apparatus



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M2M World of Connected Services
The Internet of Things



Figure 1 – Internet of Things

Research conducted by University of Stanford Professor Tony Seba⁷ shows that the proliferation of sensors in society has grown exponentially since 2007. Dr. Seba opines that this growth of sensor deployment and use will continue to grow exponentially for many more years. These sensors provide a tremendous source of information for public safety, but until now public safety did not have a broadband network capable of capturing any significant amount of this information in real time. The NPSBN will now provide that ability.

⁷ <https://tonyseba.com/>



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Figure 2 below represents the anticipated use of sensor technology by business sector by the year 2026.

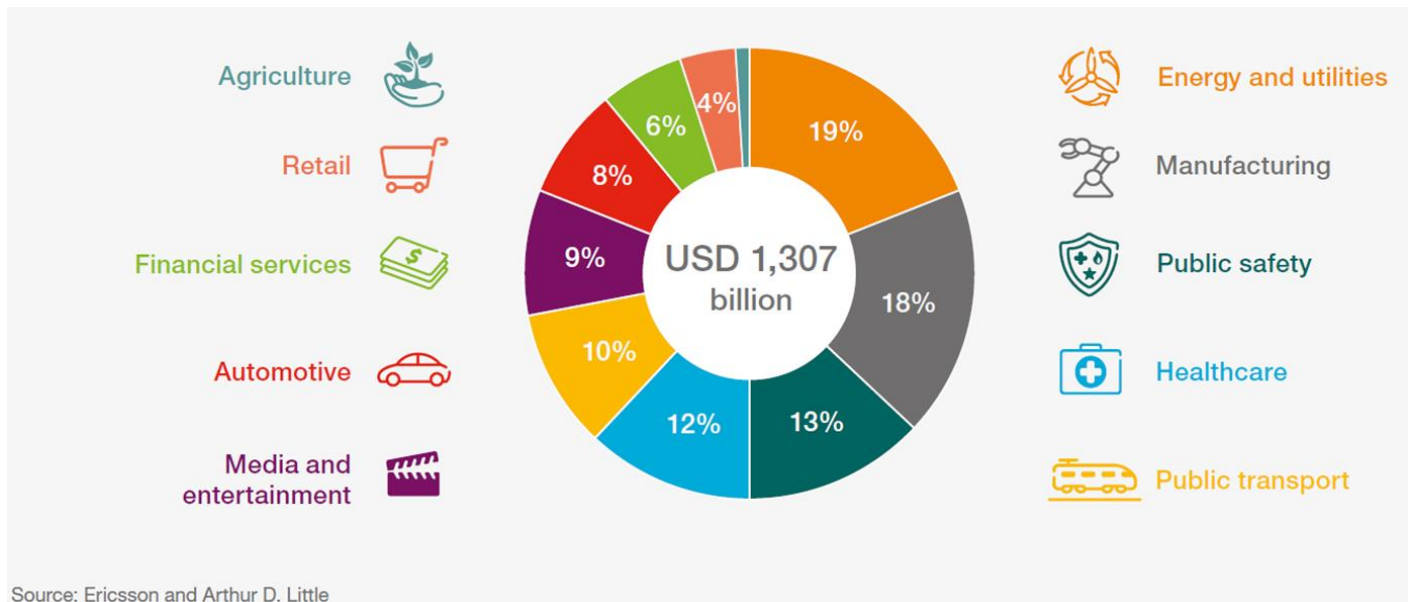


Figure 2 – Sensor Technology Use by 2026

Some examples of how IoT technology will be utilized in public safety by 2026, include the following:

- Growing public surveillance with video surveillance and wearable cameras
- Tracking: Human (Wearables), Animal, Postal, Food, Health, Packaging, Baggage, Equipment, Weapons
- Public Infrastructure and Personal Property Monitoring: Water Treatment, Building Environment, General Environment, Surveillance, Housing
- Real Time Analytics
- Connected Vehicles
- Gunshot locators
- Automated license plate readers
- Unmanned aerial vehicles

The NPSBN will enable public safety responders to access mission critical data from the IoT in real time once appropriate applications have been developed to harness and parse the tremendous amount of available data. This ability will increase the efficiency and effectiveness of first responders like never previously imagined.



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PRIORITY AND PREEMPTION

Priority and preemption on the NPSBN will be given to primary public safety entities, i.e., law enforcement, fire/rescue service, emergency management, public safety answering point (PSAP), and emergency medical services (EMS). “Extended” public safety entities such as Public Works, Transit, public utilities, and many others which have a public safety component to their mission but are not dedicated solely to public safety, will be afforded priority service on the network for an additional monthly fee, but will not be afforded the preemption feature. Extended public safety entities that purchase the priority access will be established at the lowest static priority level; however, their priority level may be escalated for a set period of time through the public safety portal by a primary public safety agency, to enable participation in a particular emergency operation.

Quality of service, priority, and preemption are the critical features of this network which will enable public safety unfettered access to their mission critical data. This feature set is the primary difference between the NPSBN and commercial networks for public safety.

MISSION-CRITICAL VOICE SERVICES OVER THE NPSBN

Mission-critical PTT voice service is planned to be an intrinsic feature in the Third Generation Partnership Project (3GPP) specification for LTE. Outside of the state plan process, and as reported by *Urgent Communications* on June 28, 2017: “...*FirstNet staff presented board members with a new roadmap for the organization that includes a technological commitment to support mission-critical push-to-talk (MCPTT) technology across the nationwide public-safety broadband network (NPSBN) by March 2019.*”

Although the NPSBN was intended from the very beginning to exponentially ramp up public safety’s data capabilities in the field, a question was raised almost immediately: could the NPSBN someday replace the land mobile radio (LMR) systems that traditionally have provided mission-critical voice service? In March 2016, 3GPP announced that MCPTT would be an element of LTE Release 13, which is expected to be implemented early in 2018. While it will take several years of system and device development and testing to ensure that MCPTT over LTE truly is public-safety grade, it now seems clear that the NPSBN eventually could satisfy all public safety’s voice and data needs. Before that can happen, however, critical issues concerning talk-around—an essential capability for first responders, particularly firefighters, because it enables one portable radio to communicate directly with another without going through an LMR system repeater—system hardening, coverage, capacity, and user fees all would need to be resolved.

These issues will take time to be resolved to the point where public safety, mission-critical first responders (e.g., law enforcement officers, firefighters, paramedics and EMT’s, emergency managers) could effectively utilize the NPSBN for delivery of mission-critical voice communications. In the



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meantime, it is critical that public safety LMR networks continue to be operated and maintained to provide effective mission critical voice communications.

However, with the development of push-to-talk (PTT) applications on cellular networks which enable PTT capabilities between users on commercial cellular networks, and also afford the ability to interface with LMR networks, the effectiveness of this PTT capability could be explored for use by non-mission-critical responders such as Public Works, Transportation, public safety agency administrative and command personnel, etc. The use of these PTT apps for such non-mission critical users could be utilized to free up capacity on an LMR network and may be a more cost-effective solution.

COVERAGE AND DEPLOYMENT SCHEDULE

As indicated in the *Basic Services to Be Provided By FirstNet* section above, AT&T has dedicated its entire legacy (existing) network to public safety by implementing quality of service, priority, and preemption (QPP) across their entire spectrum. The Act also allocated 20 MHz of spectrum in the 700 MHz radio band to this network, known as Band 14. Over the next five years, AT&T will add this Band 14 spectrum to its existing network to increase coverage and capacity across the network. This construction will be accomplished in five phases, known as Interim Operational Capabilities (IOC) 1 through 5, plus a Final Operational Capability (FOC). After the five-year period AT&T will continue network expansion as required under their twenty-five year contract.

In addition to the persistent terrestrial based coverage the network will provide, AT&T is building 72 deployable satellite cell on light trucks (COLTs) to augment coverage and/or capacity when needed. These deployables will be staged in varying locations across the country, and Arizona anticipates having at least one of the units staged within the state. These deployables can be requested through AT&T by any subscribing agency for use at either pre-planned or emergency incidents.

LEGACY AT&T NETWORK

Statistics furnished by FirstNet indicate that the legacy AT&T network serves greater than 84 percent of the land area of Arizona and greater than 99 percent of the state's population. Statistics on the coverage to be provided by the Band 14 implementation are not provided on the State Plan Portal. FirstNet buildout coverage maps are covered by the confidentiality provision of the terms of use for the Portal. However, coverage mapping for the legacy AT&T network is provided on the public FirstNet website www.firstnet.com. An image of the current coverage for AT&T within Maricopa County is provided in the Maricopa County section below. FirstNet has indicated that this mapping will be updated as Band 14 is deployed.



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SERVICE PLANS

AT&T has completed the process of adding the rate plans for the FirstNet service offering into the national procurement contract sponsored by the National Association of State Procurement Officials (NASPO). The State of Arizona has negotiated a procurement amendment (PA) to the NASPO contract for entities within Arizona. For agencies to take advantage of the pricing offered in this PA, they must be a member of the Arizona State Purchasing Cooperative. For more information concerning the Cooperative, please visit <https://spo.az.gov/procurement-services/cooperative-procurement>. The table below reflects the prices negotiated for Arizona agencies:

Table 1: Arizona FirstNet Price Plan

NASPO Rate Plan for FirstNet Users	FirstNet (NASPO) List Pricing	State of Arizona Pricing
Enhanced Push to Talk (EPTT) Standalone	\$22.00 per month per device	\$18.99 per month per device
Unlimited Standard for Smartphones Voice/Text/Data	\$50.00 per month per device	\$40.00 per month per device
Unlimited Enhanced for Smartphones Voice/Text/Tether	\$60.00 per month per device	\$54.40 per month per device
Unlimited for Data-Only Devices	\$40.00 per month per device	\$37.00 per month per device

Table 1 above contains rates specific to Arizona. These rates can be compared to the standard pooled rates on the national contract at <http://www.naspo.valuepoint.org/#/contract-details/49/contractor/227>.

USER EQUIPMENT AND DEVICES

FirstNet/AT&T will introduce a suite of user equipment for use across the network. Devices such as vehicular modems, tablets, and smartphones will operate on the NPSBN just like they do currently on the commercial networks. Included among these will be devices that are ruggedized to withstand the conditions that first responders often encounter while performing their duties. As AT&T deploys the Band 14 infrastructure over the next 5 years, Band 14 enabled devices will also be available for use. It should be noted, however, since AT&T has included its entire legacy network for use by public safety, with quality of service and priority and preemption features, the purchase of Band 14 devices is not necessary at the start. The Band 14 deployment will add an additional 20 MHz of bandwidth in the areas where deployed to augment the coverage and capacity of the legacy network. Users can assess their need for Band 14 enabled devices as that bandwidth is deployed in the coming years.



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LOCAL CONTROL

Public safety entities that are FirstNet subscribers will have secure access to an agency homepage⁸ to manage their account, create and manage user groups, manage user priority, and perform other housekeeping functions through this interface. Information regarding network status and site conditions will be provided to subscribers through this Public Safety Portal interface. Managers will be able to use the interface to push out applications to users, manage activation and cancellation of accounts, and manage push-to-talk (PTT) applications. Primary public safety agencies also will use the portal to uplift and manage extended primary agencies during planned events and unplanned incidents.

AT&T/FirstNet has also established a FirstNet Dedicated Care call center at 800-574-7000. The call center, based in the United States, is a 24/7/365 service that subscribing agencies can call for assistance with issues or problems.

The following section contains information specific to Maricopa County, including data from the most current US census, and other information concerning the need for and current challenges of public safety communications. There also are images showing available critical infrastructure data⁹ within the county, as well as an image of the current legacy AT&T network coverage¹⁰ according to AT&T. Coverage maps depicting the anticipated coverage over the next 5 years as the Band 14 spectrum is deployed are not publicly available. Any questions concerning future coverage should be referred to an AT&T representative.

⁸ <http://localcontrol.firstnet.att.com/>

⁹ (Office of Emergency Communications/Interoperable Communications Technical Assistance Program, 2013)

¹⁰ <https://www.firstnet.com/coverage>



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MARICOPA COUNTY

The following Maricopa County information was obtained from the U.S. Census Bureau website:¹¹

- Land area: 9,200 square miles
- July 1, 2016 population: 4,242,997
- Population per square mile 414.9
- Households: 1,442,518
- Language other than English spoken at home: 26.5 percent
- Persons in poverty: 6.3 percent

Maricopa County is a mostly urban area with dense population and more than 4 million permanent residents. It is the most-populous county in Arizona—with more than half of the state’s residents—and the fourth-most populous in the U.S.; the population is greater than that of 23 states. In March 2017, the U.S. Census Bureau reported that Maricopa County had the highest annual population growth of any county in the nation, adding an average of 222 people per day from July 1, 2015, to July 1, 2016.

The county is home to five Native American reservations. Three interstate highways traverse the county, and 10 municipal airports are located in its environs, in addition to Sky Harbor International Airport in Phoenix.

Many large events are held in the county on a regular basis, such as the Super Bowl, NASCAR races, professional sports (all four major leagues), NCAA men’s basketball Final Four, Major League Baseball spring training, and many more. Numerous sports and cultural events are held at Arizona State University, many of which draw large crowds.

The need for interoperable access to mission-critical data by the many entities within the county that provide public safety and emergency response is important in not only enhancing everyday operations, but also those involving multijurisdictional response, such as occurs at the events and venues identified above.

¹¹ <https://www.census.gov/quickfacts/fact/table/maricopacountyarizona/PST045216>



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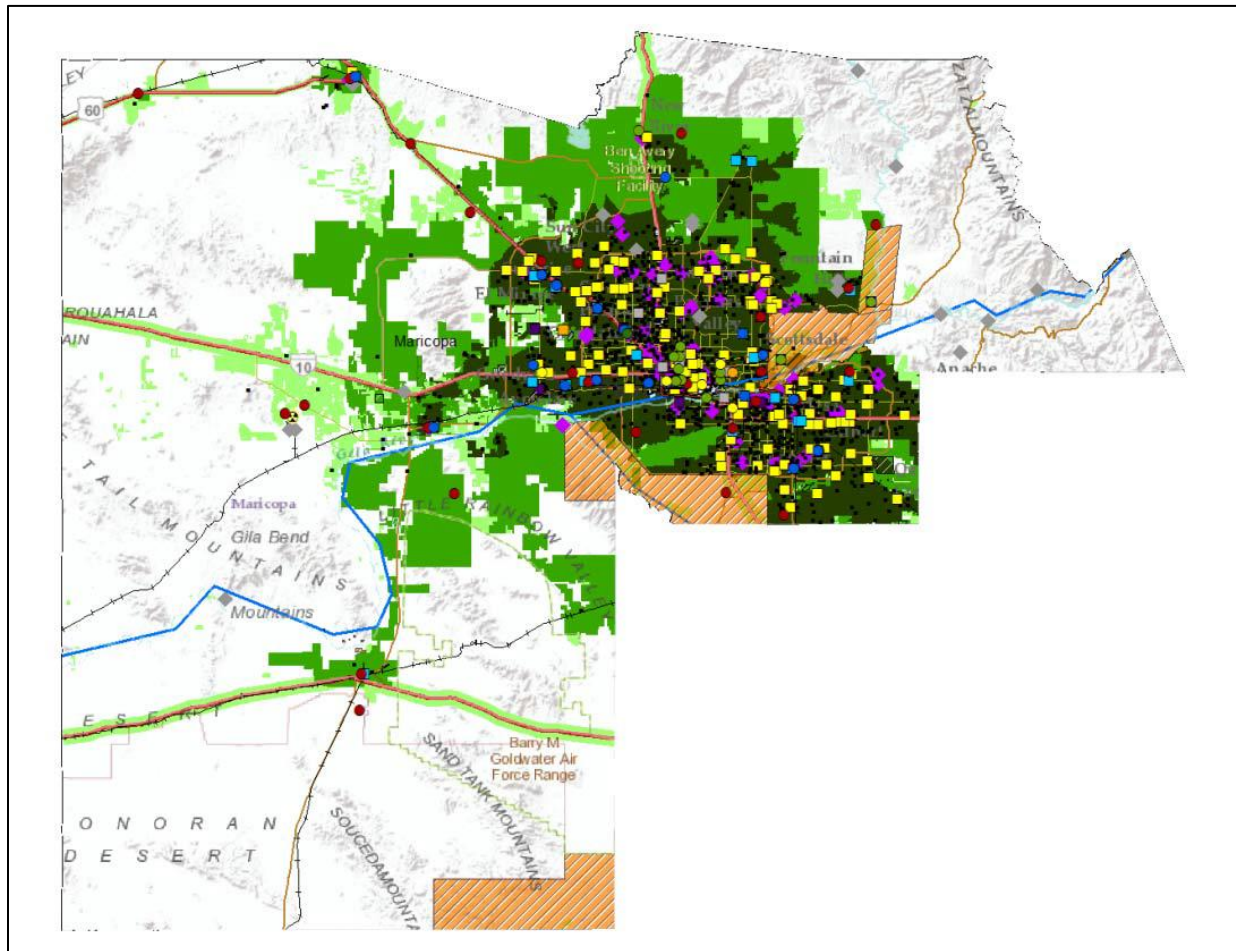


Figure 3 – Maricopa County Infrastructure¹²

¹² (Office of Emergency Communications/Interoperable Communications Technical Assistance Program, 2013)



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Figure 4 – Maricopa County Current AT&T Network Coverage¹³

FOR ADDITIONAL INFORMATION

FirstNet and AT&T have formed a public private partnership to deploy the NPSBN across the nation. AT&T, as the designated network operator partner, is charged with the actual deployment and operation of the network, including marketing and user adoption. While the contract between AT&T and FirstNet is not publicly available, it is known that it is a 25-year contract that contains adoption rate metrics and rural deployment metrics which AT&T must meet or suffer “significant” monetary penalties. Some of FirstNet’s roles moving forward are to assist AT&T with the deployment, and to insure AT&T complies with the terms and conditions of the contract. To differentiate the roles from a branding and nomenclature perspective, FirstNet, under the US Commerce Authority is now known as the “FirstNet Authority”, with their logo reflected in figure 5 below. AT&T has also developed a new logo depicted in figure 6 below which differentiates the AT&T NPSBN operation from the AT&T commercial network operation.



Figure 5 – FirstNet Authority Logo

¹³ <https://www.firstnet.com/coverage>



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Figure 6 – AT&T Logo for Their NPSBN Operation

www.firstnet.gov

The FirstNet Authority website is located at <http://www.firstnet.gov/>, and contains background information concerning FirstNet and the NPSBN, as well as all of the network deployment planning efforts that have occurred since 2012.

www.firstnet.com

For information concerning the network, please visit <http://www.firstnet.com/>. This website contains information on current coverage levels, devices, rate plans, applications, and other network topics. Contact the Arizona AT&T FirstNet Consultant, **Amos Chalmers** at ac403g@att.com for additional information regarding your region.

<https://azfirstnet.az.gov>

The Arizona Public Safety Broadband Program staff will continue to update stakeholders with relevant information as it becomes available. Currently, a working group has been established to provide input and receive updates concerning the project. There is a monthly teleconference conducted with the working group. Anyone interested in being on the working group contact list please contact Scott Neal at scottneal@mcp911.com or Karen Ziegler at Karen.Ziegler@azdoa.gov. Additional information about Arizona activities can also be found at <https://azfirstnet.az.gov>.

REFERENCES

Office of Emergency Communications/Interoperable Communications Technical Assistance Program. (2013). Arizona Broadband Consultation Prep Workshop. Washington, D.C.: U.S. Department of Homeland Security, Office of Emergency Communications.