The 5 Reasons Why Now is the Time to Transition to Next Generation 9-1-1

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Introduction

In 1999, Congress passed the Wireless Communications and Public Safety Act, which mandated enhanced 9-1-1 (E911) and required 9-1-1 to serve as the emergency number for non-landline phones as well. The service seemed revolutionary at the time. Pick up your phone, dial three digits and a public safety dispatcher at the other end would know your location as you asked for help. Cell phone use was not yet ubiquitous and virtually everyone still had a landline phone. The Internet was only beginning to gather steam as a driver of social, economic and technological change.

Today, the landscape has changed drastically. A majority of Americans — 64 percent — own a smartphone[1] and about 70 percent of all 9-1-1 calls are wireless.[2] Two-in-five U.S. households no longer have a landline.[3] Meanwhile, the Internet has become the nation's voice and data infrastructure, capable of routing video, images, text and phone calls in digital format.

This rapid transformation in how Americans communicate and the technology that undergirds our telecommunications network has profound implications for the nation's more than 6,000 public safety answering points (PSAPs) managing 9-1-1 traffic. These vital public safety centers rely on outdated technology that makes it difficult to receive smartphone-capable communications such as texts or videos, which can be vital in emergency situations. The infrastructure is also slow when it comes to transferring calls and handling increased payloads, and, in some cases, can fail to operate when an outage occurs.

Shifting to a new technology is never easy, so there needs to be a strong argument to do so. For the nation's 9-1-1 centers, the case for adopting Next Generation 9-1-1 (NG9-1-1) technology has never been so apparent. It starts with the opportunities that come with emerging technology, including the ability to accept different types of media, such as text, that could save lives. Just as important, however, is the infrastructure that has made 9-1-1 so reliable for so many years is shifting from analog to digital. PSAPs have to maintain the highest levels of reliability and accuracy. But those key metrics are a challenge as the nation's phone companies transition their networks from copper wires and switches to routers and the Internet protocol (IP).

Now is the Time for NG9-1-1

- For the nation's 9-1-1 centers, the case for adopting NG9-1-1 technology has never been so apparent.

- Emerging technology, including the ability to accept different types of media, is providing opportunities to save lives as the 9-1-1 infrastructure shifts from analog to digital.

- This handbook explains the reasons why it's time to move to NG9-1-1 and includes information on how to fund that transition and start the planning process.

Public safety officials work in an environment where it's critical to understand the facts about NG9-1-1. Many may know what NG9-1-1 is, but not everyone knows how it works and why it's important to start the transition now. This handbook will show the way.

Reason No. 1:
New Technology Can Transform 9-1-1 Response

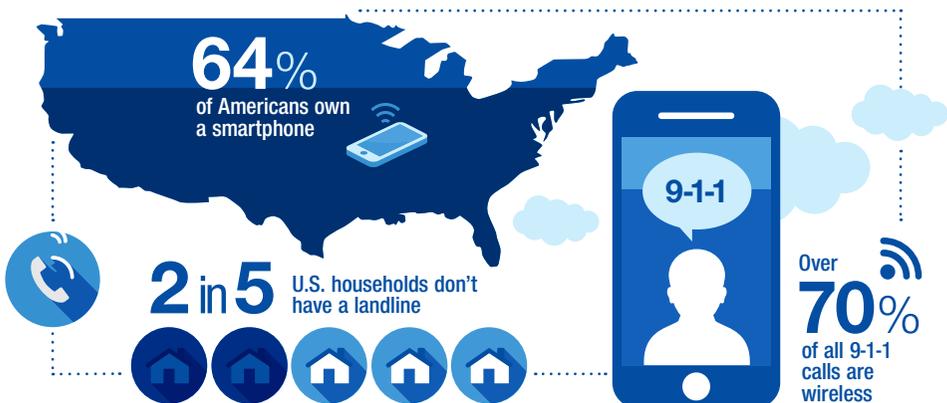The benefits of NG9-1-1 are driven by advances in technology and there's no better place to start than with the options it gives to callers. The most talked about benefit is text-to-911. This nonverbal form of communication with PSAPs will allow individuals with disabilities, in particular the deaf and hard-of-hearing, to reach 9-1-1 without the use of additional devices. It also opens public safety's door to what is becoming the fastest-growing form of communication, especially among teens. According to Pew Research, 75 percent of teens text, and 63 percent say they exchange text messages every day with people in their lives.[4]

The technology behind texting could expand to include biomedical devices, such as a defibrillator, to automatically call 9-1-1 during a medical emergency. NG9-1-1 will also allow citizens to send multimedia, such as images and video, to 9-1-1 centers. While most people think of smartphone devices here, multimedia could also include images from security cameras or digital map images from police officers in remote areas.

Technological advances benefit PSAPs in several other fundamental ways:

- **More efficient routing of calls.** Currently, in some areas, callers must wait 20 to 30 seconds for their call to be routed to the 9-1-1 operator. Digital technology will minimize those delays. Call transfers between jurisdictions are also problematic with existing E911 systems. That's not the case with NG9-1-1. PSAPs will be able to transfer calls and activate alternative routing if a spike in calls overwhelms a PSAP or if a natural disaster temporarily shuts down a center. For example, Vermont, which has an IP-based network to link its eight PSAPs, routed call traffic around a PSAP taken offline during Hurricane Irene in 2011.
- **Faster location of callers.** With NG9-1-1, law enforcement and first responders will receive more precise location information automatically, so public safety workers won't spend as much time looking for a car that's gone off the road and into a ditch, for example.

A changing landscape is affecting the nation's 6,000 PSAPs:

64% of Americans own a smartphone

2 in 5 U.S. households don't have a landline

9-1-1

Over **70**% of all 9-1-1 calls are wireless

The technology that allows individuals to text to 9-1-1 could expand to include biomedical devices, such as a defibrillator, to automatically call 9-1-1 during a medical emergency.

- **Increased mapping capabilities.** New technology will provide PSAPs with increased mapping capabilities and improved call location accuracy over time. GIS databases used to route responders through computer-aided dispatch (CAD) systems will be enhanced with NG9-1-1 and GIS data will drive the geospatial routing of calls to the PSAP. No longer will static telephone data be the steering mechanism for call routing. For states or counties with multiple PSAPs under their direction, this geo-redundancy will be extremely beneficial. For example, Fairfax County, Va., is upgrading its PSAPs to NG9-1-1. Steve McMurrer, the 9-1-1 systems administrator for the county, says the eventual geospatial routing capability will allow more flexibility for geographically separated 9-1-1 centers to back up one another by updating policy rules linked to geospatial polygons. Such flexibility will allow call flows to be redirected over NG9-1-1 IP networks to call centers that can absorb the additional calls. "It's going to be very flexible," he says.[5]

Reason No. 2:
Industry Standards Will Advance the Growth of NG9-1-1 Technology

Key to ensuring all the benefits of NG9-1-1 come to fruition are a set of standards designed to promote interoperability of PSAPs throughout the U.S. The National Emergency Number Association (NENA) has been developing standards and guidelines for NG9-1-1 for several years. Pulling everything together is the i3 framework, which outlines an architecture that will allow PSAPs to share information with other PSAPs and with emergency agencies in a network.

"The intention is to have interconnected networks," says Roger Hixon, technical issues director for NENA. "That type of interoperability requires

standards. People in public safety also indicated they wanted more flexible systems — not just in terms of multimedia versus voice, but also in terms of their ability to pick different vendors and have them operate together, so they weren't locked in with just one vendor."[6]

While NG9-1-1 standards are not yet fully developed, they will be critical to upgrading call centers and networks into robust operations. Standards for interfaces and IP-based GIS databases will provide 9-1-1 callers with great flexibility, while network standards will ensure interoperability, the cornerstone of NG9-1-1. Standards will also ensure the technology platforms for 9-1-1 can continue to grow rather than face replacement as technology advances.

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Interoperability is perhaps a central reason to transition to NG9-1-1. The Center for Digital Government (CDG) surveyed over 150 state and local government IT professionals regarding their 9-1-1 systems and 14 percent said their greatest challenge was that new technologies do not integrate with existing technologies. Most standards for E911 were actually designed more than 40 years ago, when voice was the only means of communication and networks of PSAPs weren't possible.

An example of how standards will allow NG9-1-1 to grow is the role played by emergency services IP networks (ESInets), which will be the foundation for interoperable, regional PSAPs. ESInets use broadband, packet-switching technology capable of carrying voice in addition to large amounts of data. Their use will be multipurpose and they will be capable of supporting a tiered design approach to local and regional 9-1-1 operations.[7]

PSAP networks are beginning to emerge. In southern Illinois, 17 emergency telephone system boards have come together to create a secure public safety broadband network, which will share voice and data

Fairfax County, Va., is upgrading its PSAPs to NG9-1-1 and will eventually implement geospatial routing of 9-1-1 calls using shared GIS databases. Steve McMurrer, the county's 9-1-1 systems administrator, says the incorporation of geospatial information systems will increase flexibility and allow for more dynamic policy-based rules for dealing with call overflow within the National Capital Region.

compatible with an NG9-1-1 system. Instead of purchasing 17 separate sets of NG9-1-1 equipment that would each serve a limited geographic area, they are purchasing two redundant systems and connecting them through a secure IP network.[8] Fairfax County, Va., is pursuing a similar, standards-based network for its 9-1-1 needs.

Reason No. 3:
It Provides an Opportunity to Enhance 9-1-1 Security

At first glance, transitioning 9-1-1 to IP standards would seem to be a cause for concern when it comes to security. After all, cybersecurity is one of the leading technology issues in state and local government. These concerns are reflected in the aforementioned CDG survey, in which 61 percent of respondents said cybersecurity was a concern with implementing NG9-1-1. Traditionally, 9-1-1 systems have worked within their own enclosed networks. But NG9-1-1 is IP based. "That means the system has to be much more capable and resistant to intrusions," says McMurrer of Fairfax County.

However, NG9-1-1 is expected to provide extensive security capabilities at the hardware and software levels to significantly enhance the privacy and reliability of existing E911 systems.[9] An architecture that centralizes these security capabilities will allow agencies to establish safeguards that can

> It's likely new PSAPs will be built on a cloud-based architecture, which will make security critical. Cloud-based architectures should have dedicated infrastructures built from the ground up to provide robust security features.

protect data compared with decentralized databases that lack certain security controls, most of which are presently delegated to local exchange carriers.

It's likely new PSAPs will be built on a cloud-based architecture, which will make security critical. Cloud-based architectures should have dedicated infrastructures built from the ground up to provide robust security features. A cloud-based system could support multiple PSAPs in a region or a state, but can be designed to provide each with its own features, functions and data security. Correctly designed, a cloud architecture should include physical-level security as well as application-level security.

Public safety agencies will want to find commercial partners who are extremely knowledgeable about security risks and can provide robust support.

Reason No. 4:
Successful Governance Models are Emerging

One of the most promising aspects of NG9-1-1 is that it advances how public safety is supported through the sharing of critical information in PSAP network databases. The ability to share various types of geospatial data while routing calls will make it possible to construct networks of PSAPs, via an ESInet, that can drive down costs for technology, security and maintenance.

These so-called "networks of networks" will create cost-efficient, robust public safety systems for 9-1-1 services. Having the right kind of

governance to manage a network of 9-1-1 centers will be crucial to NG9-1-1's success. For statewide NG9-1-1 networks, a centralized governance structure might be the best approach. Massachusetts began transitioning its 249 PSAPs to a statewide system that complies with i3 architecture standards in late 2014.[10] Maine completed its statewide rollout of NG9-1-1 in 26 PSAPs in July 2014, and Vermont is currently developing a statewide NG9-1-1 system and has a nationally recognized governance framework to guide its operation at the state level.

For regional 9-1-1 networks, which involve multiple jurisdictions and governments, a more collaborative governance structure is appropriate. Collaborative governance frameworks allow for choices based on different political situations within the region, but they can be complicated to manage.

Experts recommend public safety agencies adhere to industry standards to make collaborative governance easier to manage. This is the approach adopted by Fairfax County, Va., and other jurisdictions in the National Capital Region, including the District of Columbia. While the process is still in the early stages, the goal is to have a regional network, based on standards, so each public safety agency can create its own NG9-1-1 network that is part of a broader regional network. Critical data, such as geospatial information, will be jointly shared, yet each 9-1-1 center will be built to the specifications set by the individual jurisdiction.

NG9-1-1 Frontrunners

Maine completed its statewide NG9-1-1 rollout in July 2014, transitioning 26 PSAPs to the new infrastructure.

Massachusetts began transitioning its 249 PSAPs to NG9-1-1 in late 2014.

Connecticut began rolling out NG9-1-1 on a pilot basis to 10 PSAPs in early 2015 with plans for statewide implementation the following year.

Still, other jurisdictions will transition to NG9-1-1 on their own and develop individual governance frameworks. Some might involve military bases, depending on their location. And then there's FirstNet, the national broadband wireless public safety network for first responders. While still in early planning stages, FirstNet's impact on NG9-1-1 — especially in sharing data among callers, dispatchers and first responders — will become clear as time goes on. While the governance framework is unclear at the moment, it's important to keep the scope of FirstNet in mind as public safety agencies begin their own transition to NG9-1-1.

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The U.S. Department of Transportation's (USDOT) NG9-1-1 initiative recommends options for establishing a working governance framework:

1. Clarify jurisdictional frameworks and responsibilities and identify the coordination required at each level of government to make IP-enabled 9-1-1 possible.
2. Consider developing model legislation that would address the update of regulations, legislation and other policies to reflect modern communications and IP-enabled 9-1-1 system capabilities.[11]

Reason No. 5:
Workforce Development Will Benefit

Everyone realizes NG9-1-1 will usher in new capabilities that will require training for dispatchers and other 9-1-1 employees, as well as decisions about how far to take that training. Text-to-911 presents one kind of training challenge. Another is the introduction of multimedia to the job. "Obviously, there will be an impact, as well as the need to train people to do something in a different way," says Fairfax County's McMurrer.

Call takers, dispatchers and responders will have to operate with more data than they have had to manage in the past. Once NG9-1-1 centers are ready to accept multimedia, call takers face the possibility of seeing graphic situations and other material they are not trained to handle. Call takers will need training in not just how to deal with images and video and their content, but how to interpret some of that content, as well as other types of data. In addition to training, public safety agencies may have to teach staff new workflow processes and procedures to take full advantage of the new technology.

Funding Options

The cost of transitioning to a new 9-1-1 technology will not be cheap. The Federal Communications Commission (FCC) says it will cost $2.68 billion over 10 years to provide the broadband connectivity to PSAPs needed for the next-generation network architecture.[12] However, with consolidation expected from the use of interoperable design and IP standards, that cost could be cut nearly in half.

Still, that leaves state and local governments struggling to pay for upgraded call centers and the training that will go with the new systems. Subscriber fees on existing telephony services to fund 9-1-1 are proving insufficient to cover the costs of new technology as the number of landline users continues to decline. The FCC is charged with monitoring and

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reporting on states' collection and usage of 9-1-1 funds, yet revenues collected for 9-1-1 sometimes are diverted for other purposes.

Funding the necessary technology upgrades for NG9-1-1 may require changes in existing laws, which regulate and set tariffs based on older technology. The USDOT NG9-1-1 initiative recommends three options for improved funding:

1. **Ensure IP-enabled 9-1-1 upgrades are considered a fiscal priority** for states and local jurisdictions and federal grant programs through outreach and education.

2. **Transform current 9-1-1 funding and cost recovery mechanisms** to address the diminishing revenue base, shared resources and provider cost recovery. Options for consideration include legislation establishing technology-neutral revenue mechanisms that accommodate all current and future devices and services capable of accessing 9-1-1 (e.g., text messaging, prepaid wireless, sensors and alarms).

3. **Ensure 9-1-1 funds are preserved for 9-1-1.** To bolster long-term 9-1-1 funding viability, Congress may wish to consider expanding and strengthening federal incentives that encourage state and local 9-1-1 authorities to use 9-1-1 funds, surcharges and fees solely for costs attributable to 9-1-1 operations, services and equipment.[13]

Getting Started

Transitioning to NG9-1-1 will bring great benefits to the nation's public safety. However, moving from a legacy technology platform to one that is far more advanced is no trivial matter. Yet new technology brings with it greater flexibility.

When it comes to NG9-1-1, there's no specific starting point. Public safety agencies can begin with constructing an IP-based PSAP or an ESInet; others might begin with a geospatial database or enhancing their automatic location identification data so it can travel at high capacity over the IP network. These are all fundamental building blocks of NG9-1-1, which can be brought together as funding and project management proceed.

> "When lives are at stake, NG9-1-1 is not a luxury; it's a true necessity. It needs to be implemented posthaste."
>
> David Bailey, NG9-1-1 Coordinator, Morgan County, Ohio

The key point is not to wait. "I've been involved in public safety in excess of 45 years, as well as industry safety," says David Bailey, Morgan County, Ohio, NG9-1-1 coordinator. "And when lives are at stake, NG9-1-1 is not a luxury, it's a true necessity. It needs to be implemented posthaste."[14]

Endnotes:

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