

ANSWERING THE NEW CALL FOR HELP

HOW PUBLIC SAFETY AGENCIES AROUND THE GLOBE
ARE PREPARING TO ANSWER THE EVOLVING CALL FOR HELP
WITH NEXT GENERATION PUBLIC SAFETY SOLUTIONS

06:43:17



A DRIVING RAINSTORM, A TERRIBLE CRASH ON THE AUTOBAHN

All six occupants of the two vehicles involved are seriously injured, and the driver and front seat passenger in one car are unconscious. None of the victims is capable of making an emergency call for help. Fortunately, other motorists are passing by. From one car, a passenger texts a message for help from a tablet computer. In another car a passenger uses a cell phone to send video of the scene to the PSAP. Location data from the devices provides dispatchers with the exact location of the accident. First responders know precisely where to go, and dispatchers know the type of backup that will be needed. EMTs have a good idea of the seriousness of the accident and what they'll need to do upon arrival, saving precious seconds as they treat the injured.

A next generation of emergency calls for help is on the horizon, providing more communications flexibility, more information and more multimedia details that will help shorten response times, increase efficiency, optimize effectiveness... and save lives.

THE NEED FOR CHANGE

Whether the number is 9-1-1, 9-9-9 or 1-1-2, emergency call systems are one of the world's most crucial public safety applications. Young or old, rich or poor, city or country, every citizen counts on being able to call for help whenever they need it. More important, they count on receiving that help as quickly as possible. For the last 30-plus years, our emergency call centers have aided millions of people and helped save countless numbers of lives. But times — and communications technologies — are changing rapidly. The old reliable systems that have served us so well for so long are beginning to show their age. More powerful, more effective new systems are on their way, inexorably driven by a convergence of social, technological and economic trends.

COMMUNICATIONS EXPECTATIONS

Communications are in the midst of a startling worldwide revolution. It wasn't so long ago that mobile phones were the ultimate in high-tech communications. Today, those days seem like the dark ages. People don't use their new smartphones and other devices just for talking anymore. They text. They tweet. They send photographs. They upload videos. It's only natural that they expect to be able to call for emergency help in the same ways they communicate every day. But that's easier assumed than done.

OLD AND IN THE WAY

The Internet is transforming how we communicate. Internet-based communication is fast becoming the new standard virtually everywhere in the world. As it does, the legacy Public Safety Answering Point (PSAP) infrastructure that has served our communities so well for all these years is fast becoming not just old, but is actually getting in the way of necessary change. Traditional equipment is quickly becoming obsolete and it's limiting the ability of today's PSAPs to begin leveraging the substantial benefits of new Internet Protocol (IP)-based technology.

THE IP REVOLUTION

Today, virtually all PSAPs utilize older narrowband, circuit switched communication networks generally capable of delivering only voice messaging. Enhanced systems in some countries are also able to carry a limited amount of data, like the caller's location. But they aren't able to support the astonishing new abilities of all-IP networks.

Next generation emergency call networks employ IP-based packet switched technology and are able to support powerful new capabilities including emergency text messaging and the ability to send and access more robust data including images, documents and even video. They also allow PSAP personnel to easily access valuable supporting data ranging from medical records to telematics to building plans over a common high-speed data network. Just as important, they enable streamlined new interoperability between agencies and jurisdictions to promote collaborative responses in emergencies. This critical need for this interoperability has been shown in emergencies ranging from the World Trade Center, Mumbai and Oslo to the Indian Ocean Tsunami and the recent earthquake in Japan.

DOING MORE WITH LESS

Today's uncertain fiscal environment is another force dictating change in PSAP operations. The realities of public funding have already put most public safety agencies in the position of having to do more with less, i.e. fewer personnel and fewer dollars. Economics are also driving other major changes such as the growing trend of PSAP consolidation. One of the best ways of doing more with less is optimizing the use of advanced IP-based communications technology. These new technologies will not only enable faster and better response, they will also help agencies control costs by controlling their own data, eliminating the high costs of accessing information from third parties.



"The transition to a broadband-enabled NG9-1-1 network is of critical importance to our nation because it will ensure that our 9-1-1 dispatchers, first responders and the public have the ability to take advantage of the most advanced communications tools. Unfortunately, the legacy 9-1-1 system is unable to accommodate many of the new capabilities of mobile devices, such as the ability to transmit and receive photos, text message and video. As a result, the nation's 9-1-1 system is in need of a significant overhaul."

Rear Admiral (ret.)
James Arden Barnett, Jr.
Chief of the Public Safety and
Homeland Security Bureau
United States Federal
Communications Commission

THE NEXT GENERATION

In almost every country in the world, these are the issues driving the need for next generation emergency calling systems. Using the NG9-1-1 initiative in the United States as an example, this overview will explore the technologies, the benefits and the current status of next generation solutions.

NG9-1-1, DEFINED

What exactly is NG9-1-1 — and by extension, next generation 9-9-9, 1-1-2 and other systems? The NG9-1-1 initiative in the United States kicked into high gear in 2006 when the Department of Transportation decided to study the existing 9-1-1 infrastructure to determine how it could be adapted to support the mobile communications revolution. Other organizations, such as the National Emergency Number Association (NENA), have been working on the issues even longer. Fundamentally, NG9-1-1 is a standards-defined initiative dedicated to enhancing emergency calling systems in the era of mobile communications. Formally, according to NENA, “NG9-1-1 is the evolution of Enhanced 9-1-1 to an all-IP-based emergency communications system.” NG9-1-1 networks also, according to NENA, are comprised of a “set of network elements, software applications, databases, CPE components, and operations and management procedures required to provide next generation emergency services.”

INTRODUCING THE ESINET

Vital components of NG9-1-1 include the Emergency Services IP Network, or ESInet, which uses broadband IP-based packet switched technology to replace legacy circuit switched networks. NG9-1-1, including the ESInets component, is standards based and compliant with a wide range of international standards. The system uses a services-oriented architecture (SOA) and is software and database driven, providing dispatchers and first responders with immediate access to both internal and external sources of data. NG9-1-1 fulfills the promise of next generation communications by providing the ability to support both voice and non-voice multimedia, such as text, photos and video.

BETTER HELP, FASTER

Why do citizens and PSAPs need NG9-1-1? They need faster and better emergency calling service because this leads to faster and better response. Crucial needs addressed by NG9-1-1 begin with the faster receipt of more robust data by the PSAP. Bottom line, PSAPs need to be able to take advantage of the richer forms of information provided by today’s communication devices and networks in order to do their jobs even better than they do them today. That includes receiving and using more useful forms of information such as text, images, documents and video from any and all networked communications devices.

NG9-1-1 systems are also necessary for enabling better and more coordinated multiple agency operations and support. NG9-1-1 systems optimize the aggregation and sharing of data, resources, procedures, and standards, which helps to improve emergency response. They promote increased collaboration and partnership within an agency and throughout the emergency response community. In terms of economics, next generation emergency calling systems can help reduce overall capital and operating costs. Equally important, they can make demonstrably more effective use of available public funding, providing taxpayers with easily understandable value for their money.

MORE VALUE FOR THE TAX DOLLAR

NG9-1-1 systems are designed to deliver more than just exceptional service and enhanced safety. They’re also designed to provide exceptional value. NG9-1-1 systems have greater potential to meet the public’s expectations for accessibility than the current 9-1-1 environment. Being able to text for help or upload a cell phone photo of flames coming out of a building are capabilities taxpayers from virtually anywhere in the world can easily understand and appreciate. In addition, NG9-1-1 offers new opportunities for cost savings, cost avoidance and increased operational efficiencies. It offers enhanced control of call management, network and data, and maximum scalability and flexibility. Bottom line, NG9-1-1 has exceptional potential to increase public and first responder safety through advanced interconnectivity and interoperability.



“NG9-1-1 is the evolution of Enhanced 9-1-1 to an all-IP-based emergency communications system.”

[National Emergency Number Association \(NENA\)](#)

NEW ESINET-ENABLED CAPABILITIES

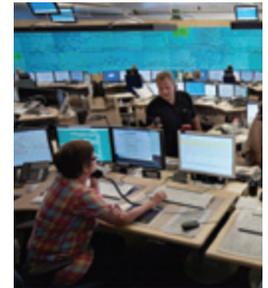
NG9-1-1 solutions are crucial to opening a new era of efficiency and effectiveness in answering and responding to next generation citizen calls for help. The first capability an NG9-1-1 system needs is the ability to continue to provide all functionalities of existing basic 9-1-1 and E9-1-1 systems — for both callers and PSAPs — even as the system changes from circuit switched technology to an all-IP framework. All present services need to be seamlessly supported; in matters of life and death, no service dropouts of any kind can be tolerated.

But NG9-1-1 systems go far above and beyond current systems' abilities, adding advanced capabilities that enable PSAPs to capitalize on the technology advancements of today and tomorrow. The ESInet leverages today's high-speed IP-based networks and NG9-1-1 applications deliver powerful new capabilities that will transform call management efficiency, enable faster, more effective responses and maximize public and responder safety. Added capabilities that NG9-1-1 brings include:

- **SUPPORT FOR NEW COMMUNICATIONS TECHNOLOGIES.** NG9-1-1 enables citizens in emergencies to reach the PSAP by virtually any method or available communications technology, enabling emergency calls to be placed from any networked device from laptop to tablet to smartphone. The system also supports the delivery of data in virtually any form; enabling the call for help to do more than just alert first responders to

a problem, which ultimately makes call handling easier. NG9-1-1 systems can also deliver better and more useful information that can help speed and optimize response, including data files such as building plans or electronic medical records, and images, photos and even streaming video.

- **GIS-BASED CALL ROUTING FLEXIBILITY.** NG9-1-1 systems use advanced GIS-based (i.e., caller location based) routing control that no longer relies on Selective Router databases to route calls, or ALI databases to locate callers, but dynamically transports caller location data with the call. This enables calls or messages to be routed automatically to the most appropriate PSAP, saving time-consuming re-routing and pinpointing the caller's location to virtually the exact spot, even if the caller is incoherent or unable to speak. Responses can be faster and more appropriate, helping to save time, effort and lives.
- **ADDED INTEGRATION AND INTEROPERABILITY.** NG9-1-1 systems provide advanced interconnectivity with other emergency and public safety agencies and jurisdictions, which enhances response collaboration and coordination. With appropriate access controls, the system will enable other entities to receive calls and data sent by the NG9-1-1 system, and to acquire and pass data between all parties.



"Next generation public safety systems are based on the use of all-digital IP broadband technology. The introduction of these advanced, modern technologies to facilitate richer inbound requests for help from the public and outbound communication from the command center (PSAP) to the first responders, as well as within PSAPs themselves, provides a level of flexibility and functionality to public safety systems that will enable them to be able to handle multimedia and other new forms of communication in a way that meets the emerging requirements of both public safety and the public."

Bob Smith
MSSI Vice President,
Global Services
Motorola Solutions

BENEFITS OVERVIEW

Next generation emergency call systems enable public safety agencies to capitalize on today's technology advancements, and help position them to continue to take advantage of new communications technology as it continues to evolve and improve. They enable emergency calls for help from any networked device, mirroring how citizens communicate in their daily lives. They provide faster delivery of calls and call data, which includes more accurate and more useful information such as real-time texting, photos and other images, video and data files ranging from electronic medical records and location histories, including details from previous incidents. At the PSAP level, NG9-1-1 establishes more flexible, secure and robust operations, featuring increased capabilities for sharing data and resources, and more efficient procedures. It also provides the interoperability that enables intra- or inter-PSAP call access, transfer and backup to optimize response and maximize safety.

NG9-1-1 BASICS

In North America, NENA has worked hard to develop NG9-1-1 standards that will help guide this fundamental update to existing 9-1-1 and E9-1-1 systems. According to NENA, “The NG9-1-1 technical specification, commonly known as i3, defines an Emergency Services IP Network (ESInet) as a network designed to work as an IP-based ‘network of networks’ shared by all agencies involved in an emergency.”

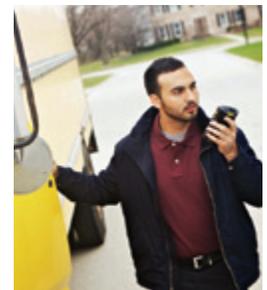
DIFFERENCES FROM 9-1-1

An NG9-1-1 system begins with ESInet connectivity, but there are a great many other, additional capabilities that separate true next generation systems from legacy systems. These include GIS data creation to populate multiple databases, including geospatially controlled IP-based call routing functions. “Next generation systems will be able to route calls — and facilitate the transfer of all the relevant data associated with the call — directly to the most appropriate PSAP using very accurate real-time location data provided by the device itself or by the originating network to which it is connected. This represents a ‘sea change’ in how emergency calls are routed and will greatly improve call routing and emergency dispatch beyond today’s state-of-the-art ALI systems,” says Bill Mertka, offer manager NG9-1-1, Motorola. NG9-1-1 will allow additional data acquisition to provide first responders with richer, more detailed multimedia information about callers and incidents. NG9-1-1 also includes system monitoring, troubleshooting, maintenance and

discrepancy reporting functionalities, and enables connection and collaboration between ESInet-connected agencies. In one way, NG9-1-1 does not differ from 9-1-1 at all; to ensure smoother, safer transition, NG9-1-1 systems support all existing 9-1-1 or E9-1-1 functionalities.

WHAT DOES NG9-1-1 LOOK LIKE?

Next generation emergency call network architectures will differ extensively from today’s systems. As envisioned by NENA, for example, an NG9-1-1 system employing an ESInet-based architecture will use this IP-based “network of networks” shared by all agencies — locally, regionally and nationally — that may be involved in an emergency, rather than being dependent on inflexible dedicated analog trunk networks like today’s legacy systems. According to NENA, “If every local ESInet is interconnected with its neighbors, any agency anywhere in the country can connect with any other agency, if authorized.” Further, as the organization notes, “i3 PSAPs are inherently multimedia, accepting voice, video and text calls for help.”



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Bill Mertka

Offer Manager NG9-1-1

Motorola Solutions

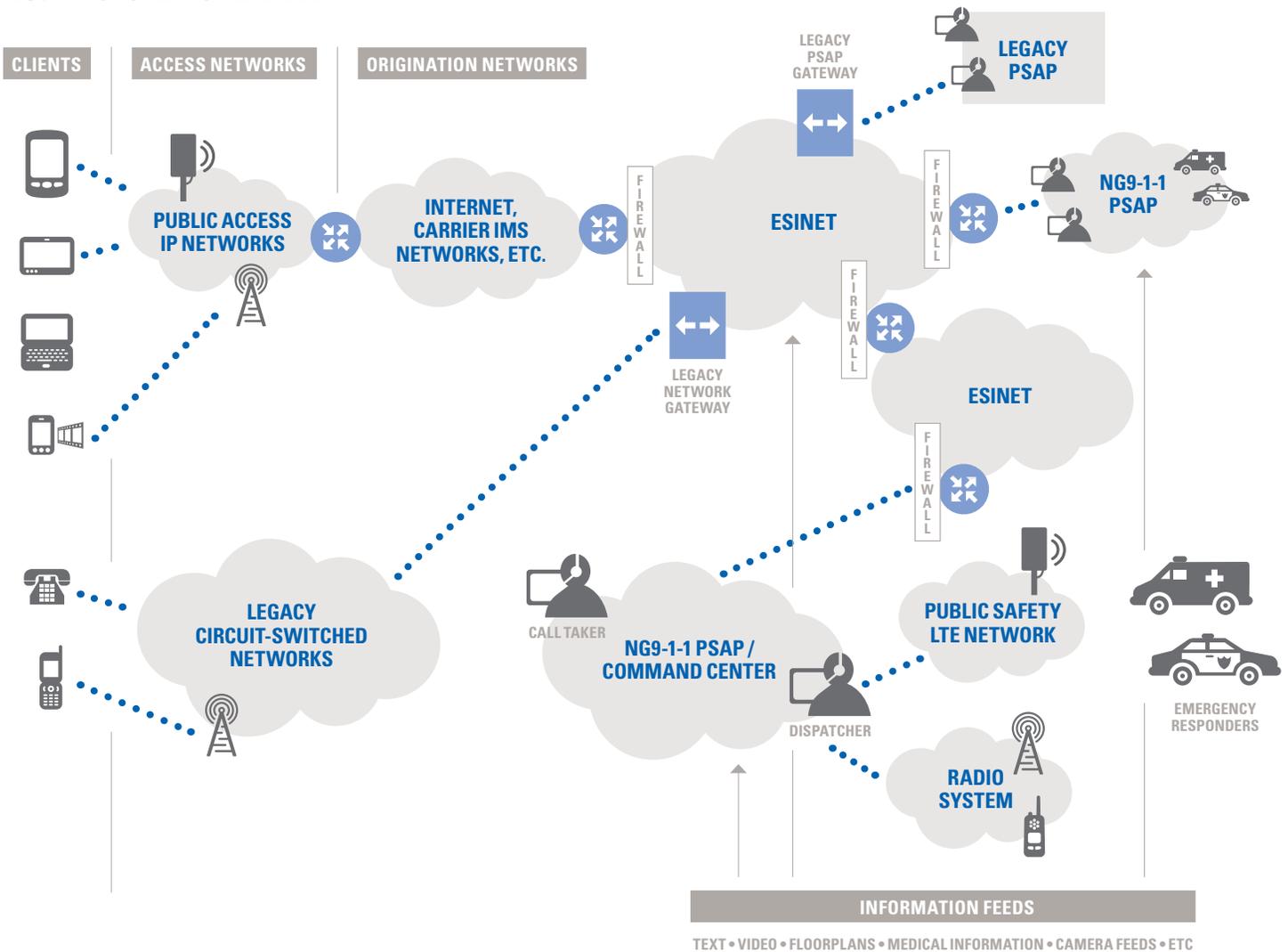
Member, NENA ICE Steering Committee; Chair, ICE 1 and ICE 2 Planning Committees; Vice-Chair, ICE 3 and ICE 4 Planning Committees

E9-1-1
Complex analog trunking and data network
Class 5 switch for Selective Router
Translation based control
Limited to voice calls
Data bandwidth 20 char (digits)
Complex Emergency Gateway Network for VoIP
Custom interfaces for each service type

NG9-1-1
Engineered, managed IP networks (ESInet)
IP software selective routing
GIS and database controls
Voice, text, video
Bandwidth unlimited
Direct handling of Internet sourced calls
Standard IP interface for all service types

Source: National Emergency Number Association

NG9-1-1 SYSTEM OVERVIEW



CHALLENGES TO OVERCOME

As NG9-1-1 systems move quickly from concept to reality, public safety agencies of all sizes are facing a number of challenges. One is both strategic and urgent; planning for NG9-1-1 should not be put off until “later.” Strategically, public safety agencies need to understand that NG9-1-1 and other next generation emergency call systems are inevitable and are available today. That means they should become the major focus of both strategic and tactical planning by agencies at all levels, state, regional, and local.

Another challenge is equipment-driven. Whether an agency has a two-seat or a 200-seat PSAP, it will want to ensure that new equipment purchases or upgrades are capable of supporting next generation systems. The technology is now available to public safety entities, ensuring that

when NG9-1-1 is fully in place, they’ll be able to gracefully adopt it using software-centric — as opposed to complete system forklift — upgrades. PSAPs must also begin planning to meet challenges such as evolving regulations and jurisdictional impact. If, for example, multiple services are on the same ESInet sharing usage and costs, the question of who’s in charge must be resolved.

Economics can also be challenging. Costs, especially during the transition period, can be relatively high, but there are many mitigating factors, such as better price performance as system geography increases. In addition, regulatory agencies around the world are recognizing the need for the transition to next generation calling systems and are looking favorably toward providing funding.

GETTING THERE FROM HERE

Where does NG9-1-1 stand today? It's advancing rapidly. As individual public safety agency develop their plans, the system is being tested by NENA in collaboration with a coalition of stakeholders, including vendors, government users, other industry associations and experts, and NENA technical leaders and senior staff. Even as testing continues, next generation systems are already being deployed in the real world by a growing number of early adopters. Other global entities concerned with next generation public safety will be implementing their own testing programs in the near future, testifying to global interest in next generation emergency call taking and other next generation command center solutions.

NENA NG9-1-1 ICE TESTING

Today, through a series of Industry Collaboration Events (ICE), NENA is working with a wide range of vendors and other interested parties to test next generation systems. Each ICE test is focused on a specific area. The first test brought together vendors involved with delivering NG9-1-1 technologies that locate, route and answer IP emergency calls. The second ICE focused on defining elements that will facilitate the migration from legacy systems to next generation systems. Other test areas have included, or will include, location information, supplemental data, emergency call services for the hearing impaired, recording and logging devices and more. ICE tests are planned as an ongoing series that will give new vendors or those with new technologies and solutions the opportunity to verify compatibility and interoperability.

READY FOR PRIME TIME

One of the most prevalent myths regarding the establishment of next generation PSAPs is that existing centers won't be ready for transition until "sometime in the future." The fact is, the time to start the transition to NG9-1-1 is now. What can agencies do right now to pave the way for NG9-1-1? First, they should realize that next generation calling systems are not a nice-to-have, they are need-to-have. Second, if they haven't already started planning for the transition, they're probably behind. Finally, they should know that next generation technology is available today. Whenever a technology purchase or upgrade is necessary, all public safety entities should think twice before purchasing outdated last generation 9-1-1 equipment.

Bottom line, next generation emergency call technology is ready today, and it's definitely not too early to begin preparing to answer the Call for Help.



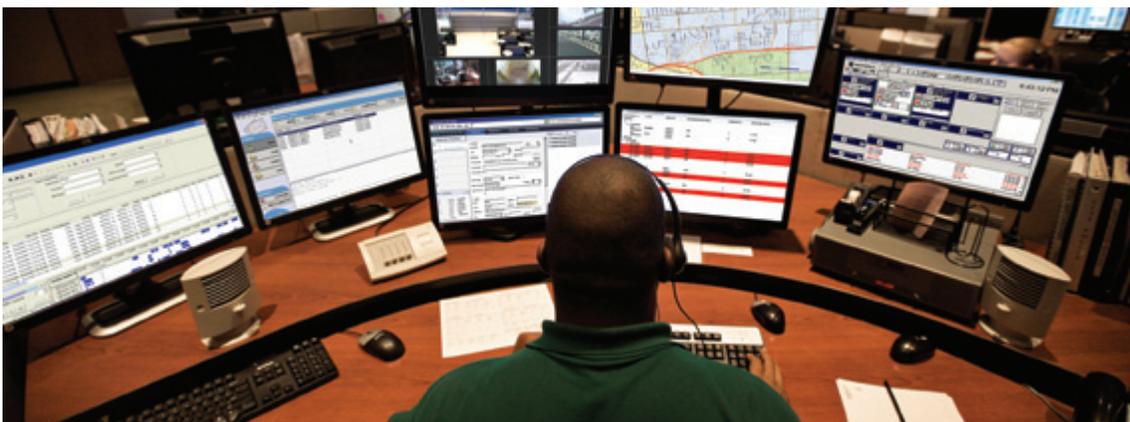
"As they progress, NENA ICE events are involving an ever growing number of NG9-1-1 systems vendors. The events represent the first serious effort to put nascent NG9-1-1 standards to the test by bringing together vendors building to these standards to see whether their equipment actually works together. The fact that the events to-date have been so successful is a testament to care and thoroughness taken to develop the standards, and they clearly demonstrate that the basic core NG9-1-1 systems are 'ready for prime time.'"

Bill Mertka

Offer Manager NG9-1-1

Motorola Solutions

Member, NENA ICE Steering Committee; Chair, ICE 1 and ICE 2 Planning Committees; Vice-Chair, ICE 3 and ICE 4 Planning Committees



MOTOROLA'S END-TO-END VISION FOR NG9-1-1

At Motorola, we've been proud to serve and partner with public safety agencies for more than 70 years. We are a global leader in mission critical network design and engineering, and we are a valued presence in PSAP command centers all around the world. NG9-1-1 is part of Motorola's vision for end-to-end solutions that support next generation public safety. We provide NG9-1-1 expertise, strategy, technology and services, and our standards-based next generation solutions are designed and engineered to give our customers maximum operational flexibility and — especially important — control over their next generation 9-1-1 and other public safety systems. Our next generation vision is one of innovation. We support NENA and other global standards bodies, and we are at the forefront of providing vendor-agnostic and technology-agnostic systems that leverage LTE and other high-speed technologies to deliver end-to-end interoperability and enhanced first responder and community safety.

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