NENA IP Capable PSAP Features And Capabilities Standard

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1. Executive Overview

Voice over Internet Protocol (VoIP) is poised to become the predominant technology used in the telecommunications industry. As the public adopts VoIP, E911 calls will increasingly originate from VoIP instruments. Some VoIP telecommunications service provider networks, however, are not natively compatible with the existing E911 infrastructure. If the public safety agencies want to effectively service these calls, equipment throughout the 9-1-1 system will have to evolve to IP. Specifically, the equipment and software throughout the 9-1-1 system will need to become IP based in order to support emergency voice, text, and video messaging directly from the Internet and from the public switched telephone network (PSTN), including the delivery of accurate caller location information.

This document contains a list of capabilities or features that need to be supported in a public safety answering point (PSAP) using IP based 9-1-1 equipment and software. These capabilities and features should be considered a minimum level of functionality, developed in an open architecture environment that will allow interoperability at all levels of the 9-1-1 network, regardless of vendor. Nothing in this document should be interpreted as limiting the development of additional capabilities or features by 9-1-1 equipment and software developers.

2. Introduction

2.1 Purpose and Scope

This document is intended to be a guide for the NENA Technical and Operations Committees to use in establishing additional standards in preparation for the installation of IP based 9-1-1 systems in the PSAP. The 9-1-1 equipment, software, and service vendors should use this standard as a guide during their product research and development. PSAP administrators may also find this document useful for planning purposes, as they prepare to transition from their current equipment to IP based systems.

2.2 Reason to Implement

The current 9-1-1 network uses voice-based technology that is not compatible with VoIP and other data-based forms of telecommunications technology that are now being widely deployed. The rules under which these systems were built are no longer applicable (such as Service Providers who no longer are physically based in the locality and aren't even licensed telephony providers, nomadic customers, mobile customers, and dramatic changes associated with numbering resources to name a few). This has led to degradation in the way that enhanced 9-1-1 service is now provided to the general public. The 9-1-1 systems used by PSAPs will need to be upgraded or replaced with IP based systems in order to support these new technologies.

2.3 Benefits

IP based 9-1-1 systems that maintain an open architecture offer more opportunities to share infrastructure, work load, and call-related data throughout the 9-1-1 and other public safety networks. This will allow PSAPs to work together cooperatively in ways that the current systems do not allow. The open architecture will also allow PSAPs to receive call-related data directly from multiple data sources such as telematics service providers or Internet based telephone service providers, rather than being restricted to access to a single database (ALI) as in the current 9-1-1 system. This should reduce overall costs and increase efficiency.

2.4 Technical Impacts Summary

The use of IP based 9-1-1 equipment and software at the PSAP will require network and data technical standards to be developed and adhered to in order to take full advantage of the IP environment and ensure true interoperability throughout the entire 9-1-1 system. The IP environment is global in nature. Many of the service providers utilizing the Internet as their communications infrastructure are also doing business on a global basis. IP based 9-1-1 systems must be able to accept and transfer calls on an international basis. This will not be possible unless the standards require open architecture and non-proprietary data exchange formats.

2.5 Document Terminology

The terms "shall ", "must" and "required" are used throughout this document to indicate required parameters and to differentiate from those parameters that are recommendations. Recommendations are identified by the words "desirable" or "preferably".

2.6 Reason for Reissue

NENA reserves the right to modify this document. Whenever it is reissued, the reason(s) will be provided in this paragraph.

2.7 Costs Factors

PSAPs that desire or are required to provide 9-1-1 service for technologies that are not supported by the current 9-1-1 system will incur expense in upgrading or replacing their current PSAP equipment and software. IP based 9-1-1 PSAP systems must be open in architecture and should utilize technology that is being or has already been developed for the general business market, whenever feasible, in order to keep costs as low as possible.

2.8 Cost Recovery Considerations

(Not Applicable)

2.9 Acronyms/Abbreviations

The acronyms/abbreviations used in this document have not as yet been included in the master glossary. After initial approval of this document, they will be included. Link to the master glossary is located at:

http://www.nena.org/9-1-1TechStandards/nena_recommended_standards.htm.

The following Acronyms are used in this document:	
ACD	Automatic Call Distribution
ALI	Automatic Location Identification
ANI	Automatic Number Identification
CAD	Computer Aided Dispatch
CPE	Customer Premise Equipment
EIA RS-232	Electronic Industry Alliance Recommended Standard 232 (serial interface)
IP	Internet Protocol
LAN	Local Area Network
OID	Operational Information Document
PSAP	Public Safety Answering Point
PSTN	Public Switched Telephone Network
RMS	Records Management System
TDD	Telecommunications Device for the Deaf
VoIP	Voice over Internet Protocol
VPN	Virtual Private Network
WAN	Wide Area Network
XML	Extensible Markup Language

2.10 New Acronyms/Abbreviations

The authoring committee shall list any new acronyms and their definitions not listed in the NENA Glossary at the time the recommendation/model procedure is submitted to the Committee Chair for review. This should be a simple list, such as – When used in the context of this model recommendation/standard, the following acronyms/abbreviations have not been previously listed in the NENA Glossary.

3. Features And Capabilities Requirements

This list of capabilities and / or features should be considered as minimum requirements necessary to support 9-1-1 at the PSAP in an IP environment. Any protocols or architecture used should be open and non-proprietary. Recommended capabilities or features that are in addition to the minimum requirements are identified by the use of the words "desirable" or "preferably".

The list is divided into what would correspond to "network" or "data" interfaces in the current or traditional 9-1-1 network for ease of understanding by non-technical 9-1-1 professionals. It is assumed that both voice and data packets can use the same infrastructure in the IP environment and do not require separate facilities for voice and data, as the traditional 9-1-1 system does.

3.1 The IP PSAP Network Interface

shall support the:

3.1.1. Ability to receive 9-1-1 calls from the public switched telephone network (PSTN), managed private IP networks, and directly from the Internet.

3.1.2. Ability to transfer calls, with the associated data, between answering positions within the PSAP, regardless of how the call was received. (For external transfer information, see Sections 3.1.8 and 3.1.10)

3.1.2.1. The ability to keep the 911 caller's audio path open so the call taker can always hear the caller, even while establishing the transfer connection.

3.1.3. Ability of multiple call takers to monitor and / or participate on the same call, regardless of how the call was received.

3.1.4. Ability to establish a pre-determined limit on the total number of simultaneous 9-1-1 calls presented to the PSAP, regardless of what technology was used to deliver each individual call; and, at the option of the PSAP, give excess callers a "fast busy" signal or some other alternate response (See 3.1.6 and 3.1.7).

3.1.4.1. It is desirable that the system be designed with sufficient bandwidth to support the pre-determined limit of simultaneous calls using the type of call technology supported that has the highest bandwidth requirement. (i.e. if streaming video

with audio calls are supported and that type of call requires more bandwidth than any other type of call, the total bandwidth available to support 9-1-1 should equal the bandwidth required for the streaming video call type multiplied by the pre-determined limit on simultaneous calls presented).

3.1.4.2. The system shall be capable of negotiating for the highest quality of service supported by the 911 caller's equipment in order to get the best audio / video available. Background noise at the caller's location should be transmitted as accurately as possible, not suppressed or amplified, so that the call taker can use that information in properly assessing the caller's emergency. (i.e. sounds of furniture being broken, fighting, arguing, etc.).

3.1.4.3. The PSAP shall have access to a log file that contains the calling party's number and any other data sent with the call. The log file shall be created automatically upon call delivery, regardless of whether the call is answered by the PSAP.

3.1.5. Ability to support an automatic call distribution (ACD) system that delivers calls to PSAP call takers based on the longest time idle, or by some other pre-determined method of call distribution.

3.1.6. Ability to queue incoming calls that cannot be immediately answered because of call volume, and at the option of the PSAP:

3.1.6.1. Provide a pre-recorded voice announcement to callers in queue.

3.1.6.1.1. It would be desirable to have the ability to provide a dynamically updated, incident specific voice announcement to callers in queue.

3.1.6.1.2. It would be desirable to have the ability to provide an interactive voice announcement that would allow callers to provide additional information by voice response about their emergency while in queue.

3.1.6.1.2.1. Use the additional information provided to prioritize the calls in queue.

3.1.6.1.3. It would be desirable for the pre-recorded announcements to be directed to callers based on a incident specific geographic location (i.e. only callers with a 10 block radius of 300 Main St would receive a pre-recorded announcement about a fire already reported at 300 Main St).

3.1.6.2. Provide text message equivalents of any voice announcements for text and TDD calls identified in the queue.

3.1.7. Ability to overflow IP 9-1-1 calls directly to another designated backup IP PSAP using the Internet or a dedicated IP 9-1-1 network (i.e. WAN, VPN, etc.).

3.1.7.1. Provide a visual indication at the original PSAP that calls are overflowing.

3.1.7.2. Provide a visual indication at the designated overflow PSAP that they are now receiving overflow calls from the original PSAP with identification of the original PSAP.

3.1.7.3. Provide a non-proprietary "Instant Message" type interface that would allow the call taker at the overflow PSAP to send the 9-1-1 caller's information and a

brief summary of the caller's emergency back to the original PSAP. This would allow the original PSAP call taker to determine if the call is the 30th call on an incident they are already aware of or if it is a new incident that they need to handle. This would also create a record of the call for the original PSAP.

3.1.7.3.1. It would be desirable for PSAPs that have agreed to work cooperatively in handling overflow calls to also have the ability to link their call takers using the audio / video conference bridge described in 3.1.21, at least during the time that calls are actually overflowing to the backup PSAP.

3.1.7.4. Ability to transfer a call from the overflow PSAP back to the original PSAP if the original call taker wants the call, with all of the associated incident and location data. Ideally, this could be accomplished by allowing the original PSAP to initiate a three-way conference call between the 9-1-1 caller, the overflow PSAP and the original PSAP immediately while reviewing the "Instant Message" information sent by the overflow PSAP, or in some other manner that would get the call to the head of the queue or prevent it from overflowing again.

3.1.8. Ability to transfer IP 9-1-1 calls to any other IP PSAP, with data, regardless of proximity or equipment used.

3.1.9. Ability to overflow IP 9-1-1 calls to a traditional 9-1-1 PSAP, with data, to the extent the traditional 9-1-1 network supports connectivity (i.e. shares access to the same selective router, can transfer calls and data between selective routers, etc.).

3.1.10. Ability to transfer IP calls to a traditional 9-1-1 PSAP, with data, to the extent the traditional 9-1-1 network supports connectivity.

3.1.11. Ability to receive overflow calls from a traditional 9-1-1 PSAP, with data.

3.1.12. Ability to transfer callers to an automated attendant (i.e. local government information line, department directory, etc.).

3.1.13. Ability to steer any call, based on a language indicator in the call setup, to the appropriate PSAP call taker with those language skills. For a text based call, the PSAP equipment should handle any special display characteristics of the language specified. If a language indicator is present, a visual language identifier should be displayed to the call taker.

3.1.14. Ability to receive and respond to emergency e-mail messages.

3.1.14.1. A method needs to be developed to identify when this type of message is "active" or pending (considered as a call when calculating the pre-determined limit on simultaneously presented calls defined in 3.1.4), and to identify when this type of message has been responded to or otherwise handled.

3.1.14.2. A method also needs to be developed for notifying the sender, at the option of the PSAP: 1) that their message is in queue and 2) when the call taker actually opens or sees the message.

3.1.15. Ability to receive and respond to emergency "Instant Message" or "Short Message Service" messages.

3.1.15.1. A method needs to be developed to identify when this type of message is "active" or pending (considered as a call when calculating the pre-determined limit on simultaneously presented calls defined in 3.1.4), and to identify when this type of message has been responded to or otherwise handled.

3.1.15.2. A method also needs to be developed for notifying the sender, at the option of the PSAP: 1) that their message is in queue and 2) when the call taker actually opens or sees the message.

3.1.16. Ability to link multiple PSAPs on a wide area network (WAN) and share 9-1-1 CPE infrastructure.

3.1.17. Ability to dynamically add call taker positions for a specific PSAP on a local area network (LAN), WAN, or highly secured Internet based VPN connection in order to meet workload requirements.

3.1.18. Ability to receive and respond to TDD calls with location data.

3.1.19. Ability to receive and respond to multimedia information, including audio, digital photographs, and streaming video along with NENA XML tagged data.[1]

3.1.19.1. Ability to create a permanent log file, upon call delivery, of all communications, regardless of the format the data was received in.

3.1.20. Ability to conference callers and emergency responders in a multimedia environment that would permit the exchange of digital photography, digital audio, video, etc.

3.1.20.1. The ability to keep the 911 caller's audio path open so the call taker can always hear the caller, even while establishing the conference connection.

3.1.20.2. The call taker shall be able to isolate any party to a conference call in order to conduct a private conversation with another participant(s), including fully or partially muting participants on an individual basis.

3.1.20.2.1. "Fully mute" means the participant cannot hear or speak to the call taker.

3.1.20.2.2. "Partially mute" means the call taker can hear the participant, but the participant cannot hear the call taker audio.

[1] NENA Technical Data Standard 02-010
http://www.nena.org/9-1-1TechStandards/Standards_PDF/NENA%2002-010.PDF

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3.1.21. Ability to link all call takers at a specific PSAP together on a full-time, real-time audio or video conference bridge that will allow call takers to work collaboratively regardless of proximity.

3.1.21.1. The bridge shall support the ability to set up a short term private conversation between 2 or more call takers.

3.1.22. Ability to provide or interface with clock synchronization protocols between other PSAP hardware and software applications (i.e. CAD, RMS, log file recorders, or radio console clocks)

3.2 The IP PSAP Database Interface

shall support the:

3.2.1. Ability to connect to multiple location databases utilizing the Internet, a dedicated IP 9-1-1 network, or both.

3.2.2. Ability to receive caller and location data, in the NENA XML format or as part of the IP telephony call setup protocol, directly with the voice on an IP call – "push" location data

3.2.3. Ability to query location databases using a caller's telephone number and / or other routing key – "pull" location data in the NENA XML format

3.2.4. Ability to receive telematics information, in the NENA XML format, directly from the vehicle through the telematics service bureau along with the voice of the service bureau representative or as part of a three way voice connection with the vehicle occupants, the service bureau representative, and the PSAP

3.2.5. Ability to transfer all data received to another agency in the NENA XML format

3.2.6. Ability to automatically and by manual request, transfer received data into other PSAP systems, including map display software, CAD, RMS, etc. using non-proprietary communications standards, including but not limited to EIA RS-232 and NENA XML format

4. References

The following documents were used in the preparation of this standard:

a. NENA Technical Data Standard 02-010 (http://www.nena.org/9-1-1TechStandards/Standards_PDF/NENA%2002-010.PDF)
b. Interface to IP Capable PSAP 08-501 (http://www.nena9-1-1.org/9-1-1TechStandards/TechInfoDocs/NENATIDIPPSAPIF.pdf)

5. Exhibits

The Exhibits section is an optional section intended to include descriptive samples of the subject matter described in the other portion of your document.