Use Cases & Suggested Requirements for Non-Voice-Centric (NVC) Emergency Services

NENA Use Cases & Suggested Requirements for Non-Voice-Centric Emergency Services
NENA 73-501, Version 1.0, January 11, 2011

Prepared by:
National Emergency Number Association (NENA) Next Generation Messaging Working Group, a joint working group of the Technical and Operations Committees

Published by NENA
Printed in USA

NENA
INFORMATION DOCUMENT

NOTICE

The National Emergency Number Association (NENA) publishes this document as an information source for the designers and manufacturers of systems to be utilized for the purpose of processing emergency calls. It is not intended to provide complete design specifications or parameters or to assure the quality of performance for systems that process emergency calls.

NENA reserves the right to revise this Information Document for any reason including, but not limited to:

- conformity with criteria or standards promulgated by various agencies
- utilization of advances in the state of the technical arts
- or to reflect changes in the design of network interface or services described herein.

It is possible that certain advances in technology will precede these revisions. All NENA documents are subject to change as technology or other influencing factors change. Therefore, this NENA document should not be the only source of information used. NENA recommends that readers contact their 9-1-1 System Service Provider (9-1-1 SSP) representative to ensure compatibility with the 9-1-1 network.

Patents may cover the specifications, techniques, or network interface/system characteristics disclosed herein. No license expressed or implied is hereby granted. This document shall not be construed as a suggestion to any manufacturer to modify or change any of its products, nor does this document represent any commitment by NENA or any affiliate thereof to purchase any product whether or not it provides the described characteristics.

This document has been prepared solely for the use of E9-1-1 System Service Providers, network interface and system vendors, participating telephone companies, etc.

By using this document, the user agrees that NENA will have no liability for any consequential, incidental, special, or punitive damages arising from use of the document.

NENA's Committees have developed this document. Recommendations for change to this document may be submitted to:

National Emergency Number Association
1700 Diagonal Rd, Suite 500
Alexandria, VA 22314
202.466.4911
or commleadership@nena.org

Acknowledgments:

The National Emergency Number Association (NENA) Next Generation Messaging Working Group developed this document. NENA recognizes the following industry experts and their companies for their contributions in development of this document.

Members	**Company**
Roger Marshall, Co-Leader	TeleCommunication Systems
George Stanek, Co-Leader	AT&T
Ajit Kahaduwe	Nokia Siemens Networks
Art Prest	Illinois Valley
Bill Horne	Tarrant County 9-1-1
Bill Mertka	RedSky Technologies
Brian Daly	AT&T
Brian Rosen	Neustar
Cheryl Blum	Telecommunications Industry Association (TIA)
Chris Crittenden	US Cellular
Chris Lounsbury	Missoula County, Montana
Christian Militeau	Intrado
David Robinson	Syniverse
Deb Barclay	Alcatel Lucent
DeWayne Sennett	AT&T
Donna Platt	Hearing, Speech, & Deafness Center, Seattle, WA
Ed Ehrlich	Nokia
Frith Malin	Orleans Parish Communications District (OPCD)
Gary Jones	T-Mobile USA
Greg Schumacher	Sprint
Hannes Tschofenig	Nokia Siemens Networks
Jay Malin	Agent 5-1-1
Jean Nealy	Dept. of Emergency Services, Pierce County, WA
Jeanna Green	Sprint
Jerry Turk	Power Phone Inc
John Fischer	Spectrum
Kevin Rohrer	Texas CSEC
Loc Vo	Verizon Wireless
Manoj Monga	Sprint
Mark Drennan	Openwave
Marte Nelson	Time Warner Cable
Matt Keller	Motorola Solutions
Michael Nelson	Intrado

Mitch Tseng	Nokia
Nathan Wilcox	microDATA
Pete Eggimann	Metropolitan Emergency Services Board, St. Paul, MN
Peter Musgrove	AT&T
Randall Gellens	Qualcomm
Richard Ray	City of Los Angeles, Dept. on Disability
Richard Wu	Nokia Siemens Networks
Rick Jones	NENA
Robert Gunter	Montgomery County Texas 9-1-1
Robert Iwaszko	Verizon Wireless
Robert Sherry	Intrado
Roger Hixson	NENA
Simon Farrow	Stancil Corp.
Steven Zweifach	Sprint Nextel
Terry Jacobson	Alcatel Lucent
Tim Dunn	T-Mobile USA
Toni Dunne	Intrado
Tony Akers	RIM
Wayne Ballantyne	Motorola Mobility
Xiaomei Wang	Verizon Wireless

This working group would also thank Tom Breen, Technical Committee Chair/Liaison; Tony Busam, Technical Committee Vice-Chair/Liaison; Pete Eggimann, Operations Committee Chair/Liaison; Wendy Lively, Operations Committee Chair/Liaison; Roger Hixson, Technical Issues Director; and Rick Jones, Operations Issues Director for their support and assistance.

TABLE OF CONTENTS

1 Executive Overview

The Emergency Services community has a desire to have multimedia emergency services supported with the same general characteristics as emergency voice calls. As a result, there is a need to communicate with emergency services using mechanisms that are not primarily voice.

Non-Voice -Centric (NVC) Emergency Services[1] are intended to support (human) end user to authority communication. NVC Emergency Services may support the following examples of non-verbal communications to an emergency services network:

1. Text communication between end users and emergency services
2. Multi-media (e.g., pictures, video clips) transfer to emergency services during a voice or NVC session with emergency services.
3. Real-time video session with emergency services
4. Text communication with supplementary media (such as background audio and/or video)

NVC Emergency Services as defined in this document focuses on Next Generation Network (NGN) technology and does not include legacy messaging services, such as Short Messaging Service (SMS)[2]. In addition, NVC Emergency Services does not include support of calls from non-human initiated devices (e.g., fire alarms).

There will be significant impacts to the entire emergency services system resulting from the changes in networks and devices as described in this document. It is expected that end user devices and origination networks will ultimately evolve, and that the next generation emergency services solution will allow this evolution to take place over time. Many systems in the emergency services network must eventually change. New end-to-end messaging relationships must be established.

In addition to supporting the general public, this capability facilitates emergency communications by individuals with disabilities (e.g., persons who are deaf, deaf-blind, hard of hearing, or have a speech disability).

Short of NENA's motto of "Emergency Help, Anytime, Anywhere, Any Device." this document

[1] Preliminary versions of this document were referred to as Non-Voice Initiated (NVI) Emergency Services.

[2] While text messaging is expected to remain popular, the underlying technology must shift from legacy SMS to IP-enabled messaging (including various forms of instant messaging (IM)) to support NVC Emergency Services. Increasingly, both smart phones and feature phones support multiple technologies for text messaging. It is important not to confuse a specific underlying technology such as SMS with functionality such as text messaging.

focuses only on a subset of "all devices". This work is an additional step toward NENA's goal of providing non-voice messaging support and is being done within the chartered scope of the Next Generation Messaging Working Group, which states:

> The NG Messaging Working Group will initially focus on IP based originating networks (e.g., LTE and WiMAX, and subsequently, other wireless and wireline technologies), that send non-voice messages into an ESInet. The outputs will be as "access technology" neutral as possible.
>
> Note: The initial focus will be 4G technologies such as LTE and WiMAX, and may be expanded to include other originating network technologies after this initial critical "forward looking" work is completed, or even while in progress.

Therefore, this Information Document specifically limits its applicability to meet the following NVC Emergency Services definition:

> Non-Voice-Centric (NVC) Emergency Services are next generation emergency services supporting non-voice centric communications between end users and emergency authorities using real-time session-based text and other multi-media. NVC Emergency Services supports location determination of the end device, location updates, and location transport in a manner similar to next generation emergency voice communications. NVC Emergency Services support additional media in a two-way voice emergency communications session between end users and emergency authorities (e.g., - PSAPs). NVC Emergency Services may also support use cases for emergency services without requiring two-way emergency voice communications.

This document identifies suggested requirements for NVC Emergency Service. The NVC Emergency Services suggested requirements are subdivided into the following categories: end-to-end general requirements, end user device suggested requirements, origination network suggested requirements, and Emergency Services IP network (ESInet) requirements.

Although the end user device requirements (Section 3.2) and the origination network requirements (Section 3.3) are out-of-scope for NENA to develop specifications for, suggested requirements are listed here to provide an end-to-end context for NVC Emergency Services. These suggested requirements will be liaised to the appropriate Standards Development Organizations (SDOs) for consideration in addressing NVC Emergency Services.

NENA will utilize the emergency services IP network requirements (Section 3.4) in addressing NVC Emergency Services capabilities at the PSAP. These requirements are intended to be compatible with the NG9-1-1 i3/ ESInet requirements in the NENA i3 Technical Requirements Document, NENA 08-751 [2], and satisfy the NG9-1-1 i3 Stage 3 Technical Standards document, NENA 08-003. [4].

The requirements to be defined for the support of specialized emergency services and devices specifically designed for the "individual with disabilities" communities may differ from the more general NVC Emergency Services requirements.

2 Introduction

2.1 Operations Impacts Summary

This document will have a significant impact on the operational aspects of a PSAP. New data formats, new functions, new call sources, new media types, and new security challenges required for NVC Emergency Services will have an impact on PSAP operations. NENA Operations Committees will need to provide appropriate procedures to accommodate NVC Emergency Services specifications outlined in this document.

2.2 Technical Impacts Summary

NVC Emergency Services is a part of the overall Next Generation 9-1-1 project. The suggested requirements defining a NVC Emergency Services solution are identified in Section 3 (Technical Description).

2.3 Security Impacts Summary

NVC Emergency Services are next generation emergency services that utilize applications in support of non-voice centric communications between end users and emergency authorities using real-time session-based text and other multi-media. NVC Emergency Services supports location determination of the end device, location updates, and location transport in a manner similar to next generation emergency voice communications, in addition to supporting additional media in two-way voice emergency communications between end users and emergency authorities (e.g. - PSAPs). Delivery of location information to PSAPs should be protected against unauthorized disclosure and alteration in a similar manner to next generation voice emergency services.

2.4 Document Terminology Reason for Issue/Reissue

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".

2.5 Reason for Issue/Reissue

NENA reserves the right to modify this document. Upon revision, the reason(s) will be provided in the table below.

Version	Approval Date	Reason For Changes
NENA 73-501 v1	01/11/2011	Initial Document
NENA 73-501 v1.1	05/30/2015	Update web page links

2.6 Recommendation for Additional Development Work

The next generation emergency services suggested requirements developed through the NG Messaging Working Group's efforts are focused on IP based non-voice-centric emergency service requests. A significant portion of the use cases that were used to develop these requirements are based on IP wireless communication services. It is therefore appropriate as the next step in the development process for non-voice emergency services to hand off this list of requirements to the wireless standards development community. In addition, since the focus on NENA's emergency services efforts are in North America, it is appropriate to work with a U.S. focused wireless standards development organization (SDO) such as the Alliance for Telecommunications Industry Solutions (ATIS) Wireless Technologies and Systems Committee (WTSC) through the existing NENA-ATIS/Emergency Services Interconnection Forum (ESIF) liaison relationship and international standards development organizations to support roaming and devices purchased outside North America. These requirements can, through this relationship, be liaised to the global wireless SDOs, such as Third Generation Partnership Project (3GPP), 3GPP2, Open Mobile Alliance (OMA), and WiMAX Forum, for consideration as part of their own international non-voice emergency services standards.

2.7 Date Compliance

All systems that are associated with the 9-1-1 process shall be designed and engineered to ensure that no detrimental, or other noticeable impact of any kind, will occur as a result of a date/time change up to 30 years subsequent to the manufacture of the system. This shall include embedded application, computer based or any other type application.

To ensure true compliance, the manufacturer shall upon request, provide verifiable test results to an industry acceptable test plan such as Telcordia GR-2945 or equivalent.

2.8 Anticipated Timeline

As this is a component of a major change to the 9-1-1 system, adoption of these requirements will take several years. Experience with the immediately prior major change to 9-1-1 suggests that unless consensus among government agencies at the local, state and federal levels, as well as carriers, vendors and other service providers is reached, implementation for the majority of PSAPs could take a long time.

2.9 Costs Factors

NVC Emergency Services is an all-new component of the 9-1-1 system. At this time it is difficult to predict the costs and more work will be needed by vendors and service providers to determine the impact of the changes on their products and operations. The charge to the NG Messaging Working Group was to not consider cost in making decisions. Estimating the cost to deploy NVC Emergency Services will be the purview of other groups within NENA.

2.10 Future Path Plan Criteria for Technical Evolution

In present and future applications of all technologies used for 9-1-1 call and data delivery, it is a requirement to maintain the same level or improve on the reliability and service characteristics inherent in present 9-1-1 system design.

New methods or solutions for current and future service needs and options should meet the criteria below. This inherently requires knowledge of current 9-1-1 system design factors and concepts, in order to evaluate new proposed methods or solutions against the Path Plan criteria.

Criteria to meet the Definition/Requirement:

1. Reliability/dependability as governed by NENA's technical standards and other generally accepted base characteristics of E9-1-1 service
2. Service parity for all potential 9-1-1 callers from any NVC Emergency Services device
3. Least complicated system design that results in fewest components to achieve needs (simplicity, maintainable)
4. Maximum probabilities for call and data delivery with least cost approach
5. Documented procedures, practices, and processes to ensure adequate implementation and ongoing maintenance for 9-1-1 systems

This basic policy is a guideline to focus technical development work on maintaining fundamental characteristics of E9-1-1 service by anyone providing equipment, software, or services.

2.11 Cost Recovery Considerations

It will require some cost to upgrade an existing E9-1-1 system to a NG9-1-1 system which supports NVC Emergency Services. The current system is funded with a combination of special-purpose, dedicated 9-1-1 fees and state revenues. These funding sources have remained virtually unchanged since they were first established years ago. Existing states laws and regulations may not take into consideration NG9-1-1.

2.12 Additional Impacts (non cost related)

NVC Emergency Services is a part of the overall Next Generation 9-1-1 project. There will be significant impacts to the entire 9-1-1 system resulting from the changes in networks and devices as described in this document. It is expected that end user devices and origination networks will ultimately evolve, and that the i3 solution will allow this evolution to take place over time. Many systems in a PSAP must eventually change. New end-to-end messaging relationships must be established.

2.13 Intellectual Property Rights Policy

NENA takes no position regarding the validity or scope of any Intellectual Property Rights or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights might or might not be available; nor does it represent that it has made any independent effort to identify any such rights.

NENA invites any interested party to bring to its attention any copyrights, patents or patent applications, or other proprietary rights that may cover technology that may be required to implement this standard.

Please address the information to:

National Emergency Number Association
National Emergency Number Association
1700 Diagonal Rd, Suite 500
Alexandria, VA 22314
202.466.4911
or commleadership@nena.org

2.14 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. See NENA Master Glossary of 9-1-1 Terminology located on the NENA web site for a complete listing of terms used in NENA documents.

.

The following Acronyms are used in this document:

Acronym	***Description***
3GPP	3rd Generation Partner Project
3GPP2	3rd Generation Partnership Project 2
ATIS	Alliance for Telecommunications Industry Solutions
NVC	Non-Voice-Centric
OMA	Open Mobile Alliance
WTSC	Wireless Technologies and Systems Committee
PTSC	Packet Technologies and Systems Committee
ESIF	Emergency Services Interconnection Forum

The following Terms and Definitions are used in this document:

Term	***Definition***	*****N)ew (U)pdate***
Non-Voice-Centric (NVC) Emergency Services	Non-Voice -Centric (NVC) Emergency Services are next generation emergency services supporting non-voice centric communications between end users and emergency authorities using real-time session-based text and other multi-media. NVC Emergency Services supports location determination of the end device, location updates, and location transport in a manner similar to next generation emergency voice communications. NVC Emergency Services support additional media in a two-way voice emergency communications session between end users and emergency authorities (e.g., - PSAPs). NVC Emergency Services may also support use cases for emergency	N

	services without requiring two-way emergency voice communications.	
Non-Voice-Centric (NVC) Emergency Services Device	A Non-Voice-Centric (NVC) Emergency Services device is a next generation end user device (e.g.,- wireless LTE device) that utilizes pre-loaded applications to provide non-voice emergency communications, and supports location determination of the end device, location updates, and location transport in a manner similar to next generation emergency voice communications. NVC Emergency Services support additional media in a two-way voice communications between end users and emergency authorities (e.g.,- PSAPs). A NVC Emergency Services device may also support use cases for emergency services without requiring two-way emergency voice communications.	N

3 Technical Description

The section defines the suggested requirements for Non-Voice-Centric Emergency Services that are necessary to support use cases identified in Annex A.

Although the end user device requirements and the origination network requirements are out-of-scope for NENA, these requirements are listed here to provide guidance on the end-to-end context for NVC Emergency Services. These suggested requirements will be liaised to the appropriate Standards Development Organizations (SDOs) for consideration in addressing NVC Emergency Services.

NENA will utilize the NG9-1-1 i3 / ESInet requirements in addressing NVC Emergency Services capabilities at the PSAP. These requirements are intended to be compatible with the requirements in the NENA i3 Technical Requirements Document [2].

The requirements defined for the support of specialized emergency services and devices for the special needs communities may differ from the NVC Emergency Services requirements.

3.1 End-to-End General Requirements

0100-0100 Entities which support the use of NVC Emergency Services shall support end user initiated two-way emergency communications between end users and emergency authorities.
0100-0200 NVC Emergency Services may support real-time session-based text and other multi-media (e.g., file transfer of pictures or pre-recorded video clips), real-time video services, and supplementary real-time audio (e.g., background sound) or video.
0100-0300 An originating network or end user device may support some or all media types, and support of any specific media by an origination network or end user device may be subject to regional regulatory requirements.

0100-0400 NVC Emergency Services shall support, subject to regional regulatory requirements, text-based communication using Real-Time Text (RTT) [RFC4103] and Session Initiation Protocol (SIP) SIP for Instant Messaging and Presence Leveraging Extensions (SIMPLE) (session mode) [RFC4975, RFC4976]. Support of Extensible Messaging and Presence Protocol (XMPP) [RFC3920, RFC3921] and SIP SIMPLE (pager mode) [RFC3428] should be considered as a future study item.
0100-0500 NVC Emergency Services is an enhancement to next-generation emergency capabilities [2,3,4]. Because not all networks, devices, and PSAPs will be enhanced at the same time, a mechanism must be developed to inform end users whether NVC Emergency Services are available for use to report an emergency (e.g., if there is an available i3 PSAP) . It is desirable for users to be informed before attempting to make NVC emergency services call.
0100-0600 Delivery of location information to PSAPs associated with a NVC Emergency Services session should be protected against unauthorized disclosure and alteration in a similar manner to next generation voice emergency services. NVC Emergency Services data not provided by the origination network cannot be attested to or vouched for by the network operator.
0100-0700 NVC Emergency Services is not a subscription service. Access to NVC Emergency Services should be available to all end users utilizing NVC Emergency Services capable devices.

3.2 NVC Emergency Services Device Suggested Requirements

0200-0100 An NVC Emergency Services device should be voice capable.
0200-0200 An NVC Emergency Services device should be capable of detecting an emergency service request and marking it (e.g., in a similar manner as an NG9-1-1 voice call) for the benefit of the serving network.
0200-0300 An NVC Emergency Services device should be able to receive a voice call from a PSAP.
0200-0400 An NVC Emergency Services device should be able to download available destinations (e.g. – dial string, service URN) for emergency call detection.
0200-0500 An NVC Emergency Services device shall be pre-loaded with at least one application suitable for NVC Emergency Services.
0200-0600 Once a device is aware that a NVC Emergency Services session has been initiated, the device should (subject to user configuration) avoid drawing unnecessary attention to the user (e.g., playing audible tones or flashing brightly) and should confirm this to the user in as private a manner as is reasonable, such as using text on the screen or audio if headphones are already connected. Behavior in an emergency text situation may need to be different relative to the normal configuration.
0200-0700 When roaming, an NVC Emergency Services device shall originate NVC Emergency Services using the same network (e.g., home or visited) in a manner similar to next generation emergency voice communications.
0200-0800 The NVC Emergency Services device should clearly differentiate emergency text sessions from non-emergency text sessions on the user display.
0200-0900 The NVC Emergency Services device should be able to deliver recorded media in a form that allows progressive playback. (It is desirable that all pre-recorded media sent during an emergency be progressively viewable.)
0200-1000 When adding additional media to an existing session, the user must be made aware when additional media is requested by the PSAP, and must be able to permit or deny it.

3.3 Origination Network Suggested Requirements

0300-0100 It shall be possible to authenticate the end user device subject to regional regulatory requirements.
0300-0200 It shall be possible to provide integrity protection, and/or privacy for NVC Emergency Services similar to what will be provided for next generation voice emergency services.
0300-0300 NVC Emergency Services shall transport location information to the PSAP in the same manner as next generation voice emergency services
0300-0400 The origination network may provide a capability to enable a NVC Emergency Services device to obtain local emergency numbers or other emergency address(es) (e.g., destination address) in the same manner as next generation voice emergency services.
0300-0500 NVC Emergency Services shall be provided in the same network (e.g., home or visited) in a manner similar as for next generation emergency voice services.
0300-0600 NVC Emergency Services should provide a high level of reliability and low delay in the delivery of signaling and content. (The quality of service requirements for specific media classes are reserved for future study.)
0300-0700 NVC Emergency Services shall utilize the same priority mechanisms as next generation emergency voice services.
0300-0800 Detailed log records of the NVC Emergency Services session should be generated by the origination network in a similar manner to next generation emergency voice services. Note: Media is not required to be logged in the origination network.
0300-0900 NVC Emergency Services shall support any kind of emergency numbers, emergency SIP and TEL URIs and special indications for emergency sessions within the SIP signaling in the same manner as next generation voice emergency services.
0300-1000 In cases where a NVC Emergency Services device can't detect an emergency service request, the emergency session should still be detected and supported by an origination network that supports NVC Emergency Services.
0300-1100 All emergency content shall be carried with an indication of the source, in a similar manner as for next generation emergency voice services.
0300-1200 During an emergency session, the origination network must deliver subsequent NVC Emergency Services content to the same ESInet as the initial media and call setup signaling at the beginning of the non-voice emergency session.
0300-1300 The origination network shall be responsible for routing NVC Emergency Services signaling and content to the appropriate ESInet.

3.4 Emergency Services IP Network Requirements

0400-0100 In NVC Emergency Services situations, the NG9-1-1 i3 / ESInet shall provide a capability to route to an alternate PSAP when necessary.
0400-0200 Within an NG9-1-1 i3 / ESInet, all NVC Emergency Services attempts shall be logged and the data made available as required by the PSAP.

0400-0300 An NG9-1-1 i3 / ESInet shall be able to transfer NVC Emergency Services content to an appropriate alternate destination if the situation is not an emergency.
0400-0400 During an emergency session, the NG9-1-1 i3 / ESInet must deliver subsequent NVC Emergency Services content to the same PSAP as the initial content and call setup signaling at the beginning of the non-voice emergency session.
0400-0500 The NG9-1-1system shall have the capability to associate all emergency sessions and content with the originating caller.
0400-0600 The PSAP shall be able to acknowledge setup of the NVC Emergency Services session back to the originating caller.
0400-0700 The NG9-1-1 i3 / ESInet shall be responsible for routing NVC Emergency Services sessions to the appropriate PSAP.
0400-0800 Within an NG9-1-1 i3 / ESInet, it shall be possible to associate non-voice sessions and voice calls from the same caller together.
0400-0900 Detailed log records of a NVC Emergency Services session should be generated by an NG9-1-1 i3 / ESInet.
0400-1000 The NG9-1-1 i3 / ESInet shall be responsible for any logging of multi-media that may be needed for post processing.

4 Recommended Reading and References

1. NENA Master Glossary of 9-1-1 Terminology, National Emergency Number Association, NENA ADM-000
2. i3 Technical Requirements Document, National Emergency Number Association, NENA 08-751
3. NENA Functional and Interface Standards for Next Generation 9-1-1 Version 1.0 (i3), National Emergency Number Association, NENA 08-002
4. NENA Detailed Functional and Interface Specification for the NENA i3 Solution – Stage 3, National Emergency Number Association, NENA 08-003 (yet to be published)

5 Exhibits

Annex A contains eighteen NVC Emergency Services use cases to provide example scenarios of the usage of next generation messaging to PSAPs in support of non-voice centric emergency communications. The following is a summary of the use cases detailed in Annex A:

1. Text Message from NVC Emergency Services Mobile Device to Emergency Services
2. Text Message from an NVC Emergency Services Device to Emergency Services with Multimedia Provided
3. Emergency Communication from an NVC Emergency Services Device to a PSAP with the Addition of Pictures
4. Emergency Communication from an NVC Emergency Services Device to a PSAP with the Addition of Pre-recorded Video

5. Emergency Communication from an NVC Emergency Services Device to a PSAP with the Addition of Real-time Video
6. Emergency Text Messaging in a Non-Emergency Situation
7. Delayed Transmission of Pictures of an Emergency Situation by an NVC Emergency Services Device Associated with Voice Communications to a PSAP
8. Delayed Transmission of Pre-recorded Video of an Emergency Situation by an NVC Emergency Services Device Associated with Voice Communications to a PSAP
9. Delayed Transmission of Real-time Video of an Emergency Situation by an NVC Emergency Services Device Associated with Voice Communications to a PSAP
10. Emergency Communication by an NVC Emergency Service Device to a PSAP using Text Messaging Service
11. Text Messaging from an NVC Emergency Services Device to Emergency Services with Location Change
12. Transmission of Pictures from an NVC Emergency Services Device in a Non-Voice Interaction with a PSAP
13. Transmission of Pre-recorded Video from an NVC Emergency Services Device in a Non-Voice Interaction with a PSAP
14. Transmission of Real-time Video from an NVC Emergency Services Device in a Non-Voice Interaction with a PSAP
15. Differentiating Emergency Experiences
16. Adding Media to a Text-Initiated Emergency Call from an NVC Emergency Services Device
17. Using Sign Language in Real-time Video between an NVC Emergency Services Device and a PSAP
18. Using Sign Language in Real-time Multi-Video Conferencing among an NVC Emergency Services Device, PSAP and a Third-Party Relay Operator

Annex A

NVC Emergency Services Use Cases

1. Text Message from NVC Emergency Services Mobile Device to Emergency Services

Short Description
Bob has a mobile device with NVC Emergency Services text messaging application. In an emergency situation, Bob decides to send a message to Emergency Services.

Actors
Bob – MS Device user
Carol – E9-1-1 call taker.

Pre-conditions
Bob's MS supports NVC Emergency Services text messaging. The underlying Radio Access Network used by the MS is not specifically relevant to the use case. The PSAP for which Carol works is configured to receive text messaging.

Post-conditions
The text message originated by Bob was delivered to Carol at the PSAP
.

Normal Flow
1. Bob already has his mobile device turned on.
2. Bob encounters an Emergency situation in which it would be dangerous to make a voice call, e.g., armed robbery in the convenience store where he is a customer. (It cannot be assumed that Bob is deaf, deaf-blind hard of hearing, or has a speech disability.)
3. Bob composes a text message describing the emergency, and sends the message to "9-1-1" or "SOS" or another string known to designate the destination as Emergency Services.
4. The text message is sent to the PSAP, along with the Bob's location. (A callback phone number may be also included.)
5. Carol, who works at the PSAP, receives the message. Carol sends a message back to Bob asking questions, and Bob responds. Bob's device is configured so that it does not beep or make noise when the response from the PSAP is received.
6. Carol decides that dispatching an Emergency Response team is warranted, and sends the response team to Bob's location.
7. Carol sends a message to Bob advising that help is on the way.

2. Text Message from an NVC Emergency Services Device to Emergency Services with Multimedia Provided

Short Description

Bob has a mobile device with NVC Emergency Services text messaging application. In an Emergency situation, Bob decides to send a message to Emergency Services (ES), and then follows this up with transmission of additional content.

Actors

Bob – MS Device user

Carol – E9-1-1 call taker.

Pre-Conditions

Bob's MS supports NVC Emergency Services text messaging. . The underlying Radio Access Network used by the MS is not specifically relevant to the use case. The PSAP for which Carol works is configured to receive text messaging, as well as additional content, during an Emergency session.

Post-Conditions

The text message originated by Bob was delivered to Carol at the PSAP, and follow-up with additional content is also delivered successfully.

Normal Flow

1. Bob already has his mobile device turned on.
2. Bob encounters an Emergency situation in which it would be dangerous to make a voice call, e.g., armed robbery in the convenience store where he is a customer. (It cannot be assumed that Bob is deaf, deaf-blind, hard of hearing, or has a speech disability.)
3. Bob composes a text message describing the Emergency, and sends the message to "9-1-1" or "SOS" or another string known to designate the destination as Emergency Services.
4. The text message is sent to the PSAP, along with the Bob's location.
5. Carol, who works at the PSAP, receives the message. Carol sends a message back to Bob, asking questions, and Bob responds. Bob's device is configured so that it does not beep or make noise when the response from the PSAP is received.
6. Bob manages to take a photo of the scene where the Emergency is occurring, using the digital camera in his MS device, and sends this back to Carol.
7. Carol decides that dispatching an Emergency Response team is warranted, and sends the response team to Bob's location.
8. Carol sends a message to Bob advising that help is on the way.

Alternative Flows

Alternate Flow 1: same as above, except that Step 6 changes as follows:

- Bob sets up real-time streaming video capture of the scene where the Emergency is occurring, using the digital camera in his MS device, and sends this back to Carol.

Alternate Flow 2: same as above, except that Step 6 changes as follows:

- Bob uploads a file to Carol which is pertinent to the Emergency scene. For example, the file could be a pre-recorded .mpg video file that Bob took prior to starting the Emergency session with Carol. Another

possibility is that the file is a data file containing results from some chemical or radioactive sensors that are embedded in, or attached to, Bob's MS device.

Exceptions
The local PSAP policy may ban reception of live video streams, by default, and Carol may have to enable permissions for that session only. Alternatively, the emergency session may have to be restarted as a video call.

3. Emergency Communication from an NVC Emergency Services Device to a PSAP with the Addition of Pictures

Short Description
A NVC Emergency Services session establishes a voice communication with a PSAP to report an emergency situation. The communication includes the transmission of pictures of an emergency situation to the PSAP.

Actors
Bob is the emergency caller and Carol is the PSAP call taker receiving the emergency communication.

Pre-Conditions
The emergency communication and the transmission of pictures of an emergency situation will be sent to a PSAP using a NVC Emergency Services capable device.

In addition, the transmission of pictures of an emergency situation may be sent to a PSAP either in the same session utilizing the same network address as was established for the voice communication, or in a separate session that utilizes network addressing separate from the network address that was established to route the voice communication to the PSAP.

Note: A separate session requires that the destination be recognized as an emergency destination address for the session to be treated as an emergency session.

Note: The PSAP has the capability to attribute all emergency sessions and content to the originating device.

Note: Emergency sessions should be prioritized over non-emergency sessions by the network. All content utilizes the same priority mechanisms as next generation emergency voice services.

Post Conditions
Carol continues the voice communication with Bob while she reviews the pictures that were transmitted to her using a NVC Emergency Services capable device. With this information she is able to provide support to Bob as well as dispatch the necessary emergency response units.

Any short term storage or retention of the pictures is the responsibility of the PSAP system. The pictures that were transmitted to Carol are not required to be stored in the transport network

Normal Flow
1. Bob initiates a NVC Emergency Services session to establish a voice communication to report an emergency situation

2. As Bob is describing the emergency situation to Carol, she asks him if he can send a few pictures of the site
3. Bob takes several pictures with the same NVC Emergency Services device that he used to initiate the voice communication
4. Bob takes the pictures while the voice communication with Carol continues
5. Based upon information available to Bob, he then immediately uses the original communication session to forward the pictures to Carol using his NVC Emergency Services capable device

Alternative Flow

1. Bob initiates a NVC Emergency Services session to establish a voice communication to report an emergency situation
2. As Bob describing the emergency situation to Carol, she asks him if he can send a few pictures of the site
3. Bob takes several pictures with the same NVC Emergency Services capable device that he used to initiate the voice communication
4. Bob takes the pictures while the voice communication with Carol continues
5. Based upon information available to Bob, then immediately establishes a separate communication session to forward the pictures to Carol using his NVC Emergency Services capable device

Note: Bob must enter an emergency destination address in order for the session to have emergency handling.

Exceptions

None

4. Emergency Communication from an NVC Emergency Services Device to a PSAP with the Addition of Pre-recorded Video

Short Description

A NVC Emergency Services session establishes a voice communication with a PSAP to report an emergency situation. The communication includes the transmission of a video recording of an emergency situation to the PSAP.

Actors

Bob is the emergency caller and Carol is the PSAP call taker receiving the emergency communication.

Pre-Conditions

The emergency communication and the transmission of the video recording of an emergency situation will be sent to a PSAP using a NVC Emergency Services capable device.

In addition, the transmission of the video recording of an emergency situation may be sent to a PSAP either in the same session utilizing the same network address as was established for the voice communication, or in a

separate session that utilizes network addressing separate from the network address that was established to route the voice communication to the PSAP.

Note: The PSAP has the capability to attribute all emergency sessions and content to the originating device.

Note: Emergency sessions should be prioritized over non-emergency sessions by the network. All content utilizes the same priority mechanisms as next generation emergency voice services.

Post Conditions

Carol continues the voice communication with Bob while she reviews the video recording that was transmitted to her using a NVC Emergency Services capable device. With this information she is able to provide support to Bob as well as dispatch the necessary emergency response units.

Any short term storage or retention of the video recording is the responsibility of the PSAP system. The video recording that was transmitted to Carol is not required to be stored in the transport network.

Normal Flow

1. Bob initiates a NVC Emergency Services session to establish a voice communication to report an emergency situation
2. As Bob is describing the emergency situation to Carol, she asks him if he can send a video recording of the site
3. Bob makes the video recording with the same NVC Emergency Services capable device that he used to initiate the voice communication
4. Bob makes the video recording while the voice communication with Carol continues
5. Based upon information available to Bob, he then immediately uses the original communication session to forward the video recording as multi-media message to Carol using his NVC Emergency Services capable device

Alternative Flow

1. Bob initiates a NVC Emergency Services session to establish a voice communication to report an emergency situation
2. As Bob is describing the emergency situation to Carol, she asks him if he can send a video recording of the site
3. Bob makes the video recording with the same NVC Emergency Services capable device that he used to initiate the voice communication
4. Bob makes the video recording while the voice communication with Carol continues
5. Based upon information available to Bob, he then immediately establishes a separate
6. communication session to forward the video recording as multi-media message to Carol using his NVC Emergency Services capable device

Exceptions

None

5. Emergency Communication from an NVC Emergency Service Device to a PSAP with the Addition of Real-time Video

Short Description

A NVC Emergency Services session establishes a voice communication with a PSAP to report an emergency situation. The communication includes the transmission of a real-time video of an emergency situation to the PSAP.

Actors

Bob is the emergency caller and Carol is the PSAP call taker receiving the emergency communication.

Pre-Conditions

The emergency communication and the transmission of the real-time video of an emergency situation will be sent to a PSAP using a NVC Emergency Services capable device.

In addition, the transmission of the real-time video of an emergency situation may be sent to a PSAP either in the same session utilizing the same network address as was established for the voice communication, or in a separate session that utilizes network addressing separate from the network address that was established to route the voice communication to the PSAP.

Note: A separate session requires that the destination be recognized as an emergency destination address for the session to be treated as an emergency session.

Note: The PSAP has the capability to attribute all emergency sessions and content to the originating device.

Note: Emergency sessions should be prioritized over non-emergency sessions by the network. All content utilizes the same priority mechanisms as next generation emergency voice services.

Post Conditions

Carol continues the voice communication with Bob while she reviews the real-time video that was transmitted to her using a NVC Emergency Services capable device. With this information she is able to provide support to Bob as well as dispatch the necessary emergency response units.

Any short term storage or retention of the real-time video is the responsibility of the PSAP system. The real-time video that was transmitted to Carol is not required to be stored in the transport network.

Normal Flow

1. Bob initiates a NVC Emergency Services session to establish a voice communication to report an emergency situation
2. As Bob is describing the emergency situation to Carol, she asks him if he can provide a real-time video of the site
3. Bob begins streaming real-time video with the same NVC Emergency Services capable device that he used to initiate the voice communication

4. Based upon information available to Bob, he immediately starts streaming real-time video to Carol as part of the original communication session using his NVC Emergency Services capable device
5. Bob streams real-time video while the voice communication with Carol continues

Alternative Flow

1. Bob initiates a NVC Emergency Services session to establish a voice communication to report an emergency situation
2. As Bob is describing the emergency situation to Carol, she asks him if he can provide a real-time video of the site
3. Bob begins streaming real-time video with the same NVC Emergency Services capable device that he used to initiate the voice communication
4. Based upon information available to Bob, he immediately establishes a separate communication session to start streaming real-time video to Carol using his NVC Emergency Services capable device
5. Bob streams real-time video while the voice communication with Carol continues

Note: Bob must enter an emergency destination address in order for the session to have emergency handling.

Exceptions

None

6. Emergency Text Message in a Non-Emergency Situation

Short Description

Even though 3-1-1 is available for non-emergency calls in some municipalities, 9-1-1 is often called for these situations. Because they are non-emergencies (for example, a failed traffic light or a stranded car off the road), the situation persists for a longer period without a response, generating multiple calls for the same incident. Moreover, the social context in which texting is used today – as an informational message, less intrusive than a direct voice call and the user not experiencing the responsibility of direct contact with the call taker – will encourage more non-emergency calls via text. Whatever level of non-emergency voice calls a PSAP is experiencing today, regardless of a 3-1-1 presence, it is reasonable to expect even more when they begin to accept text messages.

Actors

Bob, Ted and Mary are the message senders and Carol is the PSAP message taker receiving the incoming text messages.

Pre-Conditions

Bob, Ted and Mary have all made a decision to send an informational text message to 9-1-1. They each may or may not know of the availability of a non-emergency channel (3-1-1 or other line) for this type of communication. They may deem this situation to be slightly more urgent than the 3-1-1 line would handle or they may be unaware of an alternative non-emergency line. However, they have made a choice not to call 9-1-1 and to use NVC Emergency Services texting because the situation does not warrant a direct voice call or they do not want the direct personal involvement and responsibility associated with a live call.

Carol is unaware whether these are emergency situations or not prior to examining them. They are not associated with any other call or prior information.

Bob, Ted and Mary are all sending a message about the same event, though Carol does not know this at the time of reception.

The messages may or may not have video (still or motion) associated with them.

Post-Conditions

A large number of text messages could be received at the PSAP for this event and because it is a non-emergency situation, it may persist for a long period as responding to it cannot be a priority.

Any short term storage or retention of the messages is the responsibility of the NG9-1-1 system.

Normal Flow

1. Bob send a text message to 9-1-1 to report that the traffic light at State and Main is out
2. Carol receives this message and responds with a pre-formatted standard reply message acknowledging receipt with a pre-formatted standard reply message.
3. Seconds later, Mary sends a message that a driver failed to stop at this non-functioning light and nearly hit her. Carol acknowledges it with a pre-formatted standard reply message.
4. Carol dispatches a responder to the scene.
5. Messages continue to stream in until someone is directing traffic or the light is corrected.

Alternative Flows

Alternative Flow #1

1. Bob send a text message to 9-1-1 to report that the traffic light at State and Main is out.
2. Carol replies with a text to question Bob on the status: is the power out? Is it flashing red or yellow? Is the intersection congested, etc.?

Alternative Flow #2

1. Bob send a text message to 9-1-1 to report that the traffic light at State and Main is out.
2. Carol calls Bob on his mobile phone (the same number in the text message) to question Bob on the status: is the power out? Is it flashing red or yellow? Is the intersection congested, etc.?

Alternative Flow #3

1. Bob, Ted and Mary all send text messages on the same event as before.
2. After the first few messages, Carol composes a detailed response that states that police are aware of the situation and a response is underway. This message is sent out as a response to every subsequent text message on this subject.

Exceptions

None

7. Delayed Transmission of Pictures of an Emergency Situation by an NVC Emergency Service Device Associated with Voice Communications to a PSAP

Short Description

Some time after a voice communication with a PSAP to report an emergency situation has ended, pictures of the emergency site are transmitted to the PSAP.

Actors

Bob is the emergency caller and Carol is the PSAP call taker receiving the emergency communication.

Pre-Conditions

After Bob completes a voice communication with a PSAP to report an emergency situation, he waits a while and then takes several pictures of the emergency site and transmits the pictures to the PSAP using an NVC Emergency Services application on the device. The pictures should be transmitted to the PSAP in a timeframe that is reasonably associated with the duration of the emergency situation. As the pictures are received at the PSAP, they must be associated with the voice communication that Bob made to report the emergency situation.

Post Conditions

As the pictures are received at the PSAP, they are associated with the earlier voice communication that Bob made to report the emergency situation. The pictures are handed off to Carol, as the PSAP operator handling this emergency situation. After Carol reviews the pictures that were transmitted, she is then able to dispatch additional emergency response units.

Short term storage or retention of the pictures is the responsibility of the PSAP system. The pictures that were transmitted to Carol are not required to be stored in the transport network

Normal Flow

1. Bob completes a voice communication to report an emergency situation
2. Bob informs Carol that he is able to take pictures of the emergency site and can send them to her.
3. Carol provides Bob with instructions (e.g., destination address) for the pictures from Bob.
   Note: The destination address must be an emergency destination address in order for the session to have emergency handling by the device and originating network. (Carol can provide these instructions using any appropriate mechanism available e.g, manually, text message, pushed application, etc)
4. After some time has passed, Bob takes several pictures of the emergency site
5. Based upon information previously provided to Bob by Carol, he then forwards the pictures

to Carol

Alternative Flows
None

Exceptions
None

8. Delayed Transmission of Pre-recorded Video of an Emergency Situation by an NVC Emergency Service Device Associated with Voice Communications to a PSAP

Short Description

Some time after a voice communication with a PSAP to report an emergency situation has ended, a video recording of the emergency site is transmitted to the PSAP.

Actors

Bob is the emergency caller and Carol is the PSAP call taker receiving the emergency communication.

Pre-Conditions

After Bob completes a voice communication with a PSAP to report an emergency situation, he waits a while and then makes a video recording of the emergency site and transmits the video recording to the PSAP using an NVC Emergency Services application on the device. The video recording should be transmitted to the PSAP in a timeframe that is reasonably associated with the duration of the emergency situation. As the video recording is received at the PSAP, it must be associated with the voice communication that Bob made to report the emergency situation.

Post Conditions

As the video recording is received at the PSAP, it is associated with the earlier voice communication that Bob made to report the emergency situation. The video recording is handed off to Carol, as the PSAP operator handling this emergency situation. After Carol reviews the video recording that was transmitted, she is then able to dispatch additional emergency response units.

Short term storage or retention of the video recording is the responsibility of the PSAP system. The video recording that was transmitted to Carol is not required to be stored in the transport network.

Normal Flow

1. Bob engages in a voice communication to report an emergency situation
2. Bob informs Carol that he is able to take video recording of the emergency site and can send that recording to her.
3. Carol provides Bob with instructions (e.g., destination address) for the video recording from Bob. Bob and Carol terminate the voice communication session.

Note: The destination address must be an emergency destination address in order for the session to have emergency handling by the device and originating network.

(Carol can provide these instructions using any appropriate mechanism available e.g, manually, text message, pushed application., etc)

4. After some time has passed, Bob makes a video recording of the emergency site
5. Based upon information previously provided to Bob by Carol, he then forwards the video recording to Carol

Alternative Flows
None

Exceptions
None

9. Delayed Transmission of Real-time Video of an Emergency Situation by an NVC Emergency Service Device Associated with Communications to a PSAP

Short Voice Description

Some time after a voice communication with a PSAP to report an emergency situation has ended, real-time video of the emergency site is transmitted to the PSAP.

Actors

Bob is the emergency caller and Carol is the PSAP call taker receiving the emergency communication.

Pre-Conditions

After Bob completes a voice communication with a PSAP to report an emergency situation, he waits a while and then starts to transmit a real-time video of the emergency site to the PSAP using an NVC Emergency Services application on the device. The real-time video should be transmitted to the PSAP in a timeframe that is reasonably associated with the duration of the emergency situation. As the real-time video is received at the PSAP, it must be associated with the voice communication that Bob made to report the emergency situation.

Post Conditions

As the real-time video is received at the PSAP, it is associated with the earlier voice communication that Bob made to report the emergency situation. The real-time video is handed off to Carol, as the PSAP operator handling this emergency situation. After Carol reviews the real-time video being transmitted, she is able to dispatch additional emergency response units.

Short term storage or retention of the real-time video is the responsibility of the PSAP system. The real-time video that was transmitted to Carol is not required to be stored in the transport network.

Normal Flow

1. Bob engages in a voice communication to report an emergency situation
2. Bob informs Carol that he is able to take real-time video of the emergency site and can send that recording to her
3. Carol provides Bob with instructions (e.g., destination address) for streaming real-time video from Bob. Bob and Carol terminate the voice communication session.
   Note: The destination address must be an emergency destination address in order for the session to have emergency handling by the device and originating network.

   (Carol can provide these instructions using any appropriate mechanism available e.g, manually, text message, pushed application, etc)
4. After some time has passed, Bob begins streaming real-time video of the emergency site
5. Based upon information previously provided to Bob by Carol, he streams the real-time video to Carol

Alternative Flows
None

Exceptions
None

10. Emergency Communication by an NVC Emergency Service Device to a PSAP using Text Messaging Service

Short Description
The use cases allow the text messaging service to be supported as an add-on experience to the voice 9-1-1 experience, instead of a standalone or a separate experience.

Upon dialing 9-1-1, the PSAP offers the caller the option of using text messaging service if it is supported by the PSAP. The text messaging service is supported concurrently with voice call.

The text messaging session between 9-1-1 caller and PSAP has the following characteristics:

The caller initiates a voice call to 9-1-1 using an NVC Emergency Services application on the device.

The caller may choose to communicate with PSAP via either voice call, or text messaging, or both at the same time. The caller and PSAP maintain the concurrent 911 voice call (maybe silent) while they exchange the text messages. If for any reason the text messaging service cannot be used, then the 9-1-1 caller and PSAP call taker can fall back to use the voice call to 9-1-1.

Actors
Bob is the emergency caller and Carol is the PSAP call taker receiving the emergency communication.

Pre-Conditions
The PSAP supports the messaging service concurrent with voice session.

The user device supports NVC Emergency Services text messaging concurrent with voice session for emergency call.

The wireless network supports messaging service concurrent with voice session for emergency call.

Post Conditions

The 9-1-1 caller used either messaging service, or voice session or both to communicate with PSAP call taker while maintaining the voice call session to 9-1-1. At the conclusion of the call, the caller or call taker hangs up on the 9-1-1 voice session and stops messaging exchange.

Normal Flow

PSAP uses routable address (e.g. email address or short code) to communicate with caller.

1. Bob uses his mobile phone to dial 9-1-1 to report an emergency situation
2. The call is answered by call taker similar to the existing voice service to 9-1-1.
3. At the same time, if the PSAP supports concurrent messaging service, then the PSAP offers the caller the options to use the messaging service.
   This message uses a routable address (i.e. email address, short code, SIP URL or other type of routable IP address) to uniquely identify the PSAP that initiated the message. (This information can be provided using any appropriate mechanism available e.g, manually, text message, pushed application., etc)

   If Bob chooses to ignore the option to use the concurrent messaging service, then the call between Bob and the call taker would continue, similar to the existing voice service to 9-1-1.
4. If Bob chooses the option to use messaging service, he simply replies to the PSAP with a message.
5. If Carol receives a message from Bob, Carol then exchanges more messages with Bob.
6. The voice session between Carol and Bob remains open. Bob may choose to use either voice or text messaging, or switch back and forth to communicate with Carol. Carol is able to hear the background noise coming from Bob's device. In the mean time, the serving wireless network is able to locate Bob's device and sends the location information to PSAP.
7. Carol obtains the location information of Bob's device. From the message exchange, Carol determines location.
8. Carol sends a message to Bob advising that help is on the way. Carol keeps exchanging messages with Bob until she heard the siren of emergency vehicle arrives at Bob's location.

Alternative Flows

Alternative Flow #1

PSAP does not support messaging service, voice service is used.

Step 3 changes as follows:

The PSAP does NOT have the capability to support messaging service. No option is offered to the caller to use messaging service. Then the call between Bob and the call taker would continue, similar to the existing voice service to 9-1-1.

Alternative Flow #2

PSAP supports messaging service but the mobile device or the serving network does not support it, voice service is used.

Step 5 changes as follows:

If Bob did not see the option to use concurrent messaging service, then the call between Bob and the call taker would continue, similar to the existing voice service to 911

The reason that Bob did not receive the messaging option could be the following:

- The serving wireless network does not support concurrent text messaging for emergency call.
- The device Bob uses does not support concurrent text messaging for emergency call.
- The mobile device Bob uses is not activated for commercial voice service, or commercial text messaging service, or both.

Exceptions

None

11. Text Messaging from an NVC Emergency Services Device to Emergency Services with Location Change

Short Description

Bob has a mobile device with NVC Emergency Services text messaging capability. In an emergency situation, Bob sends a text message to Emergency Services (ES). During the exchange of text messages with the PSAP, the location of Bob's MS changes, and the updated location is obtained by the PSAP.

Actors

Bob – MS user

Carol – 9-1-1 call taker

Pre-Conditions

Bob's MS supports text messaging. The location of the Bob's MS using an NVC Emergency Services application on the device is available, either carried with the text message or acquired by reference from an associated database. The PSAP for which Carol works is configured to receive text messages during an Emergency.

Post-Conditions

The text message originated by Bob was delivered to Carol at the PSAP. During the text message exchange with the PSAP, the updated location of Bob's MS was obtained by the PSAP and the Emergency Response team is dispatched to Bob's location.

Normal Flow

1. Bob turns on his MS if it is not already turned on.

2. Bob encounters an Emergency situation in which it would be dangerous to make a voice call (e.g., hijacking of a bus that Bob is riding).
3. Bob composes a text message describing the Emergency, and sends the message to "9-1-1" or "SOS" or another string known to designate the destination as Emergency Services.
4. The text message is routed to the PSAP associated with the location of Bob's MS. The location of Bob's MS is sent to the PSAP with the text message.
5. Carol, who works at the PSAP, receives the message. Carol sends a message back to Bob, asking questions, and Bob responds. Per NVC Emergency Services configuration, Bob's device does not beep or make noise when the response from the PSAP is received.
6. Based on the information received from Bob, Carol requests and receives updates of Bob's location (i.e., the location of Bob's MS).
7. Carol decides that dispatching an Emergency Response team is warranted, and sends the Emergency Response Team to Bob's updated (or projected) location.
8. Carol sends a message to Bob advising that help is on the way.
9. Carol requests and continues to receive updates of Bob's location. Carol may notify the Emergency Response team of Bob's updated location if necessary.
10. Carol continues to exchange messages with Bob until the Emergency Response team arrives.
11. When the Emergency is resolved, Carol clicks on an icon to indicate completion of the text messaging exchange with Bob. This ends the text messaging session.

Alternative Flow

In this Alternative Flow, the PSAP operator does not receive additional location updates once the Emergency Response team has been deployed.

1. Bob turns on his MS if it is not already turned on.
2. Bob encounters an Emergency situation in which it would be dangerous to make a voice call (e.g., hijacking of a bus that Bob is riding).
3. Bob composes a text message describing the Emergency, and sends the message to "9-1-1" or "SOS" or another string known to designate the destination as Emergency Services.
4. The text message is routed to the PSAP associated with the location of Bob's MS. The location of Bob's MS is sent to the PSAP with the text message.
5. Carol, who works at the PSAP, receives the message. Carol sends a message back to Bob, asking questions, and Bob responds. Per NVC Emergency Services configuration, Bob's device does not beep or make noise when the response from the PSAP is received.
6. Based on the information received from Bob, Carol requests and receives an update of Bob's location (i.e., the location of Bob's MS).
7. Carol decides that dispatching an Emergency Response team is warranted, and sends the Emergency Response Team to Bob's updated location.
8. Carol sends a message to Bob advising that help is on the way.
9. Carol continues to exchange messages with Bob until the Emergency Response team arrives.
10. When the Emergency is resolved, Carol clicks on an icon to indicate completion of the text messaging exchange with Bob. This ends the text messaging session.

Exceptions

None

12. Transmission of Pictures from an NVC Emergency Services Device in a Non-Voice Interaction with a PSAP

Short Description

Reporting details of an emergency situation where no voice communications are initiated but pictures of the emergency site are transmitted to the PSAP by a device with an NVC Emergency Services application.

Actors

Bob is the emergency reporter and Carol is the PSAP operator.

Pre-Conditions

To report details of an emergency situation Bob takes several pictures of the emergency site and wants to transmits the pictures to a PSAP using an NVC Emergency Services application on the device. Bob has already received a set of instruction from the PSAP on how to send the pictures.

Post Conditions

As the pictures are received at the PSAP, they are associated with a specific emergency situation. The pictures are handed off to Carol, as the PSAP operator handling this emergency situation. After Carol reviews the pictures that were transmitted, she is then able to dispatch additional emergency response units.

Short term storage or retention of the pictures is the responsibility of the PSAP system. The pictures that were transmitted to Carol are not required to be stored in the transport network

Normal Flow

1. Bob identifies an emergency situation
2. Bob uses the instruction already provided to transmit pictures of an emergency site to a PSAP using an emergency destination address.
3. Bob takes several pictures of the emergency site
4. He then forwards the pictures of the emergency site to the PSAP
5. At the PSAP the pictures are associated with a specific emergency situation.

Alternative Flows

None

Exceptions

None

13. Transmission of Pre-Recorded Video from an NVC Emergency Services Device in a Non-Voice Interaction with a PSAP

Short Description

Reporting details of an emergency situation where no voice communications are initiated but a video recording of the emergency site is transmitted to the PSAP by a device with an NVC Emergency Services application.

Actors

Bob is the emergency reporter and Carol is the PSAP operator.

Pre-Conditions

To report details of an emergency situation Bob makes a video recording of the emergency site and transmits the video recording to the PSAP using an NVC Emergency Services application on the device.

Post Conditions

As the video recording is received at the PSAP, it is associated with a specific emergency situation. The video recording is handed off to Carol, as the PSAP operator handling this emergency situation. After Carol reviews the video recording that was transmitted, she is then able to dispatch additional emergency response units.

Short term storage or retention of the video recording is the responsibility of the PSAP system. The video recording that was transmitted to Carol is not required to be stored in the transport network.

Normal Flow

1. Bob identifies an emergency situation
2. Bob has prior knowledge of how to send a video recording of an emergency site to a PSAP using an emergency destination address.
3. Bob makes a video recording of the emergency site
4. He then forwards the video r5ecording of the emergency site to the PSAP
5. At the PSAP the video recording is associated with a specific emergency situation.

Alternative Flows

None

Exceptions

None

14. Transmission of Real-time Video from an NVC Emergency Services Device in a Non-Voice Interaction with a PSAP

Short Description

Reporting details of an emergency situation where no voice communications are initiated but real-time video of the emergency site is transmitted to the PSAP by a device with an NVC Emergency Services application.

Actors

Bob is the emergency reporter and Carol is the PSAP operator.

Pre-Conditions

To report details of an emergency situation Bob starts to transmit a real-time video of the emergency site to the PSAP using an NVC Emergency Services application on the device.

Post Conditions

As the real-time video is received at the PSAP, it is associated with a specific emergency situation. The real-time video is handed off to Carol, as the PSAP operator handling this emergency situation. After Carol reviews the real-time video that was transmitted, she is then able to dispatch additional emergency response units.

Short term storage or retention of the real-time video is the responsibility of the PSAP system. The real-time video that was transmitted to Carol is not required to be stored in the transport network.

Normal Flow

1. Bob identifies an emergency situation
2. Bob has prior knowledge of how to stream real-time video of an emergency site to a PSAP using an emergency destination address.
3. Bob starts streaming real-time video of the emergency site to the PSAP
4. At the PSAP the real-timer video is associated with a specific emergency situation.

Alternative Flows

None

Exceptions

None

15. Differentiating Emergency Experiences

Short Description

The user experience when initiating a text emergency communication should be different from that of casual text communications. This can reduce accidental or casual-prank emergency communications. This also reduces the potential for user surprise if subsequent emergency behaviors occur. "Emergency behaviors" describe any potential behavior of the device that is specific to being in an emergency communication session such as the device entering" emergency mode", the device not audibly alerting when receiving text messages

from the PSAP, PSAP callbacks receiving special treatment (such as immediate display, silent announcement, etc.). Note that some of these behaviors may be dependent on device configuration, user preference, etc.

The text messaging session between 9-1-1 caller and PSAP has the following characteristics:

1. The user initiates a text message using an emergency recipient, e.g., "9-1-1".
2. The device indicates in some fashion that an emergency text communication has been initiated. The specifics of this are not for standardization and may be determined in part by the vendor, operator, or other entity. As an illustrative example of some possibilities, the border of the text message window could turn red or the window colors could be inverted; a phrase such as "Emergency" could appear above or below the text message window.
3. The device should avoid drawing unnecessary attention.
4. As is the case with many legacy devices, the concept of an "emergency mode" may be part of the user experience in NG9-1-1. On recognition of an emergency communication, the device may enter a state in which certain emergency-related events or handling may occur. The device might remain in this state for a period of time following the emergency session (although the user should be able to terminate it). For example, the device may prohibit some features, and may give special handling to a call or text from the PSAP or responder.

Actors

Bob is the emergency caller and Carol is the PSAP call taker receiving the emergency communication.

Pre-Conditions

1. The PSAP supports NG9-1-1 messaging.
2. The user device supports NG9-1-1 messaging using an NVC Emergency Services application on the device.
3. The wireless network supports NG9-1-1 messaging.
4. The device recognizes emergency text session initiation (as different from non-emergency).

Post Conditions

The NG9-1-1 caller used messaging services to communicate with a PSAP call taker. At the conclusion of the call, the caller or call taker terminates the emergency session.

Normal Flow

NG9-1-1 text with emergency indication

1. Bob uses his mobile phone to initiate an emergency text message to report an emergency situation, per the steps in the Normal Flow of the first use case above (Annex A, Use Case 1, Normal Flow). The text is routed to Carol at a local PSAP.
2. The difference from the steps in the main use case document is an additional step in which the device provides positive indication of an emergency session. Since Bob is reporting an emergency, he is reassured by this confirmation.

3. There is also an additional step at the end in which the device enters "emergency mode" during or following the emergency session.

Alternative Flow

User accidentally initiates emergency text message

1. Bob initiates a text message to an emergency recipient.
2. The device indicates that an emergency session has been initiated.
3. Bob realizes his mistake and terminates the session. (Any special handling of abandoned sessions is out of scope of this use case.)

Exceptions

None

16. Adding Media to a Text-Initiated Emergency Call from an NVC Emergency Services Device

Short Description

During an emergency call initiated by the user as text, either the PSAP call taker or the user may wish to add additional media, such as an audio or video stream. For example, based on a text description of the situation, a call taker may want to add an audio stream to be able to hear what is happening. Because the user initiated the call as text, the user should be aware of the addition of other media, and should be able to permit or deny the addition.

The text messaging session between 9-1-1 caller and PSAP has the following characteristics:

1. The user initiates a text message using an emergency recipient, e.g., "9-1-1".
2. Since a text message initiated the emergency session, text may remain the primary communication, but additional media types supported by the device and the PSAP may be used in the session. The user must be made aware when additional media is requested by the PSAP, and must be able to permit or deny it. The user should also be able to initiate additional media streams.

Actors

Bob is the emergency caller and Carol is the PSAP call taker receiving the emergency communication.

Pre-Conditions

1. The PSAP supports NG9-1-1 messaging and supports multiple media streams.
2. The user device supports NG9-1-1 messaging.
3. The wireless network supports NG9-1-1 messaging and supports multiple media streams.
4. As specified by the underlying protocols, the device and the PSAP exchange capabilities so that both endpoints know which additional media types can be supported.

Post Conditions

The NG9-1-1 caller used messaging services to communicate with a PSAP call taker, possibly with additional media streams or transmissions as well.

Normal Flow – adds audio or video

Includes the following additional steps:

1. On reading Bob's initial text, Carol determines that having additional media, such as an audio or video stream, would be helpful.
2. Carol attempts to add an audio or video feed.
3. The device asks Bob for permission to transmit audio or video.
4. Bob indicates approval
5. The device starts transmitting audio and/or video.
6. Carol listens to the audio and/or watches the video to assist in assessing the situation.
7. Bob and Carol continue to exchange text messages.

Alternate Flow – rejects audio or video request

Includes the following additional steps:

1. On reading Bob's initial text, Carol determines that having additional media, such as an audio or video stream, would be helpful.
2. Carol attempts to add an audio or video feed.
3. The device asks Bob for permission to transmit audio or video.
4. Bob rejects the request to transmit audio or video
5. Bob and Carol continue to exchange text messages.

Exceptions

None

17. Using Sign Language in Real-time Video between an NVC Emergency Services Device and a PSAP

Short Description

Communication is between a user and PSAP where sign language is used in one or both directions. The PSAP call taker knows sign language and so no relay service is required.

Actors

Bob is the emergency reporter and Carol is the PSAP operator.

Pre-Conditions

1. The NVC Emergency Services user device supports real-time video, and optionally text messaging and/or voice. The device may have a front facing camera to support bi-directional sign language (so the user can see the PSAP call taker on the screen while a camera records the user's sign language).
2. The PSAP supports real-time video, and optionally text messaging and/or voice.
3. The origination network supports real-time video., and optionally text messaging and/or voice.

Post Conditions

The user and PSAP call taker have communicated using sign language in one or both directions. If sign language was used in only one direction, voice or text may be used in the other direction.

Normal Flow (Bi-directional ASL)

1. Bob identifies an emergency situation.
2. Bob initiates an emergency communication with the PSAP using video, text, or voice.
3. Bob's device indicates in the call set-up that video is desired and that American Sign Language (ASL) is a preferred language.
4. Bob and Carol communicate directly, using sign language, bi-directionally.

Alternative Flow (ASL to PSAP, Text or Voice back from PSAP)

1. Bob identifies an emergency situation.
2. Bob initiates an emergency communication with the PSAP using video, text, or voice .
3. Bob's device indicates in the call set-up that video is desired along with text or voice and that American Sign Language (ASL) is a preferred language.
4. Bob and Carol communicate directly, using sign language, with text or voice as well.

Exceptions

The call may fail, in which case Bob may retry the call without video (e.g., using text).

18. Using Sign Language in Real-time Multi-Video Conferencing among an NVC Emergency Services Device, PSAP and a Third-Party Relay Operator

Short Description

Communication between a user and PSAP call taker where sign language is used in either or both directions via a video relay service. For example, a deaf user where sign language via video relay service is used in only

one direction, text t may be used in the other direction. Another example, may be a speech impaired user who signs and can hear.

Actors

Bob is the emergency caller and Carol is the PSAP operator. Ted is a video sign language interpreter at the relay center (aka video interpreter).

Pre-Conditions

1. The NVC Emergency Services user device supports real-time video, and optionally text messaging and/or voice. The device may have a front facing camera to support bi-directional sign language (so the user can see the PSAP call taker on the screen while a camera records the user's sign language).
2. The PSAP supports real-time video, and optionally text messaging and/or voice.
3. The origination network supports real-time video., and optionally text messaging and/or voice.

Post Conditions

The user and PSAP call taker have communicated using video interpreter via a video relay services in one or both directions. If sign language was used in only one direction, voice or text may be used in the other direction.

Normal Flow (Bi-directional ASL)

1. Bob initiates an emergency communication with the PSAP using video, text, or voice. Bob's preference is ASL in both directions.
2. Bob's device indicates in the call set-up that video is desired optionally along with text or voice and that sign language is a preferred language.
3. The PSAP adds a video relay service to the call.
4. Ted interprets between ASL and text or voice between Bob and Carol.

Alternative Flow (ASL plus voice or text)

1. Bob initiates an emergency communication with the PSAP using video, text, or voice. Bob's preference is ASL in one direction and either text or voice in the other direction.
2. Bob's device indicates in the call set-up that video is desired optionally along with text or voice and that sign language is a preferred language.
3. The PSAP adds a video relay service to the call.

4. Ted interprets between ASL and text or voice between Bob and Carol.
5. Bob and Carol optionally communicate using text or voice in one direction. Ted may have access to this media but if so ignores it.

Exceptions

The call may fail, in which case Bob may retry the call without video (e.g., using text).

Annex B

The following comments were received, but as they are beyond the scope of the current NG Messaging work group charter, have been designated as future study items. The comments are preserved here for reference.

Comment No.	Baseline Reference	Original Comment
1	Section 6 use case 3	Should there be a requirement (device, end-to-end, or multiple) to support queuing of messages sent from the PSAP to a citizen if the citizen's UE is temporarily unavailable (e.g, driving through a tunnel)? While queued, the call taker can be made aware of the delay. When delivered, the user could be made appropriately aware of the (belated) age of these messages.
2	Section 6 use case 4	Potential addition to the use case and possible new requirement(s): -Can Carol request specific properties (e.g., resolution, size, format, encoding) for still images? -Can Carol quantitatively request a specific Region-Of-Interest for the picture (e.g. GPS coordinates or a compass heading or a object descriptor)?
3	Section 6 use case 4	Potential addition to the use case and possible new requirement(s): -Is still image transfer always error-free (100% reliable)?
4	Section 6 use case 4	Potential addition to the use case and possible new requirement(s): - Is "multi-media messaging" well suited to transport large discrete files (like HD video clips)? Or is a more generic, high-speed file transfer mechanism required?
5	Section 6 use case 5	Potential addition to the use case and possible new requirement(s): -Can Carol specify the quality/bit rate of video required? This is important, as video quality on modern handsets can range from 160x120 to 1080p; the latter requiring megabits/s of bandwidth. How is an appropriate resolution/rate selected?
6	Section 6 use case 5	Potential addition to the use case and possible new requirement(s): - What if the UE is on the cell edge, and there isn't enough bandwidth to stream video and maintain the voice call simultaneously. Will the video take precedence? Or will the video be blocked? Or will the video go from streaming to discrete upload mode?
7	Section 6 use case 6	Is "voice follow-on" governed strictly by policy (i.e. call taker decides if it is appropriate) or is there a way for

		the user to control whether they can get a voice call back?
8	Section 6 use case 15	Should it be a device requirement for the user experience to be different when initiating a text emergency communication versus a casual text communications?