IP PSAP 9-1-1 System

Features and Capabilities

Operational Information Document (OID)
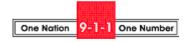
NENA
OPERATIONAL INFORMATION DOCUMENT

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NENA's Operations Committee has developed this document. Recommendations for change to this document may be submitted to:

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Acknowledgments:

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1. Executive Overview

This document contains a list of capabilities or features that are expected to be supported in a public safety answering point (PSAP) using Internet protocol (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 of Document

This document is intended to be a guide for the NENA Technical and Operations Committees to use in preparation for and installation of IP based 9-1-1 systems in the PSAP. 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 traditional 9-1-1 network, developed in the 1950's and 1960's, uses technology that is no longer supported by some forms of telecommunications technology that are now being widely deployed. This has led to degradation in or the inability to even provide enhanced 9-1-1 service with some of the telecommunications technology currently in use by 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 Reason for Reissue

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

2.4 Recommendation for Standards Development Work

This document is intended to be used as a guide for the development of IP PSAP 9-1-1 system standards. Standards need to be developed so that emerging telecommunications technology can design enhanced 9-1-1 capabilities into their products before they go to market. Most of the telecommunications technology currently being developed is mobile in nature, making the relevance of the user's home or billing address less useful to the PSAP for location purposes. PSAPs need the ability to receive the 9-1-1 caller's physical location dynamically at the time of the call. There is also an increased need for PSAPs to transfer 9-1-1 calls, with location data, to PSAPs outside their immediate area. Standards will be necessary to ensure complete interoperability between IP PSAPs, regardless of location or the type of equipment being used.

2.5   Cost 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 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.

2.6   Acronyms/Abbreviations

Some acronyms/abbreviations used in this document have not 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

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3   Operational Description

This list of capabilities and / or features should be considered as necessary to support 9-1-1 at the PSAP in an IP environment. Any protocols or architecture used should be open and non-proprietary.

3.1   The IP PSAP Network Interface should support the:

3.1.1.   Ability to receive 9-1-1 calls from both the public switched telephone network (PSTN) 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

    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, should be supported, if possible.

3.1.3.   Ability of multiple call takers to monitor and / or participate on the same call, regardless of whether it comes in on the traditional network or IP

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.   The system should be designed with sufficient band width 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 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 should negotiate 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.   A log file showing the calling party's number and any other data sent with the call should automatically be created for all calls attempted, regardless of whether they were answered by the PSAP call takers or not

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
    3.1.6.2. Provide a dynamically updated, incident specific voice announcement to callers in queue
    3.1.6.3. Provide an interactive voice announcement that would allow callers to provide additional information by voice response about their emergency while in queue
        3.1.6.3.1. Use the additional information provided to prioritize the calls in queue
    3.1.6.4. Provide text message equivalents of any voice announcements for text and TDD calls identified in the queue

3.1.7. Ability to overflow IP 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. It would also create a record of the call for the original 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 calls to any other IP PSAP, with data, regardless of proximity or equipment used

3.1.9. Ability to overflow IP 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 911 network supports connectivity

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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 on a local area network (LAN) or WAN 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 of all communications, regardless of the format the data was received in

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

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3.1.20.   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, should
  be supported, if possible.
  3.1.20.2.   The call taker should also 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

3.1.21.   Ability to link all call takers 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 should also 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 should support the:

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

3.2.2.   Ability to receive caller and location data, in the NENA XML format, 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 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

4.1. NENA Technical Data Standard 02-010

   4.1.1.   http://www.nena.org/9-1-1TechStandards/Standards_PDF/NENA%2002-010.PDF

5. Exhibits

None