The Future of 9-1-1

A Look Into the Next Generation of Emergency Services

Addressing lawmakers in July 2016, Federal Communications Commission (FCC) Chairman Tom Wheeler made clear that emergency dispatch centers across the country need support, and they need it now. “Unless we find a way to help the nation’s PSAPs overcome the funding, planning, and operational challenges they face as commercial communications networks evolve,” said Wheeler, “NG9-1-1 will remain beyond reach for much of the nation. Let me be clear on this point: 9-1-1 service quality will not stay where it is today, it will degrade if we don’t invest in NG9-1-1.”

He’s right. Despite incremental progress made in recent years, the collective effort to revamp 9-1-1 services across the country, known as Next-Generation 9-1-1 (or NG9-1-1), now hinges on whether or not public safety answering points (or PSAPs) can adapt to the digital demands of the 21st century. As of August 2016, there are 5,893 registered PSAPs in the U.S. responsible for fielding approximately 240 million 9-1-1 calls each year.2

But the National Highway Traffic Safety Administration (NHTSA) estimates that only 10 percent of those dispatch centers have made the leap to NG9-1-1 by switching from analog to IP-based systems, giving their centers the ability to receive and act on digital information (e.g., text, photo, video) sent during an emergency.3 In an age where over 70 percent of 9-1-1 calls originate from wireless phones, this presents major challenges to a 9-1-1 infrastructure still heavily reliant on landline-based systems and policies dating back to the 1960s.4

Many public safety leaders recognize the critical urgency of the situation, but are overwhelmed by what seems to be a complex migration process demanding not just more funding, but also technological expertise, effective governance, and new operational insights into a rapidly changing industry. This issue brief explores these legitimate concerns in detail and provides insights for how state and local agencies can address them when upgrading their PSAP capabilities.

The Current State of NG9-1-1

A nationwide survey of PSAP employees published in August 2016 reported that 67 percent of PSAPs had experienced at least one outage in the past 12 months.5 Meanwhile, 13 percent reported five or more outages in the same span of time. In an industry where seconds lost can mean the difference between life and death, it is critical that life-saving technology
supporting our first responders performs at the highest level. As these findings indicate, however, the majority of PSAPs still run on antiquated analog systems that are incompatible with today's mass communications era.

This is problematic on several fronts. In the event of a natural disaster, for example, PSAPs may go offline because their systems cannot handle the massive stream of calls emanating all at once from different locations. Even when systems are online, many PSAPs still lack the capability to receive any information beyond standard phone calls as the systems they use were designed in the pre-Internet age. This means that in hostage situations involving an active shooter, a large portion of the populace would still be unable to text their local PSAPs for help even though the alternative of calling in carries a strong risk of drawing the shooter’s attention.

NG9-1-1 aims to fix these shortcomings by replacing existing legacy systems with Internet Protocol (IP)-based systems that both enable receipt of new types of media and allow for immediate, automatic distribution of 9-1-1 calls to other PSAPs in the event that calls overload one center. If integrated correctly with other next-gen technology, it can also provide PSAPs more freedom to share information with other PSAPs, more context to inform medical and police units responding to the call, better location accuracy through geographic information systems (GIS), and smarter prioritization of services.

Currently, many states, cities, and counties are already in the process of building their Emergency Services IP networks, but as of July 2016, it remains the case that 80 percent of American counties still lack text-to-9-1-1 functionality and 20 percent of call centers don’t have a backup PSAP for routing calls in case of natural disaster. Although progress is being made, a number of challenges standing in the way means PSAPs will need to seek out a range of allies for assistance.

#1: Stronger, statewide leadership is needed
Many NG9-1-1 advocates say that state IT departments should have a greater role in overseeing next-gen adoption. Even though Congress authorized the creation of the First Responder Network Authority, or FirstNet, in 2012 to become the nation’s first interoperable public safety network, it has largely relegated oversight of NG9-1-1 implementation up to states and local municipalities. While some states - like Indiana, Iowa, Maine, and Vermont - have seized the occasion and overseen a statewide transition to next-gen systems, other states - such as Georgia, Missouri, Nevada, and West Virginia - have provided limited to no oversight, deferring to counties to adopt as they see fit. This raises concerns that without state or federal funding and oversight, municipalities with tighter budgets and less IT expertise may be left behind in this new surge of NG9-1-1 adoption.

In the state of Colorado, for example, 9-1-1 services are almost entirely locally managed. Daryl Branson, executive director of the nonprofit Colorado 9-1-1 Resource Center, says “that presents some challenges for local-control states when they want to try to transition to a type of network that is regional or statewide in nature [later on], which is what NG9-1-1 would be.” At the same time, this doesn’t mean states need to micromanage every step along the way. According to Laura Flaherty, coordinator of NHTSA’s 9-1-1 Program, state IT shops will be most helpful by serving as intermediaries between local and federal efforts, providing regional oversight of PSAPs as they interface next-gen technology with FirstNet’s national broadband capabilities. That involves opening lines of communication that have previously been missing in 9-1-1 reform efforts.

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“Very often, the people managing 9-1-1 systems and the IT folks didn’t talk as these were set up, so there’s a need to come together,” says Bernie O’Donnell, director of communications services for Connecticut’s Bureau of Enterprise Systems and Technology. O’Donnell is well qualified to speak on the subject, having learned from her own state’s experience earlier this year. In July, Connecticut’s newly deployed NG9-1-1 platform experienced a service outage its provider AT&T later diagnosed as a “processing capacity” error. The result was a public relations blow, with many citizens doubtful the new 9-1-1 service could deliver on its lofty promises. It is likely that greater coordination earlier on between the state’s IT bureau, PSAP staff, and AT&T could have averted the error.

Fortunately, more states are stepping up to the plate, providing much needed leadership and coordination. In November 2016, Oklahoma passed legislation to create a state 9-1-1 coordinator to lead its next-gen implementation. Oregon likewise has a designated leadership office coordinating its Enhanced 9-1-1 program, plus a specially designated PSAP relations analyst to act as personal liaison between state IT and local dispatching bodies.

#2: Next-gen tech demands a next-gen workforce
The move toward NG9-1-1 doesn’t only involve next generation technologies, it includes numerous logistical challenges as well -- chiefly, the training of PSAP personnel and provisioning of new next-gen specialists. As NG9-1-1 opens the possibility of live conversations between citizens and dispatchers through video chat, agencies will need to provide their employees with the emotional intelligence to handle the challenge of potentially receiving graphic imagery in real-time life or death situations.

Jena Swafford, a former public safety dispatcher for the Sacramento Police Department, is a strong advocate for next-gen training. Drawing on her 17 years as an emergency dispatcher, Swafford developed a training curriculum for the Los Angeles County Regional Training Center that instructs first responders on how to deal with the emotional impact of viewing images or videos of crime as they happen in real time. In her words, “emotional intelligence training for dispatchers would help them learn about themselves, their biases and triggers, and how those impact their interactions with citizens, co-workers, and the officers in the field.”

From an operational perspective, PSAP staff will also need to learn how to navigate next-gen enhancements. The surplus of digital data, combined with new features like GIS, automatic routing for language translation, alarm monitoring operations, and automotive telematics, will place more technical responsibilities on PSAP employees and may necessitate having more specialized IT professionals on site. For agencies and dispatchers lacking the IT expertise or learning materials to guide this training, it’s another opportunity where a skilled industry partner can play a valuable, complementary role in the transition.

#3: Establishing strong cybersecurity is critical
As more PSAPs gain NG9-1-1 functionality and share increasingly greater amounts of data with each other and the public, the emergence of cybersecurity threats are certain to follow. To avert the worst attacks, some government leaders have requested that Congress safeguard PSAP IP networks under the Department of Homeland Security’s “Einstein” program, channeling funds to create intrusion detection sensors that monitor illicit activity on NG9-1-1 networks. But pending Congress’s decision on the matter, many PSAPs can’t afford to wait for the national initiative to take effect.

Every day, more apps continue to be made that citizens gravitate to on account of their perceived superiority over existing PSAP capabilities. But the lack of regulation over such apps leaves them susceptible to sophisticated cyber threats and shoddy functionality. In Douglas County in Omaha, Nebraska, the proliferation of these apps and their acceptance among users has resulted in inaccurate location reporting or the display of multiple locations all stemming from one incident.

Distributed denial-of-service (DDoS) attacks are another hazard on the horizon. As PSAPs acquire greater connectivity with police departments, fire departments, wireless devices, and hospitals, they also become a more lucrative target for hackers looking to infiltrate all these institutions at once. According to Jay English, director of 9-1-1 services for the Association of Public-Safety Communications Officials (APCO), the connectivity produces a complexity that is scary, but not insurmountable.

"Not only do you have the 9-1-1 inbound traffic, you also have the computer-aided dispatch [CAD] system, [plus] records management systems for all the agencies that tie into that CAD," says English. "[So] all of a sudden you have end-to-end IP networks and end-to-end vulnerabilities." He believes that PSAPs can improve their defenses by sharing threat information with other PSAPs and federal cyber-defense entities. Many third party contractors also specialize in providing cybersecurity to bolster NG9-1-1 capabilities.

**#4: The hunt for funding**
However, as states and municipalities move to implement NG9-1-1 largely on a jurisdiction-by-jurisdiction basis, some governments are struggling to procure the necessary funds to make such technological improvements to their emergency services. Historically, funding for PSAPs has largely come from landline service fees collected by local telephone companies, but the last decade alone saw landline revenue fall 45 percent as consumers cancelled contracts in favor of cellular plans.

Budget challenges also differ on a state-by-state basis. In most states, the state government controls the expenditures of funds collected from these 9-1-1 surcharges, whether collected from landline or wireless subscribers. However, in states like Missouri, Illinois, and Nevada, at least some if not all of the surcharge revenue is controlled by local jurisdictions, limiting statewide adoption efforts. Moreover, a 2013 report by the Government Accountability Office found that just 16 states devoted a portion of their 9-1-1 funding to NG9-1-1-specific projects in the same year.

Despite these obstacles, Texas is one state that’s used federal funding wisely for NG9-1-1 reform. A recipient of grants from both NHTSA and the National Telecommunications and Information Administration (NTIA), Texas has created a comprehensive roadmap for cities and municipalities to follow in pursuing an "open, dynamic, standards-based NG9-1-1 environment." It’s also invested in the construction of a master geospatial database that can track emergency statistics from over 200 counties.

State and local public safety leaders should continue to press lawmakers for bi-partisan support of NG9-1-1 implementation. However, as this process can take time, agency leadership may find it more expedient to seek industry assistance when kick-starting the process. Not everything must be accomplished overnight; as many states and cities have discovered, it pays big to start small.

**Looking Forward**
The technology capabilities of NG9-1-1 promise more effective and efficient emergency response services for citizens. Indeed, many early adopters have already begun innovating ways to go above and beyond with these new tools, from data analytics insights to
reactive systems that can instantaneously add network bandwidth during major crises.\textsuperscript{25}

The new functionality NG9-1-1 can bring can seem daunting, but many resources are available to point agency leaders in the right direction. What is critical is that state and local leaders approach NG9-1-1 as more than just a technology transition; fundamentally, it’s a shift in thinking about how state and local leaders can collaborate with PSAPs, industry experts, and federal agencies to deliver the kind of life-saving technology Americans expect from the 21st century.

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