

NG911 & FirstNet

Together Building the Future of Public Safety Communications

A GUIDE FOR STATE & LOCAL AUTHORITIES

BRINGING

911

INTO THE DIGITAL AGE

NG911 & FirstNet:
An Overview



Modernizing Emergency
Response Communication
Technology



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Next Generation 911 & FirstNet: An Overview

This publication subscribes to the common use of "FirstNet" to reference the Nationwide Public Safety Broadband Network (NPSBN). FirstNet was originally used as an abbreviation for the First Responder Network Authority, the entity tasked with planning for and implementing the NPSBN.

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NOW IS THE TIME TO COORDINATE EFFORTS



Dear Colleagues,
We live in a world where nearly 80% of American adults own smartphones. Many people use mobile devices to direct nearly every aspect of their lives, including making emergency calls. Today, more than 75% of 911 calls are made with wireless devices. Yet, our nation's public safety emergency communication system is struggling to adapt to this new digital world.

Two game-changing public safety systems are currently being implemented across the United States. Next Generation 911 (NG911) is an internet protocol (IP)-based calling system that allows for more data-rich communication to 911 and is replacing antiquated analog 911 infrastructure. The Nationwide Public Safety Broadband Network (FirstNet) is a wireless broadband network dedicated to public safety communications. Broadband is the common element of both networks, and that technology enables new capabilities that have the potential to dramatically improve our nation's ability to keep our citizens and first responders safe.

FirstNet is being coordinated at the federal level, but NG911 has been left to local and state governments bodies to tackle. Although FirstNet and NG911 are being funded and built as separate projects, they are two inseparable parts of one whole: our nation's public safety communications system. Seamless interoperability between NG911 and FirstNet is not optional; it is elemental, foundational, essential to achieving the vision of both systems. Now is the time to focus our efforts, resources, and advocacy on how these two systems will work together, i.e., how they will interoperate.

As a community, we need to come together to advocate for the resources, political support, and policies we need locally and nationally to create smart, seamless, digitally-adaptive, responsive public safety communication networks. Those who are engineering and implementing NG911 and FirstNet need to work together proactively to ensure that this essential interoperability actually occurs. Both NG911 and FirstNet implementation are at a point in the design and implementation phase that time still exists to accomplish this. Let's keep the big picture firmly in view and approach the most important advancements in public safety we have ever seen with care and thoughtfulness.

Evelyn Bailey, Executive Director
National Association of State 911 Administrators

The National Association of State 911 Administrators (NASNA), offers support for 911 professionals and public policymakers at all levels of government by providing information and expertise on the complex issues surrounding the evolution of emergency communications.

OVERVIEW

NEXT GENERATION 911 & FIRSTNET

OVERVIEW

NG911

What is Next Generation 911 (NG911)?

NG911 is an internet protocol (IP)-based 911 system that will replace the existing analog 911 infrastructure. NG911 allows 911 callers, through mobile and digital devices, to communicate with 911 call centers, also known as Public Safety Answering Points (PSAPs). This includes the ability to share richer data such as videos, images and texts. It also enhances the ability of 911 call centers to better communicate with each other and improves 911 system resiliency.

Who is building NG911 systems?

NG911 will be built by states, counties, municipalities and regional authorities. These 911 systems are all funded and managed differently. NG911 will be launched in each state according to its own unique circumstances and governance.

Why is NG911 needed?

NG911 is a necessary upgrade of the 911 system to adapt to how people communicate today - largely through mobile and digital devices. NG911 allows for the public and others to send digital data to 911 call centers, including audio and video recordings, livestreaming video, photos, texts, etc. 911 call centers will also be able to receive data from other transmitting devices such as wearable medical devices, car computers, building alarms, etc. NG911 is a critical component of a two-part emergency communications system (NG911 and FirstNet) which will allow for the sharing of more data with 911 dispatch centers and in turn with field responders.

NG911 upgrades enable faster network communication, seamless integration and call load sharing between 911 call centers, a function severely limited or non-existent



using today's antiquated systems. In cases of mass casualty incidents or natural disasters, when the closest PSAP becomes overwhelmed by calls, an IP-based NG911 system will allow for the automated transfer and processing of calls at another available PSAP.

How did NG911 come about?

Recognizing that the growing use of mobile phones would impact emergency communications, national 911 associations called for all 911 call centers to begin upgrading their systems from analog, copper-based wire communications to systems that could integrate with mobile

communications and digital data. Early work on NG911 was done in concert and independently at the national level by organizations such as the Association of Public-Safety Communications Officials (APCO), the National Emergency Number Association (NENA), the Department of Transportation (DOT) and others. These organizations provided the initial vision and framework for how to integrate wireless and digital communications with the 911 infrastructure. ♦

BENEFITS

- + Integrates with mobile and digital devices
- + Allows for the sharing of digital data—video, text, photos, audio—with 911 call takers and field responders
- + Offers a more robust system for load sharing during high call volume times
- + Improved responder safety through quicker access to additional information
- + Enables cost savings in network sharing and other resources, e.g. GIS mapping

RISKS

- + May be launched inconsistently throughout the country
- + Creates funding challenges for states and municipalities
- + Implementation may require changes in governance of 911 call centers at regional or state level
- + Could create urban vs. rural divide as some areas launch NG911 more quickly than others
- + No federal mandate to drive NG911 upgrades

OVERVIEW

FirstNet

What is FirstNet?

The First Responder Network Authority (FirstNet) is an independent authority within the U.S. Department of Commerce. The organization's mission is to develop, build and operate a nationwide, broadband network for first responders. The nationwide public safety broadband network (NPSBN), commonly referred to as FirstNet, is a public/private federal program that will provide a wireless broadband network for first responders.

Who is building the FirstNet network?

By law, FirstNet is responsible for building a nationwide public safety broadband network. That network has two elements: core network and radio access network. FirstNet worked with each state to develop state-specific plans. States can choose to adopt the state plan, in which case FirstNet takes on the responsibility for all network elements for that state; or states can opt out and build their own radio access network as long as it meets FirstNet's specifications for interoperability with the network core.

Initial funding to begin development of the FirstNet network was provided through a federal law that created this Authority. There was a bidding process, and in 2017, AT&T was selected as the private contractor to build it.

Why is FirstNet needed?

FirstNet offers a digital communication tool for first responder teams to communicate with one another in the field, and receive important information from 911 call centers. FirstNet aims to provide seamless, mobile broadband communication among public safety



responder agencies. Through the FirstNet network, emergency dispatchers will be able to securely share critical information about the scene of an incident, such as building layouts, potential injuries, photos, videos and real-time updates, including information sent in via NG911.

How did FirstNet come about?

A coalition of public safety organizations and stakeholder groups realized the need for enhanced interoperability

and data sharing between public safety professionals during emergencies, as well as the pressing need for a first responder wireless network. This coalition lobbied Congress to fund an organization to tackle the challenge of building a broadband digital network for emergency responders. In 2012, Congress signed a bill into law that created the FirstNet organization and provided initial funding to build the FirstNet network. ♦

BENEFITS

- + Ensures wireless network availability for first responder use
- + Allows for better communication and collaboration among public safety agencies
- + More robust network during emergencies
- + Nationwide coordination and support for building the network
- + Enhances situational awareness in emergencies

RISKS

- + Not all states and territories may opt in to FirstNet network
- + If NG911 and FirstNet efforts are not coordinated, FirstNet will receive limited robust data from the public
- + Some first responder agencies could find network user fees to be an additional cost burden

FIRSTNET & NG911—THE DIFFERENCES

FIRSTNET

Communications among first responders and with 911



USERS

Mobile broadband wireless LTE technology



NETWORK

National oversight



GOVERNANCE

Initial funding provided by Congress



FUNDING

Federal requirements for states to participate in the national network



REQUIREMENTS

Designed for national coverage



COVERAGE

Single network provider



PROVIDERS

National standards organized by FirstNet



STANDARDS

NG911



Rich data from public to 911



Call center-based, broadband, fiber optic technology



Oversight at state and local level



Most funding is state and local, with some federal



No mandate to transition to NG911 or connect to a national network



Interconnected networks designed by local and regional authorities



Variety of network providers that will need to integrate



Multiple standards development organizations (SDOs)

FIRSTNET

NG911



TWO PARTS OF ONE WHOLE
THE BENEFITS OF NG911 & FIRSTNET WORKING TOGETHER

Compatibility with
MOBILE & DIGITAL TECHNOLOGY

REAL-TIME DATA
for improved
COLLABORATION & SITUATIONAL AWARENESS

Sharing of
NEW KINDS of INFORMATION

NEW DATA
for better
ANALYSIS & DECISION-MAKING

COST SAVINGS
through
DIGITAL RESOURCES

MORE ROBUST SYSTEMS
with built-in
redundancy

DATA FEEDBACK LOOPS
allow for analysis & system improvements

Ability to
SHARE INFRA-STRUCTURE

NG911 & FIRSTNET

The two systems complement each other, and when coordinated, will greatly improve public safety communications by providing the seamless exchange of rich data between the public, 911 and first responders.



BOTH NG911 AND FIRSTNET ARE ENVISIONED TO PROVIDE NATIONAL COVERAGE

1 PUBLIC EMERGENCIES

Public sends information and rich data to 911



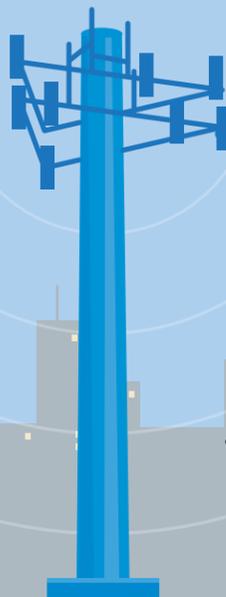
2 NG911 CALL CENTERS

Receive and prioritize information and rich data



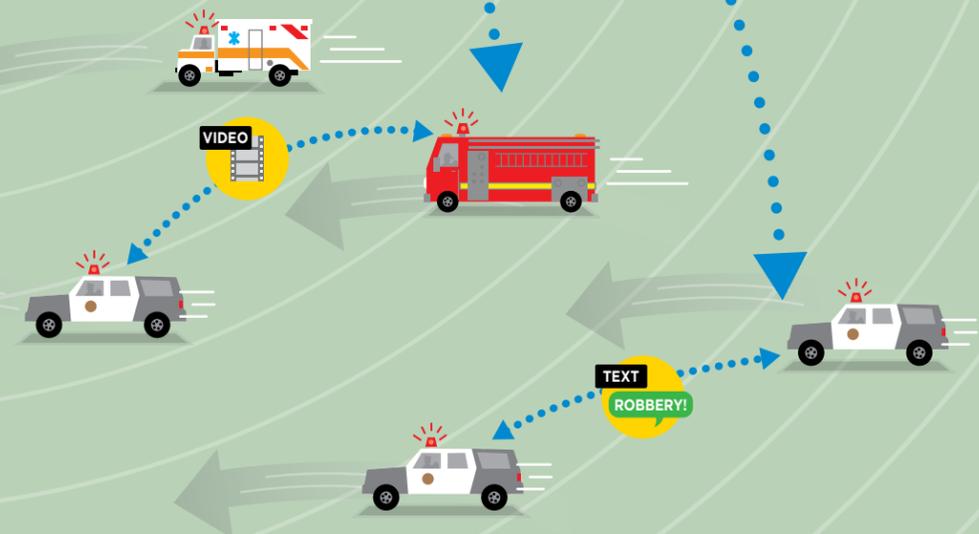
3 FIRSTNET

Wireless network sends information and rich data from 911 to first responders



4 FIRST RESPONDERS

Alerted to emergency with real-time, critical information and data



AN ABDUCTION SCENARIO



A woman witnesses an abduction.



With NG911, she provides helpful data from the scene to 911.



911 reviews and coordinates all available information.



911 sends data in real time through FirstNet to first responders in the field.



Better data from the public and faster delivery of information helps public safety.

BRINGING

911

INTO THE DIGITAL AGE



The future of 911 is when your grandmother's implanted heart monitor detects an arrhythmia and summons paramedics to her house before she even knows there is a problem. It's when a car relies on its computerized telemetry system to communicate data about a car crash after a teenage driver hits a tree in the middle of the night. The data generated by the car crash suggests a high likelihood of severe injury, so a helicopter is automatically dispatched along with ground-based EMS for faster transport to the nearest trauma center.

In the future, 911 will receive photos and videos directly from a home security system during a home invasion and provide those images to the smartphone of the police officer responding to the scene.

These examples illustrate the current and future capabilities of the mobile- and digital-adapted, internet protocol (IP)-based 911 system now being built, called Next Generation 911 (NG911).

**Next Generation 911:
Adapting for a Digital World**

The NG911 system will allow 911 callers to share videos, images, and texts with dispatchers. NG911 will be able to take in data and notifications from digitally connected devices such as car computers, computerized home alarms, building sensors and wearable monitors, which are all part of the Internet of Things (IoT). This information will be routed through NG911 from callers to public safety answering points (PSAPs) and then to first responders through FirstNet—the wireless broadband network used by public safety responders.

A More Robust System that Offers Better Information for Responders

NG911 systems will replace the nation's current 911 infrastructure, which is largely comprised of old, less flexible and soon-to-be-obsolete technology. NG911 offers a more robust, interconnected and reliable infrastructure, and faster, digital transfer of calls between PSAPs. In cases of natural disaster, for example, calls can easily be transferred from one PSAP to another if a PSAP is physically damaged. The digital system makes it easier to load-share between PSAPs, which is critical to a 911 system's responsiveness and the need to coordinate multiple agencies. Not only does this make the 911 system more resilient, it also ensures



access to more real-time information for 911 dispatchers, law enforcement, firefighters and emergency medical services.

NG911 & Law Enforcement

Real-time data such as livestreaming video could help many kinds of emergency responders, including law enforcement officers. Eddie Reyes, Senior Law Enforcement Project Manager at The Police Foundation, and retired deputy police chief of the Alexandria Police Department in Virginia, points out that NG911 could help in a child abduction case, for example.

“When a child goes missing, a photo of that child and the suspected abductor could be circulated to the computer in the squad car or the smartphone of every officer in the area,” Reyes says. “With NG911 and FirstNet in place, there may be faster apprehension of the suspect.”

Reyes suggests NG911 can also better protect crime victims. When a caller cannot safely talk on the phone, for example with a domestic violence incident, the victim might be able to text a 911 request instead. In these cases, text to 911 could help summon law enforcement sooner, while helping to keep the person safe.

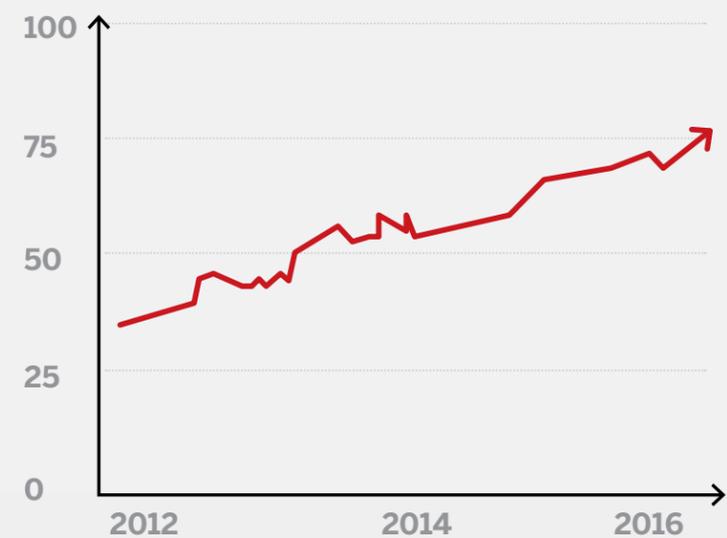
NG911's capabilities can also enhance legal investigations conducted after a crime or an emergency.

“Once citizens become aware that NG911 allows them to send data, they can send photos and videos to law enforcement that will assist with an investigation,” Reyes says.

ADAPTING PUBLIC SAFETY COMMUNICATIONS TO MOBILE

Adapting the U.S. emergency communication system to be responsive to smartphones is a pressing safety issue, and migration to an IP-enabled system is essential to meet the public's expectation of public safety systems.

PERCENT OF ADULTS OWNING SMARTPHONES: 2012–2016



SOURCE: PEW RESEARCH CENTER

What you can do to support the transition to NG911

- + Evaluate your system for risk resulting from the use of obsolete technology.
- + Advocate for NG911-to-FirstNet national standards to ensure interoperability.
- + Assess your progress on state or regional GIS databases -- an essential component to NG911 deployment.
- + Review the FCC's TFOPA NG911 Readiness Scorecard and Self Assessment for information on governance, GIS, routing and other important elements of NG911. See Resources.

Fire Response with NG911

For fire professionals, NG911 will also have wide reaching applications. In the last century, firefighting has changed dramatically through a concerted focus on fire prevention and enforcing more stringent building codes. Now, as modern building construction moves towards the standard inclusion of digitally connected alarms, sensors and video monitors, these networked devices can transmit valuable information to PSAPs collecting information about a scene where evidence of a fire has been detected. These connected devices can collect information such as real-time temperature, sprinkler use, blocked exits, carbon monoxide levels or other hazards. This information can then be transmitted to responders, helping them to make more informed decisions at the scene.

Fire protection engineers like Casey Grant, the Executive Director of the Fire Protection Research Foundation, welcomes NG911's data-rich features as key informants for the often dangerous job of firefighting.

"During an emergency event, seconds matter," Grant says. "You have to make correct decisions with the right amount and quality of data."

In emergency response, the safety of first responders is paramount. The information supplied through NG911's infrastructure contributes to increased situational awareness. Grant suggests that the data from NG911 is not just useful for active incidents. It is also important for pre-planning and for post-incident investigations.

"We can harvest this data and sculpt it into wisdom for greater safety on future applications," Grant says.

Medical Emergencies & NG911

The information available through NG911 will also help drive better patient care in emergencies in a variety of circumstances, including car crashes, which are responsible for more than 32,000 deaths in United States every year. In newer cars that are equipped with computerized telemetry systems, NG911 will be able to receive notifications and data from the car's computer, which could include information such as speed at impact, direction of impact, number of occupants, air bag deployment, etc. Using an algorithm to analyze this data, researchers have been able to accurately predict when an occupant is likely to have severe injuries and require specialized equipment to be dispatched to the scene and then transported to a trauma center.

"Internal injuries that a crash victim may suffer are not always visible to the first responders on the scene," says Dr. Paul Stiegler, medical director for OnStar. "Injuries might be missed or underestimated."

The communication of information between the car's computer system and a PSAP, and then out to first responders is an example of how NG911 can enable faster dispatch of more effective resources.

NG911 also has application in other situations: patients who call 911 with non-emergent concerns. Across the country, many EMS services have launched community paramedic programs to respond and triage patients who call 911 but aren't in need of transport to an emergency



department. These community paramedics are tasked with navigating patients to urgent care clinics, consultation with primary care providers or medical management in the home.

Jonathan Washko, Assistant Vice President of Operations at Northwell Health EMS in Syosset, New York, is a big proponent of NG911's potential video capabilities, which will allow first responders to use telehealth applications to connect with 911 callers. Community paramedics on Washko's team are currently using high-fidelity video and sound to create telemedicine connections in patients' homes, and transmit real-time vital signs and other health data to a physician. Washko, refers to these EMS providers as "physician extenders," and points out that with the help of telemedicine connections, they can help navigate patients to the appropriate care, which results in better medical outcomes and use of resources.

"We are able to keep these patients in their homes when they do not need a hospital visit," he says. "We've had 98% customer satisfaction, and we've saved \$7,900 per patient per visit."

Triaging 911 callers who have non-emergent medical concerns using telemedicine is just one potential application of NG911 and video. Washko takes it even further, envisioning a future in which PSAPs will deploy drones to mass casualty incidents or active shooter events and use NG911 to provide live video of the incident to the authorities.

NG911: A Game Changer

Although all the uses and applications of NG911 are not yet known, it is clear that this more robust, mobile- and digitally-adapted system will revolutionize how the public can communicate in emergencies, by allowing them to share texts, videos, audio recordings, and pictures. Increasingly, NG911 will also be able interface with the myriad of smart sensors and devices, including wearables, alarms, building sensors, car computers, home monitoring systems, etc. In turn, this richer and potentially real-time information can be shared with first responders through the FirstNet network, a critical improvement which will help them to be better informed and operate more safely.



**DURING AN EMERGENCY
EVENT, SECONDS MATTER..."**



With NG911 in planning stages nationwide, it is up to local and state leaders, legislators, and community groups to ensure NG911 projects have appropriate support and resources to make these important, lifesaving technology upgrades to better serve the public in emergencies and protect first responders. ♦

Resources

National 911 Program

911.gov

The Association of Public-Safety Communication Officials International (APCO)

apcointl.org

Federal Communications Commission (FCC)

fcc.gov

FCC's TFOPA Report

https://transition.fcc.gov/pshs/911/TFOPA/TFOPA_WG2_Supplemental_Report-120216.pdf

FIRSTNET First Responder Network Authority

Firstnet.gov

Industry Council for Emergency Response Technologies (iCERT)

theindustrycouncil.org

International Association of Fire Chiefs (IAFC)

iafc.org

International Association of Chiefs of Police (IACP)

theiacp.org

National Association of State CIOs (NASCIO)

nascio.org

National Association of State EMS Officials (NASEMSO)

nasemso.org

National Association of State 911 Administrators (NASNA)

nasna911.org

National Congress of State Legislators (NCSL)

ncsl.org

National Emergency Number Association (NENA)

nena.org

NG911 NOW Coalition

ng911now.org

The National Sheriffs' Association (NSA)

sheriffs.org

Intelligent Transportation Systems Joint Program Office (ITS JPO)

its.dot.gov/research_archives/ng911/index.htm



NG911 & FirstNet



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