Congressional Research Service
Informing the legislative debate since 1914

Next Generation 911 Technologies: Select Issues for Congress

(name redacted)
Analyst in Telecommunications Policy

July 9, 2018

Congressional Research Service
7-....
www.crs.gov
R45253

CRS REPORT
Prepared for Members and
Committees of Congress

Summary

In 2018, Congress and 911 advocates celebrated the 50th anniversary of the first 911 call. Over the past 50 years, states and localities have adopted 911 as the number to call during emergencies, established 911 centers (also known as Public Safety Answering Points or PSAPs) to receive and manage 911 calls, managed and funded their local PSAPs, and educated the public on 911 use. Today, 911 services are available in most jurisdictions in the United States, people know 911 is the number to call in emergencies, and 911 systems have helped to save lives.

However, there are challenges. In some areas of the nation, people do not have access to traditional 911 services. In other areas, PSAPs use different technologies and cannot interconnect. Additionally, PSAPs are at various stages of upgrade; as a result, 911 services may vary from one jurisdiction to the next. For example, some PSAPs can receive text messages, while others cannot. The variation in service may confuse callers who expect 911 services to be consistent across jurisdictions, and may delay the response.

Further, most PSAPs rely on legacy telephone technologies, adopted decades ago to receive voice calls from landline phones, and the home address associated with the phone number. With 80% of 911 calls now coming from mobile devices (e.g., cell phones), 911 systems have had to be adjusted to accommodate wireless calls and their location information. Telecommunication providers that serve 911 centers have had to configure their systems to route wireless 911 calls to the appropriate PSAP and to transmit the caller's number and location information which, for mobile callers, is a complex task. Similarly, PSAPs have had to adjust their systems to accept 911 calls and location information for wireless callers. While PSAPs can now accept calls from wireless devices, and some location information for wireless callers, most cannot accommodate text messages, photos, or videos—communications that are commonly used by consumers today.

Since 2008, Congress has urged the adoption of Internet Protocol (IP) based systems to improve 911 services. IP-based systems can: accept data communications (e.g., text, photos, videos) to allow those in danger to text 911 when they cannot call; leverage computer-based geolocation applications to accurately locate callers; enable interconnections between PSAPs, allowing PSAPs to re-route calls during emergencies, building redundancies into the nation's 911 system; and interconnect with other public safety systems to enable information-sharing during response. Some states have begun implementing next generation of 911 (NG911) technologies (e.g., installing a basic IP network or Emergency Services Internet Protocol Network (ESInet)); however, funding has been a challenge, and progress has been relatively slow.

There is general consensus that upgrades to 911 systems are needed, and that adoption of NG911 technologies will improve 911 services. However, the implementation is expected to be costly and complex. Both private telecommunication networks and 911 systems will need to be upgraded to achieve the full benefits of NG911 technologies. Further, adoption of NG911 will change the way PSAPs operate and interoperate. PSAPs will be able to accept different types of data, and will need to establish policies and procedures for handling this new information. NG911 will also enable PSAPs to interconnect to form regional 911 systems, and for regional systems to connect to form a single nationwide 911 network. The formation of a single nationwide network may drive the need for new policies related to the governance, funding, interoperability, and security of the nation's 911 centers. An issue for Congress is determining the appropriate level of federal involvement in the implementation and oversight of a nationwide NG911 system that will support the deployment, while still respecting state and local authorities over 911 services.

Contents

Contacts

Introduction

Since 1968, state and local 911 systems have provided assistance to people in need.[1] 911 systems are fast, reliable, and effective, and are credited with saving many lives. However, many 911 centers (also known as Public Safety Answering Points or PSAPs) continue to use legacy telephone technologies that can receive 911 voice calls, but cannot accept data (e.g., text, photos). Recent advancements in technology have enabled the creation of a more advanced 911 system that can interact more easily with modern communication devices.

Next Generation 911 (NG911) technologies offer callers the ability to either call 911 or send data (e.g., text, photos, or video) to PSAPs. NG911 technologies offer PSAPs the ability to accept data, share data with first responders, provide accurate location information, interconnect with other centers, and re-route calls during emergencies. There is general consensus that PSAPs should migrate to NG911; however, the migration will be costly and complex, and will require coordination between state and local 911 agencies and telecommunication providers.

NG911 technologies are expected to change the way 911 systems operate and interoperate. Local 911 systems may need to create or revise policies to accommodate the new technology. Similarly, with the ability to interconnect systems, there is potential to create a nationwide 911 system, which may create the need for new policies to ensure PSAPs are interoperable and secure. An issue for Congress will be in finding the right level of federal involvement to support the deployment of NG911 nationwide, while respecting state and local authorities over 911 services.

Background

Evolution of 911

Before the 1960s, there was no universal emergency phone number (i.e., 911) for the public to call to report an emergency or request assistance. People called the local police or fire department directly; callers often had to look up local agency numbers, which could delay the response and cost lives in certain emergencies (e.g., fire, drowning).

Fire safety organizations argued that a single nationwide number for people to call during fires would reduce response times and save lives. In 1967, President Johnson's Commission on Law Enforcement and Administration of Justice declared that a single telephone number should be established to report emergencies or request assistance. The Federal Communications Commission (FCC) partnered with American Telephone and Telegraph Company (AT&T), the regulated telephone monopoly at the time, to establish a nationwide number. AT&T proposed 911 as the universal number because it was easy to remember, and was not used for other purposes.[2]

On February 16, 1968, in Haleyville, AL, the first 911 call was made. Since then, 911 services have expanded to nearly every jurisdiction in the nation, covering most of the United States. In 2017, almost 99% of the U.S. population had access to 911 services. People rely on 911 services; annually, PSAPs receive an estimated 240 million calls for help.[3]

[1] PSAPs are owned and operated by state, local, tribal, and territorial governments. For this report, any reference to 'state and local PSAPs' also includes tribal and territorial PSAPs.

[2] National Emergency Number Association (NENA), "911 Origin and History," at https://www.nena.org/page/911overviewfacts.

[3] NENA, "9-1-1 Statistics," at https://www.nena.org/page/911Statistics.

While 911 is the nationwide number to call for emergencies, there is not one nationwide 911 network; the nation's 911 network includes 5,783 separate state and local PSAPs, each of which is operated by a different entity and serves a specific area, typically a county.[4] When a person dials 911, a telecommunications provider (e.g., telephone company, wireless provider) routes the call over a dedicated line to the appropriate PSAP;[5] the PSAP receives calls through its phone systems, and uses computer software to manage 911 caller information (e.g., phone number, location) and to dispatch public safety (e.g., police, fire) to the scene; public safety agencies receive information from the PSAP through computer-aided dispatch systems. The three entities (i.e., telecommunication providers, PSAPs, and public safety agencies) work together, through shared technologies and written agreements to operate, maintain, and upgrade 911 services.[6]

Current State of 911

The Wireless Communications and Public Safety Act of 1999 (P.L. 106-81) directs the FCC to make 911 the universal emergency telephone number for all communication devices (e.g., landline, wireless devices), and to encourage and facilitate the prompt deployment of a nationwide, seamless communications infrastructure for emergency services. Progress has been made;[7] however, there are disparities in services across jurisdictions.

No 911 Services

In some areas of the nation, people do not have access to traditional 911 services. For example, in some areas of Alaska, people are instructed to dial a 1-800 number for assistance, and the number can vary by region. The caller will connect to a public safety agency, but their location will not be automatically conveyed to the public safety agency. In the 2017 National 911 Progress Report, the total number of counties with no 911 authority is 53, based on 47 states reporting; of the 53 counties reporting, 38 were in Alaska.[8]

Basic 911 Services

Some localities are limited to Basic 911 services. In these jurisdictions, the call is connected to a PSAP, but the call-taker may not receive the phone number or location of the caller; the call-taker may need to ask the caller for their exact location, delaying the response. There are a few jurisdictions limited to Basic 911. The 2017 National 911 Progress Report listed the total number of 911 authorities[9] offering Basic 911 as 9, based on 47 states reporting.[10]

---

[4] Some PSAPs interconnect to serve regions or to serve as back-up to another PSAP. See North Carolina Guidance at https://files.nc.gov/ncdit/documents/files/Enhanced%20Backup%20PSAP%20Plan%20Document-3.pdf.

[5] Dedicated lines ensure that 911 calls will not compete with commercial callers and calls will get through to PSAPs.

[6] 911 systems are typically supported by multiple entities (e.g., those who complete the call to a PSAP, those who provide automatic location information (ALI) and automatic number information (ANI), those who provide texts to 911). See FCC, "Entities Providing 911 Connectivity," at https://docs.fcc.gov/public/attachments/FCC-14-186A1.pdf.

[7] National 911 Program Office, *2017 National 911 Progress Report*, November 2017, pp. 1-5, at https://www.911.gov/pdf/National-911-Program-Profile-Database-Progress-Report-2017.pdf.

[8] U.S. Department of Transportation, National 911 Program Office, *2017 National 911 Progress Report*, November 2017, at https://www.911.gov/pdf/National-911-Program-Profile-Database-Progress-Report-2017.pdf, p. 29.

[9] Authorities can mean a county, Council of Government, municipality; authorities can operate more than one PSAP.

[10] U.S. Department of Transportation, National 911 Program Office, *2017 National 911 Progress Report*, November 2017, at https://www.911.gov/pdf/National-911-Program-Profile-Database-Progress-Report-2017.pdf, p. 39.

Enhanced 911 Services (E911)

Most jurisdictions offer some level of Enhanced 911 (E911) services, which provide call-takers with additional location information of callers. In E911 systems, private carriers identify the location of the caller, use the location to route the call to the appropriate PSAP, and send the location to the call-taker. The National Emergency Numbers Association (NENA), a 911 advocacy association, reports that 93% of counties offer some level of E911 services.[11]

Most PSAPs can receive location information for both landline and wireless callers. Some PSAPs cannot. The 2017 National 911 Progress Report found that 345 authorities can receive landline location information, but not wireless (e.g., cell phone) location information.[12]

For mobile callers, the FCC requires wireless carriers, within six months of a request by the PSAP, to provide the location of wireless callers. Under Wireless Phase I (WPI), carriers must provide PSAPs with the wireless number and the cell site from which the call originated. Under Wireless Phase II (WPII), carriers must provide WPI information and the coordinates of the caller.[13] The 2017 National 911 Progress Report found that 3,302 PSAPs out of 5,783 PSAPs had the technologies in place to receive WPII calls.[14]

Next Generation 911 Services (NG911)

Some areas have begun to implement NG911. NG911 systems use Internet Protocol (IP) based technologies to deliver and process calls.[15] NG911 systems include Emergency Services Internet Protocol network (ESInet),[16] IP-based software services and applications, databases, and data management processes that interconnect to PSAP equipment.[17] In NG911 systems, PSAPs can accept voice calls from a variety of devices (e.g., mobile phones, Voice over Internet Protocol (VoIP), such as Skype), and data (e.g., texts, photos). NG911 systems enable PSAPs to interconnect, and for PSAPs to connect to other public safety systems, including the new public safety broadband network, also known as the First Responder Network (FirstNet).[18]

The 2017 National 911 Progress Report found that 22 states were making progress toward implementing NG911.[19] Most states and localities are not engaged in a full-scale replacement of legacy systems, but are implementing NG911 networks incrementally, as circumstances and funding enable. In order for upgrades to occur, both telecommunications providers and PSAPs must make changes to their systems to send and receive enhanced location information and data.[20]

---

[11] NENA, "9-1-1 Statistics," at https://www.nena.org/page/911Statistics.

[12] U.S. Department of Transportation, National 911 Program Office, *2017 National 911 Progress Report*, November 2017, https://www.911.gov/pdf/National-911-Program-Profile-Database-Progress-Report-2017.pdf, p. 32.

[13] For more information see https://www.fcc.gov/tags/9-1-1-location-accuracy.

[14] U.S. Department of Transportation, National 911 Program Office, *2017 National 911 Progress Report*, p. 37.

[15] Internet protocol is the method by which data is sent from one computer to another on the internet. It allows hosts in different networks to communicate with each other and enables the interconnection of systems.

[16] Emergency Services IP Networks (ESInet) are broadband-based IP networks that allow PSAPs to manage how calls and texts are routed, reroute calls to other PSAPs, interconnect to neighboring PSAPs, and accept and share data.

[17] NENA, "NG911 Project," at https://www.nena.org/general/custom.asp?page=NG911_Project.

[18] CRS Report R45179, *The First Responder Network (FirstNet) and Next-Generation Communications for Public Safety: Issues for Congress*, by (name redacted).

[19] U.S. Department of Transportation, National 911 Program Office, *2017 National 911 Progress Report*, p. 77.

[20] Tom Giambroni, "911 Will Accept Texts in 2018," *Morning Journal*, November 6, 2017, http://www.morningjournalnews.com/news/local-news/2017/11/911-will-accept-texts-in-2018/.

Issues for Congress

911 systems are operated by state and local entities. Each PSAP uses different technologies, is in different phases of upgrade, and is dependent on different sources of funding. Each 911 agency has its own agreements with local carriers, whose networks are also in various stages of upgrades. As a result, there is variability in 911 levels of services across jurisdictions.

There is consensus that upgrades to 911 systems are needed to ensure 911 systems are compatible with modern devices.[21] However, the adoption of NG911 may change the structure of the nation's 911 system from a system of individual PSAPs to one of interconnected PSAPs, and drive the need for national policies to ensure 911 systems are compatible, interoperable, and secure.

As the migration begins, issues for Congress may include addressing the migration of 911 to IP-based 911 systems (e.g., NG911); whether national policies are needed to ensure systems are interoperable and secure; the federal role in establishing and implementing national 911 policies; and mechanisms for ensuring state and local compliance with national policies. A key issue for Congress may be determining the level of federal involvement in the deployment of the NG911 and the development of policies (governance, funding, and technology policies) that support the deployment without infringing on state and local authorities over 911 services.

Governance

State and local entities make all decisions related to PSAPs, including decisions related to equipment, solutions, and vendors they will use, and whether and when to upgrade. Congress directed several federal agencies to support state and local 911 efforts, including:

- The National 911 Program Office in the National Highway Traffic Safety Administration (NHTSA) and the National Telecommunications and Information Administration (NTIA) form the Implementation Coordination Office (ICO).[22] The ICO is the lead agency on 911, facilitating coordination between federal, state, and local entities. The ICO was charged with preparing an IP migration plan,[23] grant guidance,[24] and a cost study on NG911 implementation.[25]
- The FCC was required to provide recommendations to Congress on the legal and statutory framework needed for NG911 transition, in coordination with NHTSA, NTIA, and the Department of Homeland Security (DHS).[26] The FCC coordinates 911 improvements with "public safety agencies, wireless carriers, technology vendors, equipment manufacturers, and local wireline carriers."[27] The FCC requires carriers to provide 911 services and manufacturers to ensure equipment

[21] NENA, "9-1-1 Organizations Launch NG911 Accelerated Deployment Effort," press release, February 23, 2016, at https://www.nena.org/news/news.asp?id=276464&hhSearchTerms=%222020%22.

[22] P.L. 108-494 established the Implementation Coordination Office (ICO) to serve as the federal lead on 911.

[23] P.L. 110-283 required the ICO to develop an IP migration plan.

[24] P.L. 108-494 established a $43.5 million grant program. P.L. 112-96 established a $115 million grant program.

[25] P.L. 112-96 directs the ICO to develop a cost study on NG911 implementation.

[26] P.L. 106-81 directs the FCC to work with states and other affected parties to deploy a comprehensive E911 service.

[27] For information on FCC efforts to support 911 services, see https://www.fcc.gov/general/9-1-1-and-e9-1-1-services.

is E911 compliant; investigates and reports on 911 outages; enforces rules on the handling of 911 calls by carriers; and reports on 911 fee diversion by states.[28]

- DHS was required to coordinate with NHTSA on the cost study,[29] and focuses on NG911 interoperability and cyber security issues, risks, and solutions.
- The Disability Rights Section of the Department of Justice implements the Americans with Disabilities Act to ensure equal access to 911 for the disabled.[30]

Stakeholders have acknowledged that "as states and localities continue to implement NG911, and begin to explore interconnection with other states' 911 systems, federal agencies may need to take steps to help ensure state NG911 networks are interoperable and connected."[31]

Governance Options

Some stakeholders contend that current federal governance structures can support the deployment of NG911.[32] The FCC has set timelines for carriers to improve 911 services and developed guidance on PSAP architecture and cyber security of NG911 systems.[33] The ICO has developed NG911 governance documents, shared technical guidance and standards for NG911 systems, and incentivized investment in NG911 through grants to state and local entities. However, without funding for state and local migration to NG911, implementation may be limited.

Some Members of Congress have proposed increasing responsibilities for the ICO to accelerate deployment through increased coordination, development of a nationwide NG911 strategy and model documents for NG911 systems (e.g., model governance structures, federal purchasing agreements), and grant funding.[34] Some have concluded that appointment of a single agency will help to accelerate state and local NG911 deployment. In a 2015 study on NG911, researchers found "The first step to completing an NG911 transition ... is that of establishing one single entity that has the responsibility and authority to oversee the transition. Just as this is the first step in establishing a state ESInet, it is also the first step in establishing a nationwide ESInet."[35]

Some have debated whether the ICO or FCC should lead the NG911 effort.[36] Both are needed to support NG911 migration. The FCC collaborates with carriers, and relies on its rulemaking authority to drive improvements to private telecommunication networks. The ICO is also developing a roadmap to define, through a collaborative process, federal roles and responsibilities for NG911 deployment. Congress may consider if the federal roles defined are adequate and if the federal agencies supporting NG911 have the resources to carry out their new tasks. While the FCC has been able to drive improvements to private telecommunication network through its rulemaking authority, the ICO has relied on grants to drive improvements to state and local 911

[28] P.L. 110-282 requires the FCC to report on diversion of 911 fees collected by state and local governments.

[29] P.L. 112-96.

[30] P.L. 101-336, Americans with Disabilities Act, ensures access to 911 for the disabled.

[31] U.S. Government Accountability Office, *Next Generation 911: National 911 Program Could Strengthen Efforts to Assist States*, GAO-18-252, February 23, 2018, at https://www.gao.gov/products/GAO-18-252, p. 12.

[32] FCC, *Legal and Regulatory Framework for NG911 Services Report to Congress*, p. 37.

[33] For example, see location accuracy requirements at https://www.fcc.gov/public-safety-and-homeland-security/policy-and-licensing-division/911-services/general/location-accuracy-indoor-benchmarks.

[34] S. 2061.

[35] Dr. Walter Magnussen, *The Status of NG911 Deployment in the United States*, Industry Council for Emergency Response Technologies (iCERT), 2015.

[36] FCC, *Legal and Regulatory Framework for NG911 Services Report to Congress*, p. 26.

systems. Congress may provide the ICO with additional authorities to guide the transition, but without an effective funding model for NG911 deployment, the ICO's ability to accelerate NG911 deployment may be limited.

In 2013, stakeholders suggested that an advisory committee that includes government, 911, and industry representatives may assist in the deployment of NG911.[37] New legislation supports the creation of a short-term advisory board to ensure NG911 interoperability.[38] A permanent advisory committee could provide recommendations on NG911 deployment and policies; review the impact of emerging technologies on 911 services; promote technical standards, interoperability and security requirements, and policies that support a technologically and competitively neutral environment; and facilitate coordination between 911 stakeholders and industry representatives. As an example, the Communications Security, Reliability, and Interoperability Council (CSRIC), established by the FCC under the Federal Advisory Committee Act, provides recommendations and technical guidance on telecommunication issues, including NG911.

There are several 911 organizations that support NG911 deployment.[39] National 911 leaders have formed the NG911 NOW Coalition which has set a goal "for all 911 systems and centers in all 56 states and territories to have sufficiently funded, standards-based, end-to-end, IP-based 911 capabilities, and will have retired legacy 911 systems, without any degradation in service to the public by 2020."[40] The timeline coincides with an industry timeline to migrate private networks to IP-based systems by 2020.[41] The Coalition has adopted a collaborative approach to advancing NG911 deployment, working with a wide array of stakeholders (e.g., federal, state, local, industry) to advance NG911 deployment. The timeline has created a shared goal for state and local 911 agencies; however, with limited funding, NG911 deployment may remain incremental.

There is consensus that additional federal leadership may be needed to support NG911 deployment and coordinate NG911 efforts.[42] There is also agreement that state and local entities should retain authorities over 911 services, including the timing of NG911 upgrades. An issue for Congress may involve determining the appropriate federal role in and support of NG911 deployment, in light of the longstanding state and local authorities over 911 services.

Funding

Stakeholders have cited limitations in funding as a barrier to NG911 deployment. In 2018, members of four key 911 organizations sent a letter to Congress seeking funding for NG911 deployment.[43] Stakeholders argued federal funding is needed to support migration to NG911, improve 911 services, and enable communications between 911 and public safety networks.

[37] FCC, *Legal and Regulatory Framework for NG911 Services Report to Congress*, February 27, 2013, https://www.fcc.gov/document/legal-and-regulatory-framework-ng911-services-report-congress.

[38] S. 2061.

[39] For more information on associations supporting 911 see https://www.911.gov/national911coordination.html.

[40] For more information see http://www.ng911now.org/blog/.

[41] See http://www.govtech.com/em/next-gen-911/The-NG911-Funding-Gap.html.

[42] U.S. Government Accountability Office, *Next Generation 911: National 911 Program Could Strengthen Efforts to Assist States*, GAO-18-252, February 23, 2018, https://www.gao.gov/products/GAO-18-252, p. 12.

[43] See http://www.theindustrycouncil.org/publications/Associations_Letter_to_Congressional_Leadership_re-NG911.pdf.

The FCC conducted an NG911 cost study in 2011, to estimate the cost associated with transitioning from a legacy 911 system to an NG911 system.[44] The FCC found (in 2011) that it would cost $2.68 billion over 10 years to provide the broadband connectivity to PSAPs needed for next generation architecture. It did not include estimates of the cost of new PSAP equipment, dispatch software, security software, personnel, training, which are expected to be substantial. For example, in Oregon, the cost of equipment, software, maintenance, and upgrades was estimated at $18 million (in 2011). In Tennessee, the cost of deploying the NG911 infrastructure (not including PSAP equipment) was estimated at $50-60 million.[45]

States and localities use multiple sources to pay for 911 services: grants, state and local funds, 911 fees on phone bills, and other revenue (e.g., traffic tickets). In most states, 911 fees are used to support current 911 operations; some states have diverted a portion of their 911 fees for other purposes.[46] Congress has called on states to stop diverting 911 fees, and has denied grant funding for those states that do.[47] For some states, the fees diverted exceed the grant amount; thus, there is no incentive to stop diverting.[48] The FCC has also called on states to stop diverting 911 fees, and to dedicate those funds to 911 improvements, including NG911.[49] Most states have noted that the revenue collected—$2.7 billion annually—cannot support both current 911 services *and* NG911 deployment (e.g., infrastructure improvements, equipment, personnel, training).[50]

Congress has supported 911 improvements through grant funding, but funding has been limited. In 2009, the National 911 Program Office awarded over $40 million in matching funds to states and localities to improve 911 services. Seventeen states invested in IP network implementation (i.e., ESInets). An additional $115 million was made available through P.L. 112-96 for 911 improvements; however, the funds represent a small portion of what it is expected to cost to deploy a nationwide NG911 network.[51]

P.L. 112-96 required the ICO, FCC, and DHS to conduct a report on costs for requirements and specifications related to NG911.[52] The purpose of the report was to serve as a resource for Congress as it considers creating a coordinated, long-term funding mechanism for the deployment and operation for NG911. The cost study is under review by the Office of Management and Budget (OMB), and, once released, may help to inform congress of future funding needed for NG911 deployment. Various possible funding options to spur investment in NG911 include:

- A one-time infusion of funding to spur NG911 deployment may help to accelerate investment in NG911, including IP-based infrastructure, equipment, personnel, and training. A one-time grant may help to upgrade some PSAPs, but may not provide enough funding to upgrade all PSAPs.

[44] See https://docs.fcc.gov/public/attachments/DOC-309744A1.pdf.

[45] See FCC presentation at https://transition.fcc.gov/statelocal/Next-Generation-911-Text-to-911.pdf.

[46] Ninth Annual FCC Fee Diversion Report, 2018, at https://www.fcc.gov/file/13693/download.

[47] Approximately $128 million or 5% of 911 fees were diverted; this number may be higher as seven states did not report.

[48] Congressman Chris Collins, "Collins and FCC Commissioner O'Rielly Call on New York to Stop Diverting Fees," press release, April 20, 2018.

[49] Matthew Perlman, "FCC's O'Rielly Want Action on States Diverting 911 Fees," *Law360*, March 2, 2017.

[50] U.S. Government Accountability Office, *Next Generation 911: National 911 Program Could Strengthen Efforts to Assist States*, GAO-18-252, 2018, p. 14, https://www.gao.gov/assets/690/689779.pdf.

[51] As a comparison, the nationwide public safety network received $7 billion in P.L. 112-96.

[52] P.L. 112-96, § 6508.

- Annual grant funds to support NG911 deployment may fund activities in state NG911 plans, support integration with other systems (e.g., FirstNet), and address other issues (e.g., planning, training). Funding provided over several years, with matching contributions, could incentivize states to invest in NG911 and enable PSAPs to better plan and prioritize improvements.
- Innovation grants which provide funding to entities pursuing innovative solutions for deploying NG911, including public-private partnerships, shared systems, regional investments, consolidation of PSAPs to achieve cost savings, cooperative purchasing agreements, and other innovative projects.

Funding is expected to remain a challenge throughout the migration. States and localities will need funding (e.g., existing 911 revenues from 911 fees) to support operational costs of 911 systems, as they are migrating to NG911. Once NG911 systems are installed, states and localities will need funding for personnel and training, education of the public, and integration of PSAPs with other systems (e.g., other PSAPs and FirstNet). While grants may help to accelerate deployment, grants are not intended to provide long-term sustainable funding for 911 system operations. Key considerations for Congress include ensuring that 911 fees are used for 911 services and improvements, 911 services are sustained during the NG911 build-out, and states and localities have long-term funding solutions for NG911 systems.

Technology—Interoperability and Security

The implementation of NG911 will require technical changes to 911 systems. Nationwide standards and policies may be needed to ensure state and local PSAPs will be interoperable, and can safely interconnect. Key issues that may require increased federal involvement in the deployment of a new nationwide NG911 system include interoperability and security.

Interoperability

The adoption of NG911 technologies will enable PSAPs to interconnect, changing the structure of the nation's 911 system from a set of disconnected state and local PSAPs to a nationwide system of connected PSAPs. Experts note that NG911 technologies and the ESInets that support them are hierarchical; connection will occur regionally at first, and then nationally.[53]

Currently, state and local 911 agencies decide on their own solutions, technologies, and vendors. With the emergence of NG911 as the path forward for state and local PSAPs, it is necessary for all involved (e.g., federal, state, and local governments, standards development organizations, and manufacturers) to adopt common technical standards that will enable interoperability.

The potential development of a single nationwide 911 network presents many policy issues for Congress. For example, to achieve the benefits of an interconnected system, PSAPs will need to use standards-based technology that will ensure interoperability. Currently, the standards are being developed through a consensus-based approach that incorporates the input of a wide variety of stakeholders. However, there is no requirement for state and local entities to purchase equipment that complies with those standards. Agencies can adopt technologies that suit their needs, or are more affordable, but that may not facilitate interoperability with other 911 centers.

Congress may consider actions that would encourage adoption of technical standards that will promote interoperability. Such options could include:

[53] NENA, *What is NG911?*, https://cdn.ymaws.com/www.nena.org/resource/resmgr/ng9-1-1_project/whatisng911.pdf.

- requiring state and local entities to comply with technical standards that promote interoperability, overriding state and local authorities over 911 services;
- authorizing federal grants to promote technical standards; and
- directing the ICO and its partner agencies to drive adoption of standards through current authorities (e.g., coordination with state and local leaders, grants, guidance, and FCC regulations related to certification of equipment).

NENA, an ANSI-accredited standards development organization (SDO), has developed standards for NG911, known as i3 standards. NENA's i3 standards were developed by consensus, and are widely accepted and supported by industry, public safety practitioners, and commercial partners. The i3 standards are not yet formally accredited, but are in the process.[54] The 911 community has appeared to adopt i3 standards, along with a suite of related standards; states that are moving forward on NG911 deployment have included the standard in their NG911 deployment plans and Request for Proposals.[55] However, adoption of i3 standards by state and local 911 agencies is not required, creating a risk that state and local NG911 systems will not be interoperable.

Interoperability is designed to enable PSAPs to serve as back-up to each other during power outages and disasters, creating redundancies in the nation's 911 system. To try to ensure PSAPs are interoperable, Congress may consider several actions:

- Include language in future legislation related to NG911 requiring compliance with "accredited," non-proprietary, consensus-based standards, to move NG911 standards toward accreditation.
- Insert language in federal grants funding NG911, requiring compliance with accredited standards to ensure federally-funded investments are interoperable.
- Extend the role of the ICO to support state and local purchases through joint purchasing agreements and language in RFPs that include NG911 interoperability requirements, and standards-based purchasing provisions.
- Encourage the development of a framework that facilitates cooperation between stakeholders and supports deployment of a standards-based NG911 system.
- The adoption of NG911 would enable PSAPs to connect with other IP-based public safety systems, such as FirstNet. A nationwide NG911 system could provide first responders with pictures, videos, and other data which could increase situational awareness, and improve response.[56] While integration with FirstNet is encouraged in P.L. 112-96, the two systems are being deployed separately. Stakeholders assert that 911 is not a stand-alone service, that "[it] is part of a larger emergency communications stakeholder community that includes emergency management, interoperable communications, first responders, communications service providers, and related entities at all levels of government,"[57] and should be integrated.

[54] National Public Safety Telecommunications Council (NPSTC), *APCO, NENA Emphasize Need for NG-911 Tech Interoperability*, Courtesy TR Daily, August 4, 2017, https://blog.npstc.org/2017/08/04/apco-nena-emphasize-need-for-ng-911-tech-interoperability/.

[55] VITA, *Commonwealth of Virginia Next Generation 911 Deployment Plan*, January 10, 2018, p. 9, at https://www.vita.virginia.gov/media/vitavirginiagov/integrated-services/pdf/2018-psc-/NG911DepApp01112018.pdf.

[56] The 9/11 Commission noted the lack of situational awareness caused by communication shortfalls in the 9/11 Commission Report. See https://www.9-11commission.gov/report/911Report.pdf, p. 315.

[57] Federal Emergency Management Agency (FEMA), "911 for a New Generation," blog entry, June 2, 2017.

Congress may require or encourage coordination between FirstNet and the federal agencies supporting NG911 to plan for the integration of the two systems as they are being developed, to realize the benefits of an interconnected NG911-public safety system.

Cybersecurity

As PSAPs are able to send data (e.g., photos), security risks are expected to increase.[58] There is risk that an attack on a PSAP could impact other PSAPs. There is risk that having a large concentration of sensitive information traveling through one network may increase the system's chances of being viewed as a target for cyberattacks. The President's National Security Strategy recognized a need to identify networks that may be vulnerable to attack, especially those networks where a single attack could have cascading and catastrophic consequences.[59]

Congress may leverage previous studies or commission a new study on NG911 network vulnerabilities to identify actions that can increase security of NG911 systems. The CSRIC has proposed continual network monitoring and information-sharing to mitigate vulnerabilities in wireless networks. Congress can also encourage or require 911 agencies to leverage the National Institute for Standards and Technology (NIST) Cybersecurity Framework, which promotes planning to identify, protect, detect, respond, and recover from cyber attacks. Experts assert that a combination of technologies, human solutions (e.g., training), and cybersecurity agreements between shared networks (e.g., PSAP and FirstNet) can help mitigate risks.[60]

While there is a national interest in promoting consistent cybersecurity policies across all PSAPs, there are no mechanisms in place to require state and local adoption of these best practices, which may present a risk to the NG911 network and the systems to which they interconnect.

Congressional Actions

A Congressional Next Generation 911 Caucus, led by Senator Klobuchar, Senator Burr, Representative Eshoo and Representative Shimkus, educates lawmakers, constituents, and communities about 911 issues. In the 115th Congress, two legislative actions were advanced:

Kari's Law of 2017 (P.L. 115-127) requires that multi-line telephone systems permit users to directly dial 911 without having to first dial 9 or any other code.

Next Generation 911 Act of 2017 (S. 2061) recognizes the transition to NG911 as a national priority, expands the ICO's authority, establishes an Advisory Board to advise on interoperability, creates a grant program, directs the FCC to study best practices in cybersecurity, and the Government Accountability Office (GAO) to study resiliency of PSAPs.

Conclusion

With the adoption of NG911 technologies underway, and the potential for a single nationwide system for 911, there may be a need for nationwide policies related to interoperability and

[58] Jon Schuppe, "Hackers Have Taken Down Dozens of 911 Centers. Why Is It So Hard to Stop Them?" *NBC News*, at, https://www.nbcnews.com/news/us-news/hackers-have-taken-down-dozens-911-centers-why-it-so-n862206.

[59] President of the United States, *National Security Strategy*, December 2017, p. 13, https://www.whitehouse.gov/wp-content/uploads/2017/12/NSS-Final-12-18-2017-0905.pdf.

[60] FCC Task Force on Optimal PSAP Architecture (TFOPA), *Cybersecurity and Next Gen Systems*, March 28, 2015, p. 14, https://transition.fcc.gov/pshs/911/TFOPA/TFOPA_WG1_Cybersec_Next-Gen_Systems-042915.pdf.

security to ensure the effective deployment of NG911 nationwide. Issues for Congress may include current federal roles and responsibilities, funding options, and technology policies that could advance the deployment of NG911 while considering longstanding state and local control over 911 services.

Author Contact Information

(name redacted)
Analyst in Telecommunications Policy
[redacted]@crs.loc.gov , 7-....