9-1-1: THE NEXT GENERATION

NENA's Blueprint Steers 9-1-1 Into The Future

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- NATIONAL EMERGENCY NUMBER ASSOCIATION

In the past 15 years, innovations in communications technology have created the need for a more advanced system for the public to access emergency care. While the existing E9-1-1 system has been a success story for more than 30 years, technological advances have stretched it to its limit. New wireless and IP-based devices that are capable of delivering messages via text and video are being developed and utilized at a steadily increasing rate, thus greatly expanding the need for 9-1-1 centers to be able to accept these and other sources of emergency data.

According to a recent survey, it is estimated that between 23 and 37 % of US wireless subscribers will use their cell phone as their primary communications device by 2009. Research also suggests that today's more than seven million residential VoIP subscribers will turn into a staggering 27 million by 2009.

In addition to the proliferation of new devices and data sources, local and wide area wireless networks are allowing the public to communicate wirelessly from more locations. Some cities, including San Francisco and Philadelphia, are in the process of developing citywide WiMax networks that will enable residents to communicate via IP-enabled devices from anywhere in their metropolitan area.

Unfortunately, the current 9-1-1 system was never intended to receive calls and data from these new devices or deal with the increasingly mobile public. As a result, it is being asked to perform functions it was not designed to handle. In short, the nation's 9-1-1 systems are in need of a significant overhaul if we wish to keep pace with technological advances and public expectations.

Applying new technologies to emergency communications offers significant opportunity but also presents major challenges to the 9-1-1 community. When examining the ever-changing communications landscape, the critical need for an IP-enabled Next Generation 9-1-1 (NG9-1-1) system, one that is able to adapt rapidly to new technology and support new devices, becomes apparent. Such a move, from today's 9-1-1 system to NG9-1-1, requires a national focus on key technical, operational, and legislative issues.

STÉPHANE BRUNET

A 4-alarm fire tore through a bar on St-Laurent boulevard, in Montréal's Plateau Mont-Royal district at 5AM, quickly spreading to apartments on the building's second and third floors. 80 firefighters from the Montreal fire department battled the flames for several hours. No injuries occurred during this fire, despite several hurried self-evacuations. Incidents like this generate plenty of 9-1-1 calls - over a variety of technologies; the challenge for 9-1-1 centers is in properly receiving and locating the call for dispatch.

MARK C. IDE

Baltimore County (MD) firefighters and medics prepare to transport a patient from an auto accident. With the myriad of delivery methods for callers to reach the 9-1-1 center, tomorrow's PSAPs will need next-generation solutions – today.

WHAT IS NG9-1-1?

Presently, the "emergency response community" includes public and private organizations that need to share emergency information, including, but not limited to, police, fire, EMS, 9-1-1, emergency operations centers, hospitals, clinics, public health agencies, transportation agencies, public works departments, and utilities. One serious deficiency in existing emergency communications systems is that emergency response agencies are generally isolated from each other and have trouble making potentially critical information available to each other in a timely manner. Enabling interoperable networks and systems for voice, data, and radio among these emergency response entities is a fundamental objective for the NG system.

NENA's 9-1-1 Future Path Plan in 2001 and a 2003 technical policy statement proposed a hierarchy of interconnected local, regional, and national IP networks that would enable NG9-1-1 and many other emergency communications applications to interact. The resulting NENA-Internet Engineering Task Force (IETF) model is a set of coordinated applications on an IP internetwork that serves multiple governmental functions and seamlessly interfaces voice and electronic data. In addition to improving response for daily emergencies, such a model would also improve homeland security by providing a nationally coordinated emergency response system.

Since 2003, work has been underway within NENA, the IETF, federal XML initiatives for data management standardization, and related international standards development organizations (SDOs) to define the requirements and provide the standards required to fully converge circuit switched (voice and text) and data networks into a NG9-1-1 design using IP emergency communications networks. Infrastructure requirements include transport, standards, applications and services, policies and protocols, and associated governance.

In December 2005, the National Reliability and Interoperability Council (NRIC) Focus Group 1D, an advisory group of the FCC, published a final report that defined an effective future emergency communications system as an internetwork. This concept will enable modern, integrated information capabilities to support local, regional, and national emergency needs. It is, in effect, a system of systems.

ENABLING NG9-1-1

As requirements and design moved forward, it became obvious that other factors could potentially be roadblocks on the path to realizing NG9-1-1. Major critical gaps include:

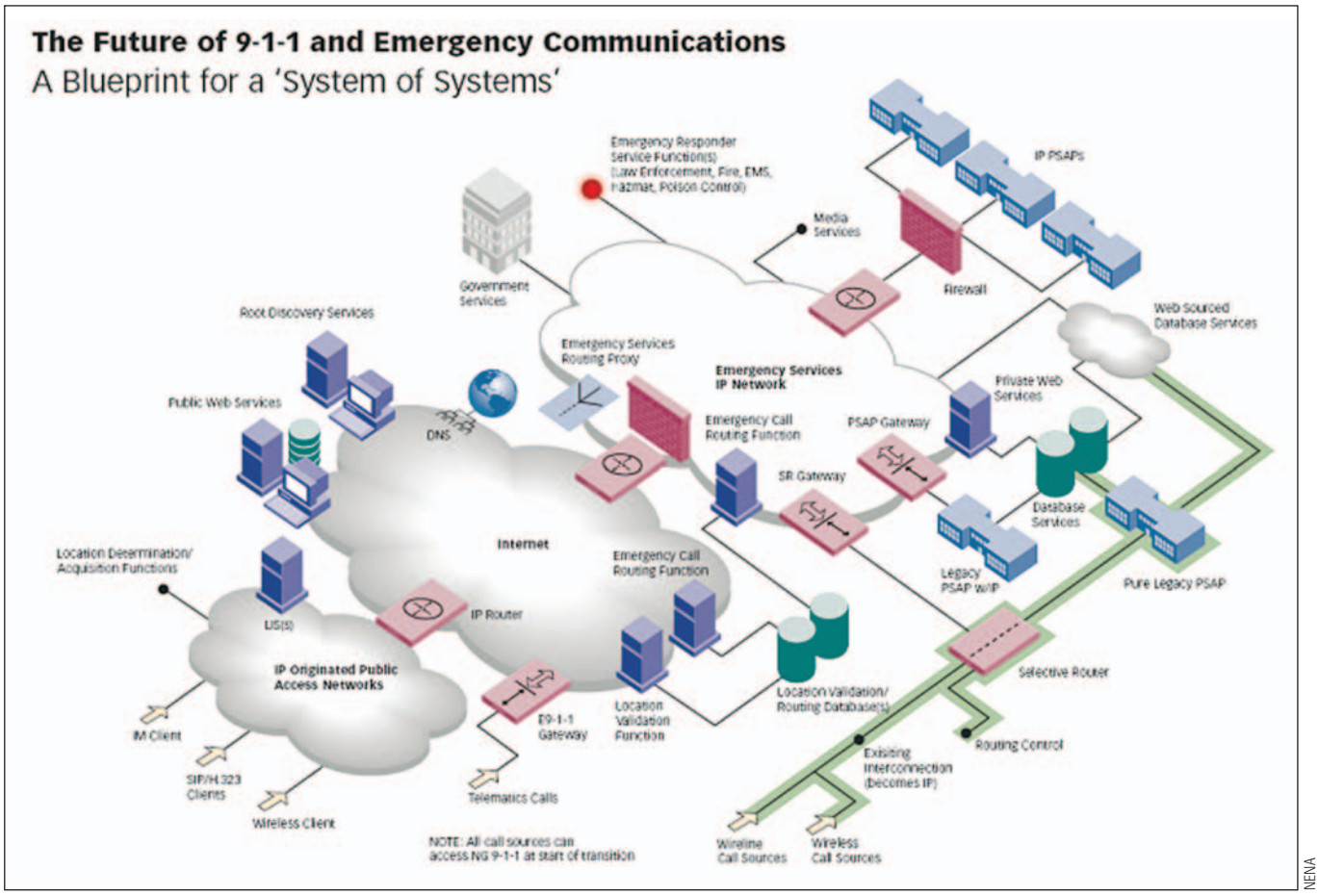
- Changing public policy to fit technological realities
- Resolving jurisdictional issues at the local, state, and federal levels
- Revising funding methodology and accelerating the availability of needed resources
- Converging actions across the nation on testing, pilot programs, and first applications
- Accelerating needed standards to support NG9-1-1 development
- Developing technical and operational policy and protocols for interoperability among agencies
- Developing network and systems operations, methods and procedures, as well as rigorous testing
- Educating and expanding the viewpoints of stakeholders, including the public, which is also critical to progress in other areas of public safety

Proposals for dealing with this myriad of issues resulted in a parallel Next Generation E9-1-1 Program. The program is targeted at accelerating planning, enabling and implementing NG9-1-1 through partnerships between business, government and other interested stakeholders. The NG E9-1-1 Program aims to use the combined knowledge, expertise, and influence of its partners to resolve these issues, in concert with technical and standards efforts. The program has grown to include 35 partners, representing wireline providers, wireless carriers, VoIP service providers, associations, nonprofit organizations, and 9-1-1 product and service vendors. Program partners have addressed a multitude of overlapping issues, and recommendations are described in the full report on the 2005 NG E9-1-1 Program, which is available at www.nena.org.

Building upon the previous year's success, in 2006 the NG E9-1-1 Program continued to address issues identified in the initial year of the program and to provide recommendations for both immediate and long-term actions. The 2006 program was organized into eight topic areas focused on key issues: funding, data, location and call routing, requirements and standards, demos and trials, education, interoperability, and disaster planning.

DEVELOPMENT AND TESTING

Requirements and standards drive a need to coordinate NG9-1-1-specific



Proposed by the National Emergency Number Association (NENA), Internet Protocol-based telecommunications services (VoIP, WiFi, WiMax) will be able to connect to 9-1-1 via the Internet through IP routers and high-level security processes into an IP-based Next Generation 9-1-1 system.

content with the larger, overall evolution toward IP based telecommunications in general. NENA is interacting with international SDOs to integrate public safety needs with worldwide emergency communications technology. In addition, as actual trial versions of the various IP protocols and database functions that make up NG9-1-1 are developed, NENA is involved in both testing and the development of certification methods to ensure that the replacement of today's 9-1-1 systems by transition to NG9-1-1 can be accomplished smoothly, without 9-1-1 service quality disruption. The USDOT NG9-1-1 trial project, initiated in 2005 and to be performed in 2007 - 2008, will be a critical step toward a viable national NG9-1-1 capability.

TRANSITION AND IMPLEMENTATION

As design, standards, and testing are completed, NG9-1-1 capabilities can be developed and implemented in substate- or state-level IP networks that are validated to have the security, authentication, and management characteristics necessary for dependable NG9-1-1 service. As shown in the diagram on above, IP-based telecommunications services (VoIP in fixed/static and nomadic; WiFi and WiMax) will be able to connect via the Internet through IP routers and high-level security processes into an IP-based NG9-1-1 system.

As local emergency services IP networks supporting NG9-1-1 applications become interconnected with each other as well as federal functions and networks such as homeland security, the overall benefit to emergency communications becomes a reality. A significant opportunity created by this capability is to "leapfrog" wireless and other services to full E9-1-1/NG9-1-1 in areas where a traditional network does not exist, at lower cost. For example, IP mesh networks can supply transport where no phone and/or traditional 9-1-1 access exists (e.g., remote rural areas and Native American tribal lands).

During this process, legacy telecommunications systems for wireline, wireless, VoIP, and others will likely transition to IP-based connectivity and into the local emergency services IP networks. Functions such as telematics will initially connect to the emergency services IP networks via the Internet until the internetwork of emergency services IP networks is available. At that time, these nationally oriented services can choose to move to connect through their local emergency services IP networks. Current complications such as trunk groups and individual selective routing switches will no longer be an issue. Data access will become a combination of baseline information arriving with the "call" (whether voice, text, or video), automatic delivery of additional data based on parameters defined by each emergency communications center, and call center initiated queries for supportive data. The emergency center personnel will be able to deliver an appropriate set of data on a given emergency to any other emergency group, anywhere, via the emergency communications internetwork.

It is critical that networks, systems, and applications be well tested, and that service and system operational methods

be developed and interactively pretested before use in order to minimize potential for service disruption.

SUMMARY

The history of emergency communications is largely oriented to local initiation and jurisdiction. As such, the cost and benefit of change have also been closely tied to local conditions, although the initiation of upgrades to cope with wireless E9-1-1 began to more widely involve multiple jurisdictions purchasing of common resources, such as mapping databases. Many components necessary to create a local, state, and national internetwork (such as standards development, user authentication, root servers, and overall network security), and the wide-ranging applications that will run on it, are unavoidably national. Therefore, in order to accomplish the major changes associated with IP-based emergency communications services, this trend of expansion will have to continue. Also, as this new type of infrastructure is likely to primarily be used locally and regionally, some functions will be managed and operated most effectively at the state level. Examples are IP network operation, standardized firewall, and security functions. Furthermore, certain capabilities critical to overall system benefits may not be economically feasible at local levels, and thus require planning, coordination, and funding at the state and/or national level. The net result is that only a combined local, state, and national approach will lead to the creation of a nationwide, fully interoperable NG9-1-1 and emergency communications internetwork. 9-1-1

For more information or to become involved, contact NENA at 800-322-39-1-1.

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Dr. Robert Cobb is NENA's development director. He developed and managed NENA's Education Program from 1992 to 2001, developed and continues to manage the Emergency Number Professional (ENP) Certification Program, served as NENA's interim executive director in 2003, and currently manages the Next Generation E9-1-1 Program. He also was Project Director for NENA's recently completed four-year Wireless Implementation Project for the USDOT, which had a positive impact on the acceleration of Wireless Phase I and Phase II throughout the United States. He currently serves as a member of ITS America's Public Safety Advisory Group (PSAG) and SAFECOM's Emergency Response Council (ERC).

As government affairs director, Patrick Halley serves as NENA's liaison with government and other organizations by working with Congress, the FCC, the administration, government agencies, and other like-minded organizations on key issues affecting 9-1-1. He also manages NENA's media affairs working with local, national, and trade press. He was previously the deployment director for COMCARE where he obtained significant experience in emergency communications and homeland security issues.