

Appendix H: Transitioning of Emergency Communications into the Next Generation

The following is an excerpt from the report "Transitioning of Emergency Communications into the Next Generation" published in March 2006 by the National Emergency Number Association's Next Generation Partner Program (pages 4-6). For a full copy of the report and additional information about NG9-1-1, go to www.nena.org/2006ng/report.

OVERALL EMERGENCY COMMUNICATIONS NEEDS

A critical weakness in existing emergency communications systems is that emergency response agencies are generally isolated from each other. Presently, the "emergency response community" includes public and private organizations that need to share emergency information, including: law enforcement, fire services, EMS, 9-1-1, emergency operations centers, hospitals, clinics, public health agencies, transportation agencies, public works departments, utilities and others.

The National Reliability and Interoperability Council (NRIC) Focus Group 1D, an advisory group of the Federal Communications Commission (FCC), identified one solution within two complementary areas: technological and institutional. In December 2005, NRIC published a final report that defined an effective future emergency communications system as an "internetwork"ⁱ—a set of policies, tools, interfaces and standards that connect securely the multiplicity of local, regional, and national wireline and wireless networks. Such an internetwork will enable modern, integrated information capabilities to support local, regional and national emergency needs. It is, in effect, a system of systems.ⁱⁱ

NENA's 9-1-1 Future Path Plan also proposed a hierarchy of interconnected local, regional and national IP networks that would enable NG 9-1-1 and many other emergency communications applications. The resulting 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 home- land security by providing a nationally coordinated emergency response system.

The needs of the new system of emergency communications include:

- Improved natural disaster management, including the prevention of and response to potential terrorist actions.
- Full support of new communications and information technology for emergency services.
- Reduce the danger of viruses capable of generating automated 9-1-1 calls and overwhelming the network.
- Use and enhance increasingly available sources of information that are only readily available with a flexible, wide access, high bandwidth network.
- Improved accessibility and increased compatibility to ensure all Americans have access to the emergency response system, including those with disabilities.

Today, millions of cell phone subscribers and commercial vehicles with GPS and communications systems can provide precise locations and verbal descriptions of emergencies. In the future, more will be able to provide images or other data. New devices, such as a direct report of a heart attack from a device worn on the chest, could also have a direct link with NG 9-1-1. Increased use of text messaging must also be supported, in general and to accommodate persons with disabilities.

NG 9-1-1 will also address N11 numbers and other services, such as poison control centers using 800 services for state/regional routing. For many VoIP

customers, there is limited or no access to N11 numbers and many 800 numbers cannot be properly routed.

Work is well underway within NENA, the Internet Engineering Task Force (IETF), federal XML initiatives for data management standardization and the Alliance for Telecommunications Industry Solutions (ATIS) to provide the standards required to fully converge circuit switched (voice and text) and data networks into one NG 9-1-1 packet network, based on IP. Infrastructure requirements include transport, standards, applications and services, policies and protocols, and associated governance.

NG 9-1-1 AS A MAJOR APPLICATION OF THE EMERGENCY COMMUNICATIONS NETWORK

As with many other networks, NRIC Focus Group 1B foresees the convergence of data, voice, text and video networks, based on ubiquitous packet transports and using standard Internet Protocols. While 2010 will not mean the end of older telecommunications equipment, Focus Group 1B advocates that the nation should have IP-based E9-1-1 capability, and begin its transition whenever and wherever possible.

The future Emergency Services Network will accommodate a flexible services infrastructure where applications can be defined and introduced without requiring major overhauls to existing network service providing elements. Capabilities will include the ability for regional and national interests to monitor, impact, and participate in emergency events or emergency preparedness. Emergency management centers at all levels of government will be able to monitor data in real time, with an ability to recognize patterns at local, regional or national levels.

Implementation of NG 9-1-1 standards will have far-reaching operational impacts:

- Handling calls from new devices, which will require new processes and procedures for call takers.
- Connecting new network elements to the system will require new administration and management tasks.
- Providing new capabilities, including the ability to transfer calls with location and all associated data, will require new processes and procedures for call takers.
- Accessing additional data will require new call taker processes, procedures, and monitors.
- New databases will require new processes and procedures for call takers, database administrators and management.
- Increased information will require new decision support tools that help interpret data for call takers and dispatchers.
- Improved connectivity will create new relationships among PSAPs and other local, regional and national emergency agencies, requiring new processes and procedures for call takers and management.

Such changes to the system will position PSAPs as emergency communications hubs, but won't restrict access by others to the same data. In addition, supplemental data such as telematics or patient medical history can be accessed from other sources.

TRANSITION AND IMPLEMENTATION

After design, standards and testing is completed, NG 9-1-1 capabilities can be implemented in sub-state or state-level IP networks that are validated to have the security, authentication and management characteristics necessary for dependable NG 9-1-1 service. As shown in the diagram on pages 10-11, IP-based telecommunications services (VoIP in fixed/static and nomadic; WiFi and WiMAX) will be able to connect to the Internet via IP routers and high-level security processes into an IP-based NG 9-1-1 system.

As “local” emergency services IP networks supporting NG 9-1-1 applications become interconnected to each other as well as federal functions/networks such as homeland security, the overall benefit to emergency communications becomes a reality. An opportunity enabled by this capability is to “leapfrog” wireless and other services to full E9-1-1/NG 9-1-1 in areas where the 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 Indian 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. The components highlighted in green at the lower right of the diagram on pages 10-11 can be removed in preference to more effective NG 9-1-1 components and functions.

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 complete. At that time, these nationally oriented services can choose to move to connection 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 pre-tested before use in order to minimize potential for service disruption.

i We use this unfamiliar term to make two points: (a) our strong belief that the model of the Internet should be copied for emergency communications in the future (except for its failures until recently to focus proper attention on security), and (b) that we do not favor building a new “national emergency network.” There are already many networks, and there need to be many more built at the state and local level. Our focus is on how to connect them (and applications that ride on them) into a seamless whole, rather than replace them.

ii “System of Systems.” Emergency communications devices are associated with systems and networks that range in size from small to large. Whether large or small, the systems and the networks they use work with each other to pass information and communications back and forth seamlessly. In some cases, new networks must be deployed by agencies, localities, regions, states, tribes or federal agencies. In other cases, we need to connect tools, systems and networks that are already deployed. Our overall goal is that all systems together become a system of systems.