Internet Protocol and E9-1-1: NENA Technical Development Status

IP is a challenge and opportunity to break out of the cycle of constant adaptation of an effective, but outmoded E9-1-1 system design. How we deal with that opportunity will set the stage for the future of E9-1-1.

BY ROGER HIXSON, NENA TECHNICAL ISSUES DIRECTOR

LET'S START OUT WITH WHAT NENA BELIEVES ARE TWO inescapable facts: (1) E9-1-1 service must and will evolve to support new call/message origination service types; and (2) over time, E9-1-1 will not operate as it does today, but it must provide the same or better results for the public's safety.

These points require that E9-1-1 systems move to mainstream technology, so that new needs can be quickly accommodated without special and customized interface methods.

Background Vision

NENA's vision for the future evolution of 9-1-1 technology and service capabilities has been conceptualized in its 9-1-1 Future Path Plan for more than two years, and the targets and criteria in the Future Path Plan have organized NENA's technical development work since its inception. This development also is in coordination with NRIC VII[1] objectives, needs for homeland security and the general direction of technology advancement. Optimally, a number of such national work efforts, objectives, and considerations will work together toward common goals. This article describes the timeline of events for the NENA technical development work needed to support the growing international use of Internet Protocol (IP) in electronic communications, as applied to Enhanced 9-1-1 service.

Photo by Jan Friml

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In August 2003, NENA formed a VoIP[2]/Packet Technical Development Committee, in conjunction with a successful IP forum to organize the technical development, impact and integration of IP with E9-1-1 emergency services. This committee became the sixth technical development group under NENA's overall 9-1-1 Technical Development Committee.

With eighty-six members, the committee includes members from the VoIP industry, leaders from the IP international standards community and experts from the 9-1-1 industry. The committee is chaired by Nate Wilcox of the Vermont 9-1-1 Program Office and staff is supported by NENA's Technical Issue Director, Roger Hixson.

Addressing operational recommendations for the nation's PSAPs and 9-1-1 centers, NENA's 9-1-1 Center Operations Committee has established a VoIP Implementation and Operations Committee, to provide additional review and feedback in conjunction with the technical development process. The committee is tasked with providing a definition of operational needs and requirements as well as implementation guidelines and operational methods for the 9-1-1 community in receiving VoIP calls.

More information on both of these NENA committees can be accessed through the NENA Web site (www.nena.org).

Leadership and Solutions

NENA's technical and operational efforts on IP and E9-1-1 solutions are concentrated in four focus areas:

1) Coordinate interim, workable solutions, in terms of consistency with (present) E9-1-1 requirements and user expectations, including the acceptability of proposed solutions.

2) Development of one or a small number of variations of long term solutions to bring IP-based emergency call and messaging sources fully into the E9-1-1 service process, through the definition of related service features and requirements.

3) Define scope of work with future path plan targets for a probable IP-based E9-1-1 infrastructure, intended to transitionally

replace today's outmoded E9-1-1 systems as described in the FCC commissioned Hatfield Report on E9-1-1 services.

4) Organize a workable and specific economic transition plan across the steps above, and contribute to identification of any legal, regulatory, and responsibility/liability issues.

Ideally the aforementioned areas of concentration are to meet and exceed NENA's 9-1-1 Future Path Plan, continuing a dynamic process to conceptually and then programmatically define an appropriate and organized technical path forward for our nation's E9-1-1 services.

Recent Activity and Status

Update from the 2004 NENA Technical Development Conference, March 14-17, 2004:

Initial IP-based Calling Services for 9-1-1 and PSAP Access

At present, a limited set of temporary solutions for 9-1-1 service delivery have appeared from the VoIP industry or their vendors. NENA continues collaborative work to improve the methods behind all present VoIP 9-1-1 call delivery efforts, while working on interim solution definition and coordination, and a longer term approach as well.

The NENA/VON Coalition agreement is an example of a temporary method of improvement, consisting of a six-point agreement on service provider needs for public safety contact, surcharge replacement policy, and involvement in the IP and E9-1-1 development process for full solutions.

Migratory Methods

Three contributions for migratory solutions have been brought to the table and are being reviewed as part of the NENA VoIP/Packet Technical Committee work. Certain baseline E9-1-1 criteria are necessary for these and any other near term methods to be considered supportable by NENA. An example is the provision of validated fixed or nomadic[3] caller address for services that replace wireline service, which has MSAG-validated addressing. Initial requirements will be released in early May. Updates to these definitions will occur as more detail and roaming location identification capabilities are identified later in 2004.

Long-Term Emergency Calling from IP-based Originators

A full IP and E9-1-1 solution set, using a common structural design (potentially with detail variations), is targeted before or in the first quarter of 2005. Review of the current developing propos-

al, based on using IP throughout the E9-1-1 service infrastructure, against detail E9-1-1 technical and operational requirements has begun.

Inherent in the development work are issues concerning E9-1-1 service provision over the general Internet, and/or over more private IP-based networks, and how originating service providers and PSAPs best interact and interconnect using either, or a combination of both choices. E9-1-1 quality of service and consistency across the various types and methods of call originators, and how that is affected by different solutions is a critical issue. Several development and review cycles will be required to accomplish a full design for a future IP-based E9-1-1 process. This will include activities during upcoming NENA IP E9-1-1 Critical Issue Forums and the NENA Annual Conference in June, as well as many NENA Committee conference calls and meetings during the remainder of 2004.

Some Major Technical and Operational Issues under Discussion

- Communicating the nature of IP technology, impact on E9-1-1, and impact of E9-1-1 in applying IP and VoIP to electronic emergency communications
- Consumer education
- Successful melding of current E9-1-1 requirements, policies and knowledge with new technology approaches
- Balancing the needs of IP-based business parties and the requirements of public safety, without compromising the quality and capabilities of E9-1-1 service for the public and for national security
- Designing a minimal number of transition steps from the current E9-1-1 design into the long-term solution
- Development of appropriate procedures and operational methods for PSAPs and other emergency service providers

Major Enabling Issues

- Clear definition of E9-1-1 requirements and minimum standards
- Appropriate level of regulation for IP-based calling services
- Funding methods for the development of E9-1-1 and IP solutions and standards
- Transition/implementation funding methods

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• Public policy concerning such areas as funding, impacts on telecommunication taxation models, and even international standards and interoperability

There are other issues, as well, and the ongoing work throughout 2004 will bring them to light. Some of these issues have either not been clear concerns in the past, or were incompletely treated in past cases of technology driven work for E9-1-1 services. As a result, we are faced with the biggest overall change impact in the history of E9-1-1 in North America. We are likely to have only one chance to effectively deal with it, as the change rate of technology is accelerating rapidly.

Conclusion

An overall NENA objective is the transition and improvement of E9-1-1 architecture via the NENA Future Path vision. We believe, so far, that IP as a protocol and technology is likely to be the basis of a much more robust, flexible, and less expensive set of systems to support not only E9-1-1 services, but also interoperability with related public safety systems, such as CAD and radio, and with messaging and data needs for other emergency service providers, such as trauma centers and emergency management centers.

Much remains to be done, but the effort to date is characterized by high levels of interest, dedication to effort, and a commitment to bringing a great deal of knowledge to bear on this work. The future of IP is both a great challenge and a great opportunity to break out of the cycle of constant adaptation of an effective, but outmoded E9-1-1 system design. How we deal with that opportunity will set the stage for the future of E9-1-1.

More information will be available via the NENA Web site and other communications, and the NENA Technical Lead team plans a major readout of IP and E9-1-1 status, results, and direction forward at the June NENA Annual Conference. **NENA**

This article was written by Roger Hixson, NENA's Technical Issues Director since 2001. Roger is the original

author of NENA's 9-1-1 Future Path Plan and has more than eighteen years of experience in E9-1-1 systems and service areas.

References

1. NRIC VII—The purpose of the Network Reliability and Interoperability Council is to provide recommendations to the FCC and to the communications industry that, if implemented, shall under all reasonably foreseeable circumstances assure optimal reliability and interoperability of wireless, wireline, satellite, cable and public data networks. [Among other objectives,] The council shall report on ways to improve emergency communications networks and related network architectures and facilitate the provision of emergency services through new technologies. This means ensuring that emergency communications networks are reliable, survivable and secure. It also means that emergency communications networks (including E9-1-1) can be accessed with currently available technologies as well as with new technologies.

2. VoIP—Voice over Internet Protocol, the transmission of voice over digital data networks—either public or private—using Internet protocol.

3. Nomadic—movement of the call origination point periodically to differing locations (as compared to mobility, where the originating device is capable of constant movement).

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