



**Report of Emergency Access Advisory Committee
(EAAAC) Subcommittee 1 on Interim Text Messaging
to 9-1-1**

Version 1.0

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Executive Summary

The ability to text 9-1-1 is key to ensuring that 9-1-1 remains accessible to people with disabilities, who are unable to make a voice call to 9-1-1, and to address situations where making a voice call is not possible or recommended. This was recognized by the EAAC as part of the December 2011 report to the FCC, where the EAAC recommended that an achievable interim method for text-based messaging to 9-1-1 would be necessary until NG9-1-1 is fully developed, deployed and adopted by industry, public safety and consumers. The EAAC tasked Subcommittee 1 to make recommendations to encourage the availability of pre-NG9-1-1 interim Text-to-9-1-1. Furthermore, the EAAC adopted a resolution to support “as an interim solution for Text-to-9-1-1, at a minimum, short message service (SMS), and other technologies as appropriate, with a three digit short code 9-1-1.”

The Subcommittee considered questions around the user needs and constraints for text-to-9-1-1, the role of originating networks and devices, the characteristics of the transport networks between the originating networks and the 9-1-1 PSAPs, and administrative and operational considerations on the PSAP side. Based on a detailed investigation of these

questions, the Subcommittee developed a set of recommendations for accessible Text-to-9-1-1 in the following areas:

1. General recommendations for Text-to-9-1-1
2. Recognized Features of SMS-based Text-to-9-1-1
3. Policy Considerations for Near-term Text-to-9-1-1 Service
4. Public Education
5. Future Considerations – Next Steps

As the technical, operational, and regulatory frameworks for Text-to-9-1-1 continue to develop, the EAAC wishes to note that the adoption and application of these recommendations will need to be determined through the appropriate rulemaking and standards development processes. The EAAC also notes that some of the recommendations may require further research and development of technical standards, best practices or guidelines, before they can be applied. The EAAC recognizes that public expectations, including individuals with disabilities, for 9-1-1 emergency communications should be taken into consideration where further research and development may be necessary.

In recommending SMS “at a minimum” for a Text-to-9-1-1 solution, the EAAC understood that the capability to support certain features was uncertain. However, the EAAC resolved to recommend this solution without significant modifications to existing capabilities in order to encourage the timely deployment of interim Text-to-9-1-1.

The EAAC recommends that the FCC and appropriate standards organizations, in consultation with appropriate stakeholders such as representatives of Public Safety and individuals with disabilities, study and consider the following issues to determine whether these issues can be resolved without significant modifications to existing capabilities and prior to the completion of the transition to NG9-1-1:

1. The impact of domestic and international roaming on the ability to successfully use the interim solution.
2. The inability to provide feedback to users in some cases when the user cannot successfully use the interim Text-to-9-1-1 solution.
3. There are many text message services that may look like SMS but may not use the SMS technology and therefore will not be connected to the interim service.
4. The feasibility of PSAPs to communicate with SMS-originated Text-to-911 messages via conversion to/from TTY.

The EAAC wishes to sincerely thank the EAAC members and invited experts for their contributions to this report and working to further the spirit of collaboration and purpose that has sustained the EAAC.

1 Overview

The Federal Communications Commission's ("FCC") Emergency Access Advisory Committee (EAAC) is pleased to offer the following recommendations to advance near-term access to 9-1-1 for individuals with disabilities.

Established by the FCC pursuant to The Twenty-First Century Communication and Video Accessibility Act (CVAA) of 2010¹ ("CVAA"), the EAAC believes that achieving equal access to 9-1-1 emergency services by individuals with disabilities as part of the migration to the national Internet Protocol ("IP")-enabled emergency network ("NG9-1-1") is a matter of long-term national policy. The EAAC recognizes that achieving the goal of an accessible NG9-1-1 system will require the collective commitment of all stakeholders, including consumers, industry, public safety and policymakers, to address the critical issues of technical standards, service deployment, and appropriate governance and funding.

As part of the December 2011 report to the FCC, the EAAC recommended that an achievable interim method for text-based messaging to 9-1-1 would be necessary until NG9-1-1 is fully developed, deployed and adopted by industry, public safety and consumers.² In furtherance of this recommendation, the EAAC requested that all stakeholders, including industry, consumers and public safety, the FCC and Department of Justice, work together to find an interim solution that can be rapidly deployed to provide nationwide access to 9-1-1 services through an industry standards-based mobile text communications solution(s) to provide critical coverage for this important constituency during the transition to NG9-1-1.

In January 2012, the EAAC designated a subcommittee to make recommendations to encourage the availability of pre-NG9-1-1 interim Text-to-9-1-1 ("Subcommittee"). In March 2012, the EAAC adopted a resolution to support "as an interim solution for Text-to-9-1-1, at a minimum, SMS, and other technologies as appropriate, with a three digit short code 9-1-1." The Subcommittee has expended significant time and resources developing the following report by learning from each other and collaborating on issues in furtherance of near-term Text-to-9-1-1.

The Subcommittee's first effort was to complete a set of assumptions on which to focus the Subcommittee's efforts. These assumptions include:³

- Using any number besides 9-1-1 creates a problem. "9-1-1" is extremely successful as a "branded" number. It is unrealistic to expect the public to remember to call any other number, especially when they have an emergency. This short-term solution should not necessarily be subject to all of the requirements of either voice 9-1-1 calls or long-term solutions so that it can be implemented in the near term and without extensively reworking the carrier, handset, or PSAP systems.

¹ Twenty-First Century Communications and Video Accessibility Act of 2010, Pub. L. No. 111-260, 124 Stat. 2751 (CVAA) (amending sections 3, 255, 303, 503, 330, 710, and 713 of the Communications Act, and adding sections 615c and 715-19, codified at 47 U.S.C. §§ 153, 225, 303, 330, 503, 610, 613, 615c, 616-20).

² FCC EAAC Report and Recommendations, PS Docket No. 10-255, at 26 and 28-30 (Dec. 12, 2011) (resubmitted in final Jan. 26, 2012) ("EAAC Recommendations for Interim Text Access and Interim Mobile Text Solution").

³ See Presentation of EAAC Subcommittee 1, Text-to-911 Solutions to 911 Interim to NG911 (Sept. 14, 2012) (outlining key assumptions about Pre-NG911 Interim Text-to-9-1-1).

- The FCC should work with consumers, industry and policy makers to secure any needed additional liability protection for all entities that are implementing new Text-to-9-1-1 calls.
- The EAAC believes that if the text message to 9-1-1 solution is not available to all people, with and without disabilities, that it would be too complicated for carriers and others to qualify some people as eligible and others as ineligible to make an SMS/text message call to 9-1-1 during emergency situations. The liability issues from denying access to unregistered callers would complicate the issue further.
- The EAAC directed this Subcommittee to take this topic up in 2012 and submit a separate report on this important topic.
- From a consumer standpoint, direct access via mobile Text-to-9-1-1 is a critical goal.

Using these assumptions as the base of work, the Subcommittee designated four subgroups to consider *User Needs and Constraints*, *Originating Networks and Devices*, *Transport Networks*, and *Public Safety Answering Point (“PSAP”)* issues. After considering the issues, the Subcommittee developed recommendations to address near-term opportunities for Pre-NG9-1-1 Text-to-9-1-1.

As the technical, operational, and regulatory frameworks for Text-to-9-1-1 continue to develop, the EAAC wishes to note that the adoption and application of these recommendations will need to be determined through the appropriate rulemaking and standards development processes. The EAAC also notes that some of the recommendations may require further research and development of technical standards, best practices or guidelines, before they can be applied. The EAAC recognizes that public expectations, including those of individuals with disabilities, for 9-1-1 emergency communications should be taken into consideration where further research and development may be necessary.

The EAAC wishes to express its appreciation to the individual Subcommittee members, EAAC members and FCC staff for the time and commitment that has gone into preparation of this report, and for the progress that the EAAC has made since it first met on January 14, 2011.

2 User Needs and Constraints

This section responds to key questions posed by EAAC in its survey on the user experience during a text-to-9-1-1 call, and outlines questions related to user expectations. Full information on the sample and data can be found at <http://transition.fcc.gov/cgb/dro/EAAC/EAAC-REPORT.pdf>.

Which text communication methods do users want to use in the interim?

In order of importance:

1. Native SMS
2. Over-the-top SMS apps (3rd party app that goes through 3rd party service to send SMS to another device, on tablets and computers)
3. Combinations of voice and text.

Note: There are four variations of this scenario.

- a. User makes a voice call to 9-1-1 and for the duration of the call the user as well as the PSAP intermix voice and text.
- b. User makes a voice call to 9-1-1 and for the duration of the call the user uses voice and the PSAP sends text back.
- c. User makes a voice call to 9-1-1 and for the duration of the call both the user and the PSAP text only.
- d. User will send text to the PSAP and ask for a voice call back and then for the duration of the call the user can text and the PSAP respond with voice.

For other possible interim solutions, beyond SMS, the EAAC survey⁴, question 16, on p. 23, covers this aspect. The results are as follows:

1. SMS (45.1%)
2. Real-time text (RTT) (45.7%)
3. Email (43.7%)
4. Instant Messaging (IM) (31.1%)
5. Web page (30.2%)
6. Systems built into car (21.3%)

Note: The EAAC resolution⁵ supports "as an interim solution for text-to-9-1-1, at a minimum, SMS, and other technologies, as appropriate, with a three digit short code 9-1-1." The user preferences suggest that RTT, e-mail, and IM should be evaluated for their feasibility as additional means to contact a PSAP, in accordance with the "other technologies, as appropriate" part of the resolution. Due to PSAP constraints, web-based access and systems built into cars may have to wait until the longer term.

Which devices do users want to use in the interim?

Ranking of devices in order of importance, also see EAAC survey Question 21:

1. Mobile phones and devices (61.8% for cell phone, 53.7% for smartphone, pager, PDA)
2. Tablets (Survey results under "Others" shows that 9 respondents mentioned iPads or iPods)
3. Computers

Note: This survey question shows which devices users would employ for texting 9-1-1. Both computers and tablets support over-the-top text-to-9-1-1.

⁴ See EAAC, *Report on Emergency Calling for Persons with Disabilities Survey Review and Analysis 2011*, July 21, 2011, available at <http://transition.fcc.gov/cgb/dro/EAAC/EAAC-REPORT.pdf>.

⁵ See FCC EAAC, Resolution regarding Text Messaging to 911 (adopted March 30 2012)

Note: Regarding point 1 above: EAAC does not have a detailed breakdown for the cell-phone figure. It is possible that the 61.8% figure includes all three types: smartphones, feature phones and basic phones.

Note: Regarding point 2 above: Since the EAAC survey was conducted, the market share of tablets has increased rapidly. The importance of tablets as number two in the above ranking is based on the assumption that today many more people with disabilities use tablets than when the survey was originally conducted and the adoption of tablet use among this community will continue to grow.

2.1 User experience

The points below reflect the user expectations of the respondents, as they pertain to text-to-9-1-1.⁶

Direct access: The expectation of the respondents is that users have direct access to 9-1-1 services. There are no third parties sitting in the path between callers and telecommunicators.

Initiating contact with 9-1-1: Users will expect that the primary method of initiating contact with 9-1-1 is via sending a text message using the three-digit code 9-1-1.

Calling 9-1-1 by voice and receiving text back: Deaf and hard of hearing users who have some voice communication capabilities may be able to initiate a 9-1-1 voice calls. These users may expect to call 9-1-1 by voice and request the PSAP telecommunicator to text them back.

Not being required to register for 9-1-1 services: Users cannot be expected to plan ahead for emergencies. The expectation is that they will not be required to register prior to using text-to-9-1-1 services. Education may be necessary to help a user appreciate that they will need to be a subscriber to the relevant text service by which they are attempting to use 9-1-1 services.

Bounce-Back message: Users will expect to receive information on the success or failure of a text-to-9-1-1 message. If PSAPs in an area do not support text-to-9-1-1 yet, the user will expect to receive an automated text response immediately that states that text-to-9-1-1 is not available and that a call should be made to 9-1-1.

Note: It is important that the content of this message be accessible to people with widely varying reading abilities, and as such needs to be crafted carefully to consider the unique needs of people with disabilities.

Note: The nature of SMS may limit the technical feasibility of the user expectations with respect to bounce-back messages. It may not be possible to determine success or failure of SMS message delivery, but rather only the availability of text-to-9-1-1 services.

⁶ Although the EAAC recognizes that each point describes user expectations for interim Text-to-9-1-1 services, the availability of each point will be subject to technical and economic feasibility. Where such features are not technically or economically feasible to implement for interim Text-to-9-1-1 services, the unavailability of such features should be communicated to the end user through public education, as appropriate.

Likewise, the store-and-forward nature of SMS may cause delivery to happen as soon as technically feasible, rather than immediately.

Roaming: Users will expect the text-to-9-1-1 service to work nearly everywhere within USA. Users are likely to get confused if there are technical limitations pertaining to roaming between carriers within USA.

Note: To the extent that text-to-9-1-1 during roaming within the USA cannot be solved via technical means, it is important that users, as stated in the previous paragraph, are informed about success and failures of a text-to-9-1-1 message. The expectation is that if a failure occurs due to roaming, or for some other technical reason, the user is informed via an automated text response immediately. Like in the previous note, the contents of this message would need to be crafted carefully.

Note: Failures because of roaming when US users are in other countries and when phones with foreign subscriptions are used in USA may be easier to understand and accept even if they will also cause dissatisfaction. They could also point to a solution (e.g., if the user is told the problem is because the user is texting on a phone from outside the country, the user may know to seek out a phone for that country to report their emergency).

Note: As above, the nature of SMS may limit the technical feasibility of the user expectations with respect to bounce-back messages during domestic and foreign roaming.

Feedback on progress: Users expect to receive responses to SMS emergency messages within a certain amount of time. If a response is delayed, they may become anxious and assume that contacting 9-1-1 has failed. The expectation is that, even if it takes time to process a text message to 9-1-1, users are kept abreast of what is happening via appropriate text responses.

Note: There are different causes for why SMS responses may be delayed, and these need to be assessed on a case-by-case basis. For any such cause, the responsibility must be determined, and the technical feasibility of an SMS response informing the user of the delay must be evaluated. For example, delays that happen due to internal processes in the PSAP cannot be handled in the same way as delays that happen due to the technology used for setting up a session between the Text Control Center (TCC) and the PSAP [e. g. a TTY call]; and these in turn are different from delays caused by the store-and-forward nature of SMS.

3 Originating Devices and Network

This section responds to the key questions posed by the EAAC regarding the role of originating networks and devices in Text Messaging to 9-1-1, at a minimum, via short message service (“SMS”) while also considering the key assumptions outlined by Subcommittee 1.⁷ The EAAC recommends that the FCC recognize the capabilities and limitations of wireless service provider

⁷ See FCC EAAC, Resolution regarding Text Messaging to 911 (adopted March 30 2012); Presentation of EAAC Subcommittee 1, Text-to-911 Solutions to 911 Interim to NG911 (September 14, 2012) (“EAAC WG1 Presentation”).

SMS offered to wireless subscribers as an emergency communications service; lead consumers, industry and public safety in managing stakeholder expectations; and ensure adequate liability protections are available to support the provisioning of Text messaging-to-9-1-1 service accordingly.

Which networks should support 9-1-1 mobile text?

Utilizing the existing standards-based SMS network architectures and capabilities currently offered by wireless service providers to wireless subscribers, with minimal modifications or alterations, would be the most technically and economically feasible way to ensure rapid deployment of SMS-based text messaging to 9-1-1 (“SMS-to-9-1-1”).

Significant modifications or alterations to the existing wireless service provider SMS network standards and architecture would create technical and economic feasibility issues. Such changes would require development of new chipsets and firmware for mobile devices and equipment, and revision of existing network standards and elements in the core wireless networks. Modification efforts would take many years and delay implementation of SMS-to-9-1-1 by which time messaging capabilities for Next Generation 9-1-1 (“NG9-1-1”) could have already been developed and deployed.

While SMS-to-9-1-1 services can lay a foundation for consumer education and network and PSAP capabilities that may carry forward into NG9-1-1 deployment, a near term deployment of SMS-to-9-1-1 services should not divert industry, public safety, and government resources from further developing and deploying NG9-1-1. All stakeholders should be encouraged to continue standards development for an NG9-1-1 environment to support necessary emergency communications capabilities on future services, networks and equipment.

What are the originating network issues around other text formats (e.g., Over-the-Top or Proprietary Solutions)?

Consistent with Section 2 of the CVAA, originating network service providers and equipment manufacturers can only support emergency communications over the services and equipment offered directly to wireless subscribers.⁸ While wireless mobile devices may support Over-The-Top (“OTT”) and other third party proprietary IP-based text applications that offer “SMS”-like messaging services, third party OTT and other SMS-like messaging service providers should utilize a standards-based approach based on the C/E gateway⁹ architecture in order to minimize implementation challenges for industry and PSAPs and ensure the consistent availability of Text-to-9-1-1 service for industry, PSAPs and consumers.

⁸ Twenty-First Century Communications and Video Accessibility Act of 2010, Pub. L. No. 111-260, 124 Stat. 2751, Section 2(a)-(b) (2010) (as codified in various sections of 47 U.S.C.) (“CVAA”); *see also, Implementation of Sections 716 and 717 of the Communications Act of 1934, Report & Order and Further Notice of Proposed Rulemaking*, FCC 11-151 ¶ 45 (rel. October 7, 2011).

⁹ C-gateway - "Carrier side gateway", converting between a carrier message format and a standardized format within the transport network.

E-gateway - "Emergency service side gateway", converting between that standardized transport format and the actual format used by the target PSAP.

What are the originating network issues around SMS?

The technical and operational issues surrounding the use of SMS as an emergency communications service are well documented.¹⁰ Consistent with these issues, utilizing standards-based SMS network architectures and capabilities currently offered by wireless service providers to subscribers on their home networks (i.e., not roaming on another wireless carrier network), with minimal modifications or alterations, would be the most technically and economically feasible way to ensure rapid deployment of SMS-to-9-1-1. Any solution that requires significant modifications to existing wireless network architectures and standards will delay deployment of SMS-to-9-1-1 and consume resources needed for NG9-1-1 deployment.

In order to encourage the timely deployment of text messaging to 9-1-1 services, the EAAC has assumed that a text-messaging to 9-1-1 solution should not be subject to all of the requirements of either voice 9-1-1 calls or long-term solutions (i.e., NG9-1-1) so that it can be implemented in the near term and without extensively reworking carrier, handset, or PSAPs systems.¹¹ Given this assumption, the following issues should be recognized as necessary to support the near-term deployment of SMS-to-9-1-1:¹²

Wireless Subscribers with SMS Capable Handsets: Under existing wireless network architectures and standards for SMS, wireless carrier SMS text message services are subscription-based and only service-initialized SMS-capable mobile devices have SMS text message functionality.

For this reason, wireless subscribers must have an active text message service plan. In addition, support of SMS-to-9-1-1 on non-service initialized (“NSI”) mobile devices is not feasible because, at a minimum, support for NSI mobile devices would require new standards and significant modifications to handsets already available to end users and the wireless originator network radio and core infrastructure.

Therefore, requiring an “all 911 calls” feature for SMS-to-9-1-1 service would create lengthy delays in its implementation. In addition, an “all 911 calls” feature for SMS-to-9-1-1 and non-service initialized mobile devices would impose significant technical and operational burdens on PSAPs.¹³

Home Network v. Roaming: Just as SMS text messaging services are unique to each wireless service provider, each implementation of SMS-to-9-1-1 will be unique to a wireless service provider’s capabilities. In inter-carrier domestic or international roaming situations,

¹⁰ *Facilitating the Deployment of Text-to-911 and Other Next Generation Applications, Framework for Next Generation 911 Deployment*, Notice of Proposed Rulemaking, FCC 11-134 ¶ 53 (Sept. 22, 2011); *see also*, *Text Messages in a PSAP Environment*, APCO Emerging Technologies (rel July 30, 2012) available at <http://psc.apcointl.org/wp-content/uploads/APCO-Emerging-Tech-Text-to-911-Final1.pdf> and *Texting to 9-1-1: Examining the Design and Limitations of SMS*, 4G Americas (October 2010) available at <http://www.4gamericas.org/documents/SMS%20to%20911%20White%20Paper%20Final%20October%202010.pdf>

¹¹ *Supra* n.1, EAAC WG1 Presentation, Slide 3.

¹² The EAAC believes specific technical issues should be addressed through the FCC’s open proceeding on NG911 and text to 911.

¹³ *See e.g.*, *Petition for a Notice of Inquiry Regarding 911 Call-Forwarding Requirements and Carriers’ Blocking Options for Non-Initialized Phones*, Notice of Inquiry, FCC 08-95 (Rel. April 11, 2008).

SMS-to-9-1-1 cannot, at this point, be supported because addressing the “Text Originator Information” and “Home Network Control” issues would require significant modifications to the wireless originator network and core infrastructure that will ultimately delay the deployment of SMS-to-9-1-1 services. Roaming capabilities should be addressed in NG9-1-1 multimedia emergency services.

Text Originator Information: SMS text messages that are sent between wireless service provider roaming partner networks (i.e., inter-carrier roaming) do not always pass through “Text Originator Information”, including location information. An SMS cannot be routed to the appropriate PSAP without text originator information.

Home Network Control: SMS text messages are under home operator control which means that SMS messages are routed to a wireless subscriber’s home network for processing regardless of the network and location from which the SMS message originated. In an international roaming situation, home network operator control is problematic because the home operator network is outside the U.S. and is not capable of routing a SMS toward the appropriate U.S.-based PSAP.

Intermixed Voice and SMS: Many users would benefit from a possibility of having SMS intermixed with a voice call. The current wireless carrier network architectures route voice calls and SMS separately. The voice call path to the PSAP is already implemented. It would therefore be a significant modification to restructure these connections to allow integration with the SMS path to handle the two paths as one call with one PSAP operator. It is therefore more realistic to not implement this integration until the implementation of NG9-1-1.

Bounce-Back Notifications of SMS-to-9-1-1 Availability: A wireless subscriber should receive an automatic reply to their SMS-to-9-1-1 message if SMS-to-9-1-1 services are not supported by the appropriate PSAP or the wireless network over which the subscriber originates an SMS-to-9-1-1 message.

Given the issues to generally support SMS-to-9-1-1 in a roaming situation, the feasibility of a bounce back message in an inter-carrier domestic or international roaming scenario requires further study by an appropriate standards body, such as the joint Alliance for Telecommunications Industry Solutions (ATIS) and the Telecommunications Industry Association (TIA) SMS to 9-1-1 standards committee.

Non-Proprietary Solutions: In order to ensure the timely and consistent deployment of SMS based Text-to-9-1-1, industry and public safety cannot be expected to support diverse and proprietary Text-to-9-1-1 solutions. The joint ATIS/TIA industry standard¹⁴ for wireless carrier native SMS-to-9-1-1 is one non-proprietary solution that can encourage the timely deployment of Text-to-9-1-1 and support a flexible and interoperable environment for multiple wireless carrier and public safety network configurations. This joint standard also defines capabilities necessary to support SMS-to-9-1-1, including standardized interfaces from the originating

¹⁴ References to “Joint ATIS/TIA SMS-to-9-1-1 industry standard” throughout this report refer to the draft of J-STD-110, *Joint ATIS/TIA Native SMS to 9-1-1 Requirements and Architecture Specification*. For additional information regarding this draft standard J-STD-110, please contact the ATIS Document Center Administrator at doccenter@atis.org.

network via the transport network to the PSAP, obtaining coarse location for routing, handling bounce-back messages, and managing the text message dialog between the originator and PSAP. Once finalized, the joint ATIS/TIA industry standard will be an open standard available for any entity to adopt, such as Over-The-Top providers.

Do phones or networks or both block three digit 9-1-1 SMS addresses? (if phones - how many phones?)

SMS-to-9-1-1 should be supported by a 3-digit SMS-capable wireless handset, including feature phones and smartphones. Using any number besides 9-1-1 creates the problem that the wireless subscriber will have difficulty remembering the new number when they have an emergency.

However, some legacy devices may not support the ability to send to a 3-digit SMS code. Originating networks and devices should be permitted to implement a longer SMS code overlay that has the same functionality as the 3 digit code. Both the 3-digit and longer codes could be implemented by providers that may have devices that will not support 3-digit short codes.

Options for location provision.

The joint ATIS/TIA industry standard for wireless carrier native SMS-to-9-1-1 is one solution that can encourage the rapid deployment of Text-to-9-1-1, support a flexible and interoperable environment for multiple wireless carrier and public safety network configurations, and define capabilities necessary to support SMS-to-9-1-1, including standardized interfaces from the originating network via the transport network to the PSAP, obtaining coarse location for routing, handling bounce-back messages, and managing the text message dialog between the originator and PSAP. Once finalized, the joint ATIS/TIA industry standard will be an open standard available for any entity to adopt.

Managing Public Expectations is Critical during Interim Text-to-9-1-1 Availability

The FCC should take a lead role and work with consumers, public safety, the wireless industry and other stakeholders to develop a public education program that appropriately explains the capabilities and limitations of SMS-based Text-to-9-1-1 service. (See specifically Section 7 of this report) As part of managing public expectations, a text originator should receive a response notifying the originator if Text-to-9-1-1 service is not available.

4 Transport Networks including TCC

This chapter describes the EAAC's consensus recommended requirements and characteristics of the network for transport of text between the originating networks and the 9-1-1-operators in the PSAPs.

Requirements

1. The transport network SHALL convey text messages directed to the short code "911" originating from a user's terminal and delivered to the transport network from the originating network.

2. The transport network SHALL contain a routing function which will select the geographically appropriate PSAP.
3. The transport network SHALL convey the messages originated in user terminals to the PSAP.
4. The transport network SHALL initially handle only SMS text originations but be standards-based and extendable to handle other text protocols.
5. The transport network SHALL convey text messages from the PSAPs to the originating network for delivery to the user terminals, routed by the routing functions.
6. The transport network SHALL link the user and the PSAP operator together for the duration of a series of text interactions (a conversation), conveying text messages between the user and the PSAP involved in the text interactions.
7. The transport network SHALL adapt the communication to protocols on the user side, and offer a defined interface for the originating networks.
8. The transport network SHALL adapt the communication to protocols on the PSAP side based upon the capabilities of each PSAP.

Assumptions

1. Originating networks provide communication services to users including text. The possibility to handle text sessions with 9-1-1 is added to these services by the originating networks.
2. The initially supported text service is the Short Message Service (SMS). The architecture and functionality shall enable addition of other services in the same architecture.
3. The mechanisms used shall work for both session-less message communication (like SMS), and for session-oriented messages initiated by a call to 9-1-1.
4. The originating network exchanges user communication content with the transport network in specific interface points, where routing and protocol translation occurs.

Architecture components and structure

1. Text Control Center, TCC. A name for the combination of gateways and routing elements needed to route messages and convert them according to the protocols used in the originating network and the emergency service networks and PSAPs.
2. C-gateway functionality. The routing and protocol translating functions in the TCC of the transport network, which are the first to receive the message from users to 9-1-1 from the carrier side of the network, are called C-gateway functions. They create new sessions through the transport network with PSAPs and keep track of existing sessions and convert messages between the service provider format and a protocol suitable for transmission in the transport network, e.g., a NENA i3 standardized protocol.

3. The C-gateway functions are provided with location together with the message, or retrieve location, and pass this information along to the E-gateways to be used for routing and location information to the PSAP.
4. The transport network shall be able to be connected to NG9-1-1 networks when they are deployed, and provide the SMS communication with NG9-1-1 at that time.
5. Depending on target PSAP type, the following happens.
 - a. For NG9-1-1, it goes straight into the Emergency Services IP Network (ESInet) and to the PSAP handling the session or to the most appropriate PSAP for new sessions.
 - b. For an Interim PSAP, it goes through a gateway on the emergency side, called E-gateway.
 - c. For a legacy PSAP, it goes through an E-gateway with a legacy protocol (i.e., TTY) towards the PSAP.

Functionality and protocols

1. A standard protocol for network conveyance of SMS is used between the originating network and the C-gateway.
 - a. Information needed for routing shall be provided to the transport network in a form that is either directly usable for routing, or possible to convert through standardized procedures to a form suitable for routing the call.
2. Formats/protocols to be used to transport text between C-gateways and E-gateways are selected from standards based protocols (e.g., NENA i3 specification text protocols, ATIS or TIA standards).
3. Formats/protocols to be used to transport text between the E-gateway and the PSAP:
 - a. **Legacy – TTY**, via E9-1-1 or direct to PSAP, (feasibility needs to be verified because of the functional limitations in TTY communication including Voice over IP (VoIP) transport. If TTY is found to not be a feasible delivery mechanism, then a routing system to capable interim or i3 PSAP is needed)
 - b. **Interim** - A specified protocol suitable for text communication and location information provision.
 - c. **NG9-1-1 NENA i3** - native SIP/Message, MSRP, SIP/RTT, with support for SIP location conveyance (RFC 6442).¹⁵

Note: It should be recognized that additional detailed specifications and testing are required for all of the above cases.

¹⁵ SIP Message - Technical method for text message communication within the Session Initiation Protocol SIP. MSRP - "Message Session Relay Protocol", another protocol for messages in SIP. SIP/RTT - "SIP/Real-Time Text", Method for transmission of text as it is created, used in the SIP protocol environment..

4. Text conversation creation and maintenance, tying messages together into a text conversation, and dissolving the text conversation when appropriate.

As specified in NENA i3 - but with longer timeout than specified there. (*Note: 2-3 minutes is specified by NENA, while experience from Europe is that the time between messages is commonly close to 2 minutes for real SMS conversations*). The text conversation is usually manually disconnected by PSAP when task is completed.

- a. C-gateways coordinate messages in a sequence so that they are routed to the same PSAP.
- b. Disconnect text conversations by PSAP command or by timeout.

5. Transcoding issues around SMS.

The main handling of transcoding issues is in the E-gateway.

If TTY is used in legacy PSAP, there are a lot of transcoding problems to be solved and specified.

- a. TTY has only upper case. TTY has a limited set of special characters. Information loss can appear from SMS to TTY because of lack of characters in the set.
- b. Proposed translation table exists in the ITU-T V.18¹⁶ standard.
- c. TTY has two cases. Letter case and number case. If a case shift character is lost, a long row of corrupted characters may appear. Manual action by PSAP is needed to recover.
- d. Only one way transmission at a time. Formal turn-taking is needed. If not obeyed, transmission will be lost or corrupted.
- e. TTY is very slow. Only about 6 characters per second can be transferred. An SMS message of 150 characters takes about 35 seconds to transmit.

6. Transcoding issues around other text formats.

There are fewer problems with other text formats, but there are some which need to be discussed and are left for future study:

- a. Long SMS messages are, for instance, composed of chained short messages that also may arrive out-of-order.
- b. Conversion from RTT to text messaging may confuse RTT users into thinking that the connection is broken because of the slowness of messaging.
- c. Three(+)-way messages may become Multimedia Messaging Service (MMS) messages.

7. PSAP capability database.

A PSAP capability database is needed for storing information on protocol supported by each PSAP, so that the E-gateway can select the proper conversion. The access to this

¹⁶ ITU-T Recommendation V.18 "Operational and Interworking Requirements for DCE:s Operating in the Text Telephone Mode". <http://www.itu.int/rec/T-REC-V.18/en>

database needs to be specified as well as its maintenance and financing. A possibility to coordinate this function with the Location to Service Translation (LoST) servers should be investigated.

5 PSAP end

There are a number of administrative and operational considerations for the PSAP text delivery and response end of the Interim Text process. Impacts and issues requiring careful planning and implementation relative to overall Interim Text solution characteristics and to local 9-1-1 Authority and PSAP processes and procedures.

Text Control and Delivery:

Several optional methods have recently been described for delivering SMS to a 9-1-1 Center:

- Delivery to the PSAP call handling equipment via Automatic Call Distribution system (where installed) is preferable.
- Delivery to a standalone web-based interface is workable as a temporary step, however taking calls for an extended period of time outside of the normal call handling system will present challenges and risks. Maximum integration with existing PSAP call handling and logging systems is desirable.
- Delivery via gateway at a local, multi-PSAP IP network where available (could include early NG9-1-1 systems).
- Delivery via SMS conversion to TTY.

Operational Considerations:

- National level solutions should not rely on the delivery of SMS calls to PSAPs via 10 digit telephone lines.
- National level solutions should not require a voice call to be placed to 9-1-1 before SMS is engaged (make a voice dial then switch to text. This is used in some local solutions but it is not feasible for national use).
- Delivery to the PSAP should be in the manner that the PSAP or multi-PSAP 9-1-1 Authority designates and is part of a standards process (e.g., each carrier cannot have a different solution at each PSAP, which would force the PSAP to support multiple, different solutions).
- The national level Interim Text-to-9-1-1 solution must assure that the process for gathering information from 9-1-1 Authorities as to their operational readiness and delivery preferences is not cumbersome. A process must be identified by which a single point of contact is established to gather this information from 9-1-1 Authorities. This could be the TCC vendor or a Public Safety organization that already has national PSAP data. Consideration should be given to leveraging the existing processes for wireless routing spreadsheets that PSAPs must currently use.
- A continuous connection between the text caller and the destination PSAP during an active text call should be maintained for a period of time defined by the PSAP unless the PSAP ends the connection. However, the connection between the text caller and a specific PSAP call taker may not be able to be maintained throughout the conversation.

- To the extent technically feasible (realizing SMS is a store and forward system), the interim Text-to-9-1-1 solution should assure that text messages are delivered to the PSAP in chronological order.
- If the TCC does not see a reply from the PSAP or its equipment for an SMS-to-9-1-1 message within a configurable amount of seconds of TCC release toward the PSAP, a notification should be sent to the text caller that their text has been sent to the 9-1-1 center and a reply is pending. (Reply wording to be defined)
- The interim Text-to-9-1-1 solution should provide an automatic message to any texting caller who attempts to text 9-1-1 in an area that does not support receiving 9-1-1 SMS messages. The message should be standardized between carriers as much as possible and should clearly advise the caller that they must use an alternate method such as a voice call, relay, or TTY call to reach 9-1-1.
- The message transport system should provide a message to a text caller indicating that a communication path has been terminated by a PSAP.

Also see Section 7 Education and Outreach

9-1-1 Authority Actions:

- All 9-1-1 authorities and PSAPs should proactively assess the proposed delivery interface options for interim Text-to-9-1-1 and whether or not they are prepared to handle text messages. PSAPs who determine they are not in a position to handle text messages by the designated deployment timeframe of the national level interim solution are encouraged to make alternate arrangements for a designated PSAP to handle their text messages, and to proactively research what it would take to accept these messages in the near future.
- PSAPs should be responsible for designating whether or not they wish to receive text messages and, if so, their preference for delivery method according to the accepted standard. 9-1-1 Authorities or PSAPs should formally request SMS-to-9-1-1 delivery to their PSAP(s) and identify the desired delivery method(s).
- The PSAP should also designate the minimum period of time that the TCC should maintain text interaction during periods of inactivity between a caller and the receiving PSAP. The minimum period of time for inactivity will eventually need to be standardized on a national level. This standardization will be determined by stakeholders from both public safety and the private sector and should be based upon testing with consumers and operational experience.
- 9-1-1 Authorities or PSAPs should be responsible for keeping their text delivery preferences up to date with the service provider, TCC vendor, or other central point for interim SMS-to-9-1-1 services. PSAPs should assess requirements for logging of text messages and assure that the delineation of responsibility for this functionality is clearly defined.
- PSAPs that are handling multiple calls during busy times may decide to terminate a text connection to assure that their telecommunicator is able to handle other incoming emergency calls in a timely manner. The decision as to how long a PSAP telecommunicator stays “ready” to accept text from a specific caller should be based on local policy.
- The method by which a PSAP is/is not able to handle delivery of other services such as medical pre-arrival instructions must be implementation-specific and based on local policy.

Also see Section 7 Education and Outreach

FCC Considerations:

- The FCC should facilitate (to the extent appropriate for the FCC) a method to channel PSAP text readiness and delivery preferences through a single point of contact process.
- The FCC should facilitate public education (directly and/or through Public Safety organizations) on the national level interim solution. Consumers must be made aware that proprietary text systems may not be compatible with the national level interim solution. Focused education should be provided for the deaf, deaf-blind, hard of hearing and speech disabled community of users to assure they understand the capabilities of the interim solution and to assure they understand that TTY will continue to be supported for those that rely on it.
- The FCC should work with appropriate industry representatives to identify and maintain a public list of any wireless handsets that will not support SMS-to-9-1-1 text capabilities or identify feasible alternative technology solutions, such as a four digit code. The FCC should work with appropriate industry representatives to allow a solution via educational or technical means.
- The FCC should characterize what the expectation is of the many proprietary systems that have been purchased/implemented in different areas to handle Text-to-9-1-1. PSAPs may choose to implement other text systems as long as it does not preclude their ability to support the national level SMS interim solution. Educational efforts will be complicated by the use of multiple solutions.
- Other than deployment or maintenance testing, Text-to-9-1-1 test messages should not be required and should not traverse the network to the PSAP call takers. If it is deemed necessary to provide the ability for the general public to “test” Text-to-9-1-1 capabilities, an alternate method must be applied to handle this Text-to-9-1-1 verification process. Further investigation of the options is required.

What are the secondary deployment priorities for national level SMS-to-9-1-1?

- An open standardized interface between the TCC and legacy E9-1-1 PSAP call handling software. In a pre-NG9-1-1 system, the call handling software is often referred to as CPE (Customer Premise Equipment).
- The capability to open an audio path with the caller’s device would greatly improve the PSAPs ability to determine the nature of the incident being reported. Further study of the technical feasibility of this feature is required.
- A method by which to incorporate 9-1-1 text calls into a PSAP’s call handling analysis system (typically a management information system –MIS) so they can effectively analyze any impact to the quality of the service they provide.
- An E9-1-1 class of service that will allow PSAPs to differentiate an SMS message from other voice or TTY calls. This may be possible for only some interface methods.
- The capability for Intra-PSAP transfers (i.e., transfer between telecommunicators or to a supervisor in the same PSAP or 9-1-1 system) is required to assure effective operations. Presumably a function of the Public Safety equipment or delivery network.
- Ability to transfer text calls to other text capable PSAPs or other text capable systems outside the 9-1-1 service system. Presumably a function of the Public Safety equipment or delivery network.
- Ability of the text call-handling application to handle multiple texts dialogs simultaneously.

If implementation at legacy PSAPs is voluntary, should a time limit be imposed wherein a legacy PSAP or designated authority is mandated to accept text calls other than current TTY?

While a time limit should not be imposed prior to initial implementation, there should be a deadline for a PSAP to designate an answering point. Within 6 months of interim Text-to-9-1-1 solution availability, a time line for PSAP acceptance should be established, based upon initial implementation experiences. The following are PSAP operational considerations that should be incorporated into the ongoing dialogue of interim text deployment:

- While it is a fact that TTY is mandated for all PSAPs, it is not accessible to the general public. The impact of interim text, even when converted to TTY, cannot be equivalently compared. Appropriate solutions should be pursued for national deployment; consideration of time mandates is not appropriate at this early stage of development.
- The text solutions based on SMS do not support voice in the same call as SMS. There are users who need to use a combination of voice and text when communicating with a PSAP (i.e., voice in one direction and text in the other). It may be hard-of-hearing persons who want to talk, but need to get text back as a complement or replacement for voice from the call-taker. Persons with speech disabilities may have the opposite need. It is also essential for the PSAP to have an opportunity to listen to sound from the place of emergency. When used together with TTYs, these modes of operation are often called VCO for "voice carry over", when it is used for letting the user talk, and HCO for "hearing carry over", when the user wants to hear. With modern technology the audio path is simultaneous with text, and the VCO and HCO terms could be replaced with "simultaneous voice and text". The industry should research if this technology can be made available for deployment within interim solutions. The PSAP call handling interface should have the capability to indicate when it is possible to use voice in parallel with interim text calls, when it is not possible, and when voice is possible but with functional limitations. Further discussion should take place to identify specific requirements for these capabilities.
- Small PSAPs with 1-2 individuals on duty, who must answer incoming calls as well as dispatch and manage radio traffic will be increasingly challenged to multitask and manage incoming 9-1-1 text calls. Simultaneously "talking and typing" has become a common multitasking skill for many PSAP personnel. Text calls however will require multitasking at a different level. A telecommunicator who must track unit status by typing information into a Computer Aided Dispatch (CAD) system will not be able to simultaneously "type" responses to a caller via text. If a national level interim text solution is backed by the FCC, these PSAPs will need time to identify and implement procedures.
- Some PSAPs may consider using a centralized approach whereby a single PSAP handles text calls for a group of other PSAPs. Such a central PSAP must have the capability to contact a local PSAP for assistance as needed. This type of mutual aid scenario will take time to analyze and implement.
- Not all PSAPs have TTY built into their call handling systems or CAD; many still use legacy standalone TTY devices. This does not lend itself to a productive way to implement text for the general public.
- Some PSAPs do not have computerized call handling systems or CAD. Telecommunicators in these cases use hand written processes to create incidents and track emergency responders in the field.

- Once national level interim text is adopted and a number of PSAPs start making the transition to use it, a responsible authority should review what can be done to encourage adoption by the PSAPs that will initially *not* be able to opt in. The interim solution will be around for many years, so all concerned parties need to do everything they can to further its use.

Are there limitations that will be encountered in an interim text solution that will impact the level of service that is typically provided during a voice based 9-1-1 call?

- Services typically provided by secondary PSAPs or other dispatch centers may not be available during an interim solution via text if the secondary PSAP does not support text. Primary and secondary PSAP interaction via voice communication may be required. (Primary PSAP would respond to text caller).
- Services provided by other partner agencies, such as transportation agencies, poison control and language services, may not be available if those entities cannot support a text conversation or if the PSAP is unable to create a multiparty communication with such partner agencies.
- Emergency Medical Dispatch (EMD) instructions as provided for voice calls may not be initially available or may not be able to be provided in a timely manner to text-based callers. It is understood that EMD is not uniformly available to TTY callers. The FCC must be cognizant of the fact that the general public may expect this level of service to be provided if they text an emergency to 9-1-1.

6 National Interim Text and Vendor Proprietary Solutions

More than a dozen proprietary text solutions, often involving additional multimedia data features, have appeared during the 2011-2012 timeframe, been marketed to PSAPs and Counties, and implemented in localized areas around the USA. Other than those that utilize a silent 9-1-1 voice call to establish initial connection to a PSAP, these solutions often have no interaction with the E9-1-1 systems, rather using Internet or other separate networking and proprietary software and often use separate hardware at the PSAP to accomplish their user to PSAP interaction.

With the coming presence of a national SMS interim text solution, and without any other actions, users would be confronted with a situation where their local PSAP or County may (or may not) have implemented one of several proprietary solutions, quite possibly applicable only within their jurisdiction. When the mobile user moves out of the area where they know a specific proprietary solution is available, they would not know if, or which, proprietary solution is applicable at their new, current location. However, the national SMS solution is likely to be available to them there.

The user will likely try their usual “at home” method, then find that it does not work and be forced to manually start a new emergency communication sequence, losing valuable time in an emergency situation. It may be possible to integrate some proprietary solutions into the national TCC routing and delivery process, but that will require more investigation and the determination of whether the solution providers are willing to take that approach. There may also be other options, which again will require more investigation.

The FCC should work with public safety, Department of Justice (DOJ), and hearing and speech disability community to work with commercial vendors to ensure their software solutions meet expectations for emergency services. A combination of Public Safety, FCC, DOJ, deaf, deaf-

blind, hard of hearing, and speech disability groups could likely use “directive influence” in negotiating with vendors for any changes to their software solutions.

Without such an approach nationally, text users will increasingly continue to be uncertain as to what works where, with an attendant risk of delayed emergency contact and response.

7 Education and Outreach

As the requirements of an interim text-to-9-1-1 solution are different from the requirements of long-term NG9-1-1 deployment, it is critical to engage in education and outreach with all affected parties to educate them on the availability and limitations of interim text-to-9-1-1. In particular, it is expected that the roll-out of a nationwide interim solution will not happen all at once, since not all PSAPs will be ready and willing to accept text-to-9-1-1 immediately. Moreover, interim text-to-9-1-1 will have technical limitations that NG9-1-1 will not have, and thus users need to be educated on these. In June 2012, the FCC convened a meeting of stakeholders to begin discussing public education messaging and outreach efforts for interim Text-to-9-1-1.

As this education development effort continues, the EAAC concludes that it is essential that parties from the stakeholder groups who understand the details of the planned national SMS solution be involved, both for input and for review of planned education materials prior to delivery. Some aspects of the education effort need to occur early in the development timeframe, specifically for Public Safety, both for various levels of Public Safety management and for PSAPs and Telecommunicators. Early information and education is not just a consumer matter.

For instance, Public Safety management needs to be aware, early in the national effort, of what impacts to expect for training needs, staffing levels, calltaker work level, budget, ‘call’ data storage and access, and other operational aspects. This planning information is needed with significant lead time, ideally 6-8 months prior to expected first deployment of Interim Text service. Early clarification of how the national SMS interim text solutions relates to other available options must be part of initial education and information for Public Safety stakeholders.

The EAAC therefore recommends that the FCC continue facilitating meetings of all stakeholders consisting of government, industry, consumer, and public safety stakeholders for the development of educational materials so as to not delay deployment.

Categories of Outreach and Training:

There are five main categories of stakeholders that need to be involved in these efforts:

- persons who are deaf, deaf-blind, hard of hearing, and those with speech disabilities
- the general public who may use text in situations where voice is not usable, for example due to extreme noise or a danger for the caller
- Public Safety community
- wireless service providers

- organizations working with communication for the users: relay services, Telecommunications Equipment Distribution Programs (TEDPs), National Deaf-Blind Equipment Distribution Program (NDBEDP), consumer advocacy organizations, and relevant user organizations

Initial Scope and Goals:

- ***Have target audience understand what text-to-9-1-1 is.***
 - Provide the answer to what is text-to-9-1-1.
 - Provide a clear and concise explanation of what texting means to end users.
 - Understand how it may differ from one location to another until NG9-1-1 is active in their location.
 - Provide a clear and concise explanation of the commonalities and differences between different texting methods.
- ***Have target audience understand how text-to-9-1-1 is different from voice to 9-1-1.***
 - Address notion that a text message generally reaches the same call takers as voice-9-1-1, rather than going to a dedicated vehicle: telemetric call center or VRS/IP/TRS¹⁷ Communication Assistant (CA).
 - At message delivery, the PSAP will not receive dispatchable caller location due to technical limitations of the interim solution.
 - Have target audience understand that roll-out will be staggered. Have them understand the timeline for deployment.
 - Public Safety related services such as emergency medical instruction may be based on local capabilities and may not be uniform across the nation. Local capabilities impact the PSAP services that may be available.
- ***Have target audience understand who can use it?***
 - Anybody with a service plan with a US carrier that includes SMS and a mobile handset that can send texts.
 - Especially beneficial for deaf, deaf-blind, hard of hearing, and persons with speech disabilities.
 - Can be used when making a voice call could be dangerous (crime, abuse, hostage situations).
 - Can be used when making a voice call is impossible (disaster or emergency situation when ambient noise level makes it impossible to hear questions from the PSAP call taker or responder).

¹⁷ VRS - Video Relay Service

IP - IP Relay Service

TRS – Telecommunications Relay Service (<http://www.fcc.gov/guides/telecommunications-relay-service-trs>)

- ***Have target audience understand how to use it?***
 - Uses native messaging application on a wireless handset, or a third party application downloaded by the user that accesses the handset's SMS functionality.
 - Question of whether or not to use short-messaging “short hand” [e.g., srsly (seriously), ASAP (as soon as possible), B4 (before), F2F (face-to-face), TY (thank you), ETA (estimated time of arrival), BTW (by the way), LMK (let me know), DWI (driving while intoxicated)].
 - Typing a text message in all capital letters will appear as though you are shouting at the recipient and should be avoided.

- ***Have target audience understand when they can and cannot use it?***
 - Use Text-to-9-1-1 when you cannot or should not use your voice or hearing.
 - And when you cannot because your wireless service provider, handset, or PSAP does not provide text-to-9-1-1 service.
 - Address misconceptions about the reliability of text messages during congestion.

- ***Have target audience understand when they **should** use it and when not?***
 - Use only in a real emergency, when you would make a voice, TTY, or relay call to 9-1-1 in similar circumstances. For example, text-to-9-1-1 is not a way to report broken street lights.
 - Should only be used when you cannot use voice-9-1-1.

- ***Have target audience understand how they can find out if text-to-9-1-1 works for their carrier, handset, and location.***
 - Educate target audience about testing text-to-9-1-1. *Note:* The feasibility of testing is not yet known and will be determined later.
 - What other ways are there to find out in advance?
 - Educate target audience when they activate a handset with their carrier.

- ***Have target audience understand what can go wrong and what should they do then.***
 - Text-to-9-1-1 may take longer under normal circumstances.
 - Text-to-9-1-1 may result in out-of-order or lost messages.
 - Text-to-9-1-1 may not work if the user is roaming.

8 Recommendations

I. General Recommendations for Text-to-9-1-1

Consistent with the December 2011 EAAC Report and March 2012 EAAC Resolution, the EAAC makes the following general recommendations to achieve standards-based methods for text-based communications with public safety answering points (“PSAP”) (“Text-to-9-1-1”) during the transition to Next Generation 9-1-1 (“NG9-1-1”) services:

- a. As a near term and interim solution, users prefer direct access to a PSAP (i.e., “Text-to-9-1-1” without third party involvement) via native mobile short message service (“SMS”). Other text-based communication technologies, such as e-mail, real-time text (“RTT”) and instant message (“IM”) (i.e., “Over the Top”/third party text messaging services), should be evaluated for feasibility of providing direct access to a PSAP.
- c. Utilizing the existing standards-based mobile SMS network architectures and capabilities currently offered by wireless service providers to wireless subscribers, with minimal modifications or alterations, would be the most technically and economically feasible way to ensure rapid deployment of SMS-based Text-to-9-1-1.
- d. All Text-to-9-1-1 solutions, including native SMS-based and “Over the Top”/third party text messaging services, should utilize a standards-based approach based on the C/E gateway architecture in order to minimize implementation challenges for industry and PSAPs and ensure the consistent availability of Text-to-9-1-1 service for industry, PSAPs and consumers. Industry, PSAPs and consumers should not be expected to utilize non-standards-based Text-to-9-1-1 solutions. PSAPs can voluntarily choose to select a non-standards-based Text-to-9-1-1 solution, but industry should not be expected to support these non-standards-based solutions.
- e. As a near term and interim solution, Text-to-9-1-1 should not be subject to all of the existing 9-1-1 requirements for telephone calls (e.g., voice calls to 9-1-1) or long-term solutions (e.g., NG9-1-1) if such requirements would require significant modifications to existing industry or public safety networks, equipment or standards.
- f. Text-to-9-1-1 should generally be available to subscribers of SMS-based and “Over the Top”/third party text messaging services. Text-to-9-1-1 should not be limited to individuals with disabilities because any limitation in this manner may create public confusion and unnecessary risk for all entities.
- g. Further research, including standards development for the transition of Text-to-9-1-1 to NG9-1-1, is necessary to maintain consistency of text-based communications to 9-1-1 services in order to avoid public confusion.
- h. Additional liability protection may be necessary for all entities involved in the support of Text-to-9-1-1.

II. Recognized Features for SMS-based Text-to-9-1-1 Service

The EAAC recommends that the FCC and appropriate standards organizations¹⁸, in consultation with appropriate stakeholders such as representatives of Public Safety and individuals with disabilities, should consider the following features for SMS-based Text-to-9-1-1 services, subject to the technical and economic feasibility of such features:

- a. **Direct Access:** SMS-based Text-to-9-1-1 should ensure a message originator has direct access to an appropriate PSAP without initially contacting a relay service.
- b. **911 digits:** Using any number besides “911” to originate SMS-based Text-to-9-1-1 will create public confusion and add uncertainty to an emergency communication. Alternative technical or educational solutions may be necessary if the three digit code “911” is not supported by existing wireless handsets or SMS network architectures or standards.
- c. **Wireless subscribers with SMS capable handsets:** Message originators must not be required to pre-register to initiate SMS-based Text-to-9-1-1, but a valid SMS service subscription is required.
- d. **Voice and Text:** Use of a voice and text communication in the same “call” should be supported in NG9-1-1 and should be further researched for non-SMS based solutions. However, this capability will not be feasible for near-term implementation of SMS-based Text-to-9-1-1.
- e. **SMS Roaming:** Due to existing SMS network standards and architectures, SMS-based Text-to-9-1-1 may not be available when a text message is originated on a wireless network other than the home wireless network to which a message originator has a valid subscription (i.e., roaming on a wireless network). Additional research may be required to provide a “bounce back” notification in this situation.
- f. **Continuous Connection and Chronological Communications:** Recognizing that SMS is a store-and-forward service, the transport networks used for SMS-based Text-to-9-1-1 should maintain continuous and, to the extent feasible, chronological communications between the message originator and PSAP.
- g. **Feedback on Progress of Communication:** The transport network used for SMS-based Text-to-9-1-1 or the PSAP should provide a message originator with feedback on the progress of a SMS-based Text-to-9-1-1 communication.
- h. **Inactivity timer:** A standard time for PSAPs to “release/terminate” an SMS-based Text-to-9-1-1 communication in case of inactivity should be researched, recommended and implemented.

¹⁸ These groups include, but are not limited to, the Alliance for Telecommunications Industry Solutions (ATIS), the Association of Public-Safety Communications Officials International (APCO), the National Emergency Number Association (NENA), and the Telecommunications Industry Association (TIA), each having a mission to develop national consensus standards for telecommunications goods and services.

- i. **“Bounce Back” Notifications:** An automatic response should be provided if Text-to-9-1-1 service is unavailable due to lack of network or PSAP support. Additional research may be required to provide a “bounce back” notification when service is unavailable in certain technically challenging situations, such as roaming.

III. Policy Considerations for Near-term Text-to-9-1-1 Service

The EAAC recommends that the FCC consider the following policy issues related to Text-to-9-1-1 services:

- a. Originating service providers should utilize a standards-based approach (e.g., ATIS-TIA industry standard for wireless carrier native SMS to 9-1-1) based on the C/E gateway architecture in order to minimize implementation challenges for industry and PSAPs and ensure the consistent availability of Text-to-9-1-1 service for industry, PSAPs and consumers independent of the originating network capabilities. Originating network, device and service providers should not be expected to support third-party proprietary services or solutions.
- b. Consistent with recognized standards (e.g., ATIS-TIA industry standard for wireless carrier native SMS to 9-1-1), Public Safety Authorities and PSAPs should choose whether to request and the method of delivery of Text-to-9-1-1 communications. If a PSAP chooses not to accept Text-to-9-1-1 communications (“non-participating PSAP”), an alternative PSAP (“designated PSAP”) shall be chosen to accept and handle Text-to-9-1-1 communications.

IV. Public Education

The EAAC recommends that the FCC consider the following public education issues related to Text-to-9-1-1 services:

- a. Under the coordination of the FCC, national Public Safety organizations and state and local public safety entities, along with leading deaf, deaf-blind, and hard of hearing organizations, should lead the education efforts with their citizens about the availability and limitations of Text-to-9-1-1 services.
- b. Other stakeholders, such as industry and other organizations representing individuals with disabilities, should provide support where appropriate and consistent with FCC and public safety public education efforts.
- c. The FCC should provide information about the availability of Text-to-9-1-1 consistent with open government policies (e.g., make data available for third parties to utilize).

V. Future Considerations – Next Steps

As the technical, operational, and regulatory frameworks for Text-to-9-1-1 continue to develop, the EAAC wishes to note that the adoption and application of the previous recommendations will need to be determined through the appropriate rulemaking and standards development processes.

The EAAC recommends that a plan for completion of development work and deployment process be established, potentially through further work by the EAAC and its Subcommittee 1, and further recommendations in these areas be provided via an expanded report to the FCC. Areas to be treated include, but are not limited to:

- a. Definition and integration of the Joint ATIS/TIA SMS-to-9-1-1 methodology with overall Text-to-9-1-1 implementation impacts.
- b. Development of a test plan for the overall Text-to-9-1-1 processing flow from SMS message to PSAP interaction for all options.
- c. Development and deployment of education materials for text originators ('callers'), Public Safety stakeholders, and other stakeholders as needed
- d. Text-to-9-1-1 processing/operations methods development, including establishment and management of TCC control databases such as PSAP interface choices.
- e. Establishment and management of a publicly accessible and searchable national Text-to-9-1-1 database of Public Safety service area status. The EAAC expects the FCC to lead the development and implementation of this database.
- f. Other items needing detail development and which affect deployment plans are defined in the body of this report.

A specific plan for further development and deployment is necessary to support completion of the desired end result, effective and timely availability of the interim Text-to-9-1-1 service. No one stakeholder can effectively finish the Interim Text-to-9-1-1 national project proposed and described in this report; an ongoing collaboration is required. Hence, a plan for that national collaboration and project is needed to enable its completion. Given the complexity of applying these recommendations, the EAAC also notes that some of the recommendations may require further research and development of technical standards, best practices or guidelines.

Appendix A: Glossary

apps	“apps” is the shorthand name for applications such as programs and applications which are loaded onto smart phones or tablets.
ATIS	Alliance for Telecommunications Industry Solutions
C-gateway	Gateway function in the transport network for communication between originating network and transport network
CAD	Computer Aided Dispatch
CPE	Customer Premise Equipment
CVAA	Communication and Video Accessibility Act
DOJ	Department of Justice
E-gateway	Gateway function in the transport network for communication between transport network and the PSAP
EAAC	Emergency Access Advisory Committee
EMD	Emergency Medical Dispatch
ESInet	Emergency Services IP Network
FCC	Federal Communications Commission
FSK	Frequency Shift Keying
i3	NENA’s designation of the architecture for the IP based next generation 9-1-1 (NG9-1-1) networks.
IM	Instant Messaging
IP	Internet Protocol
ITU-T	International Telecommunications Union (ITU) – Telecommunication Standardization Sector
LoST	Location-to-Service Translation protocol
MMS	Multimedia Messaging Service
MSRP	Message Session Relay Protocol
NDBEDP	National Deaf-Blind Equipment Distribution Program
NENA	National Emergency Number Association
NG9-1-1	Next Generation 9-1-1
NOVES	Non-Voice-Centric Emergency Services
NSI	Non-Service Initialized
Originating network	Network providing communications services to users.
OTT	Over-the-Top
PDA	Personal Digital Assistant

PSAP	Public Safety Answering Point
RFC	Request for Comment
RTT	Real-time Text
Short Message Service (SMS)	Short message service native to a wireless service provider's originating network architecture.
SIP	Session Initiation Protocol
TEDP	Telecommunications Equipment Distribution Program
Text Control Center (TCC)	A name for the combination of gateways and routing elements needed to route messages and convert them according to the protocols used in the originating network and the emergency service networks and PSAPs. The TCC is part of the transport network.
TIA	Telecommunications Industry Association
TRS	Telecommunications Relay Service
TTY	Text telephone based ITU-T V.18 Annex A ¹⁹ standard for an FSK modem, used primarily in the USA.
VoIP	Voice over IP
VRS	Video Relay Service

¹⁹ ITU-T Recommendation V.18 "Operational and Interworking Requirements for DCE:s Operating in the Text Telephone Mode". <http://www.itu.int/rec/T-REC-V.18/en>

Appendix B: Use Cases for SMS-based Text-to-9-1-1

The following use cases are based upon the “Use Cases & Suggested Requirements for Non-Voice-Centric Emergency Services” (NOVES) and are relevant for SMS-based Text-to-9-1-1²⁰. Other message types will be defined as the development proceeds. Some elements had to be adapted for the constraints of an interim SMS-based solution.

Text-to-9-1-1 and receiving text back from the native messaging application

In NOVES two use cases apply: one if the user remains in the same location, and one if the user changes location. There the assumption is that the PSAP will be notified of the location change, which may not be possible with SMS-to-9-1-1, due to the limitations inherent in SMS. However, even in SMS-to-9-1-1, a location change should not disrupt the call flow.

Text Message from a Mobile Device to Emergency Services

Based upon NENA 73-501 v1 Use Case 1²¹:

Short Description

Bob has a mobile device with a native SMS-capable text messaging application. In an emergency situation, Bob decides to send a message to Emergency Services.

Actors

Bob – Mobile Device user

Carol – E9-1-1 call taker.

Pre-conditions

Bob’s device supports SMS text messaging, and has an SMS service plan activated. The device is on his home carrier’s radio access network. 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.)

²⁰ Use Cases & Suggested Requirements for Non-Voice-Centric Emergency Services, NENA 73-501 v1. Online: http://www.nena.org/general/custom.asp?page=NG_NonVoiceEmergSvc

²¹ Id., at p. 17

3. Bob composes a text message describing the emergency, and sends the message to the three-digit code 9-1-1.
4. The text message is sent to the PSAP designated for the area that Bob is in. 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, including questions about the location of the emergency, 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.

User texts 9-1-1 with location change:

Text Messaging from a Mobile Device to Emergency Services with Location Change

Based upon NENA 73-501 v1 Use Case 11²²:

Short Description

Bob has a mobile device with a native SMS-capable text messaging application. In an emergency situation, Bob decides to send a message to Emergency Services. 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 device changes.

Actors

Bob – Mobile Device user

Carol – 9-1-1 call taker

Pre-Conditions

Bob's device supports SMS text messaging, and has an SMS service plan activated. The device is on his home carrier's radio access network. While changing location, the device still remains on Bob's home carrier's radio access network. 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. During the text message exchange with the PSAP, the change in location has resulted in the continued delivery of text messages to Carol at the same PSAP.

²² Id., at pp. 30-31

Normal Flow

1. Bob turns on his mobile device 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 the three-digit code 9-1-1.
4. The text message is routed to the PSAP designated for the area that Bob is in. 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, including questions about his location, and Bob responds. Bob's device is configured such that it 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 via exchanges of text messages with Bob, asking him about his new location.
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 continues to ask Bob about his 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.

New Use Case for Bounce-Back when PSAP Does Not Support Text-to-9-1-1:

Text Message from a Mobile Device to Emergency Services and Emergency Services do not support text-to-9-1-1.

Short Description

Bob has a mobile device with a native SMS-capable text messaging application. In an emergency situation, Bob decides to send a message to Emergency Services. The PSAP designated for Bob's location does not accept text-to-9-1-1.

Actors

Bob – Mobile Device user

Pre-conditions

Bob's device supports SMS text messaging, and has an SMS service plan activated. The device is on his home carrier's radio access network. The PSAP designated for Bob's

location does not accept text-to-9-1-1.

Post-conditions

The text message originated by Bob was not delivered, and Bob received a bounce-back message informing him of the failure to deliver his message to 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 the three-digit code 9-1-1.
4. The text messaging routing function determines that the PSAP designated for Bob's location does not support text-to-9-1-1.
5. An automated bounce-back message is delivered to Bob's device, informing him that his message could not be delivered, and to seek alternate means of contacting 9-1-1.

New Use Case for Bounce-Back when User is Roaming:

Text Message from a Mobile Device to Emergency Services, and the Mobile Device is Roaming

Short Description

Bob has a mobile device with a native SMS-capable text messaging application. In an emergency situation, Bob decides to send a message to Emergency Services. Bob's device is roaming on a network in the U.S. that is not his home carrier's.

Actors

Bob – Mobile Device user

Pre-conditions

Bob's device supports SMS text messaging, and has an SMS service plan activated. The device is **not** on his home carrier's radio access network.

Post-conditions

The text message originated by Bob was not delivered, and Bob received a bounce-back message informing him of the failure to deliver his message to 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 the three-digit code 9-1-1.
4. During the routing of the text message it is discovered that Bob is roaming, and thus no information about his location, which is necessary for routing, is available.
5. An automated bounce-back message is delivered to Bob's device, informing him that his message could not be delivered, and to seek alternate means of contacting 9-1-1.

Call 9-1-1 and receive SMS-based text back

This use case is primarily geared toward hard of hearing users, who have some voice calling abilities, and who may feel comfortable initiating a voice call, but rely on receiving text back for best understanding. Possible limitations are:

1. Simultaneous voice and text is not supported by the call path to the PSAP, or the PSAP itself.
2. Making a voice emergency call may put some phones in a mode that prevents them from receiving text messages until the emergency call has concluded.

Based upon NENA 73-501 v1 Use Case 10²³:

Emergency Communication by a Mobile Device to a PSAP via a voice call, then switching to 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. If the user accepts, the emergency call switches to text messages.

²³ Id, at p.p 28-30

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 the native calling function of his mobile device.

The caller may choose to communicate with PSAP via either voice call, or SMS-based text messaging, but not both concurrently. 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

Bob's device supports SMS text messaging, and has an SMS service plan activated. The device is on his home carrier's radio access network. The PSAP for which Carol works is configured to receive text messaging.

The user device supports making a voice emergency call, then switching to SMS-based text messaging.

The wireless network supports switching from a voice emergency call to text messaging.

Post Conditions

The 9-1-1 caller made a voice call to 9-1-1, asked the PSAP to switch to text messaging, and the PSAP responded via SMS. Both the caller and the PSAP continued exchanging text messages.

Normal Flow

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

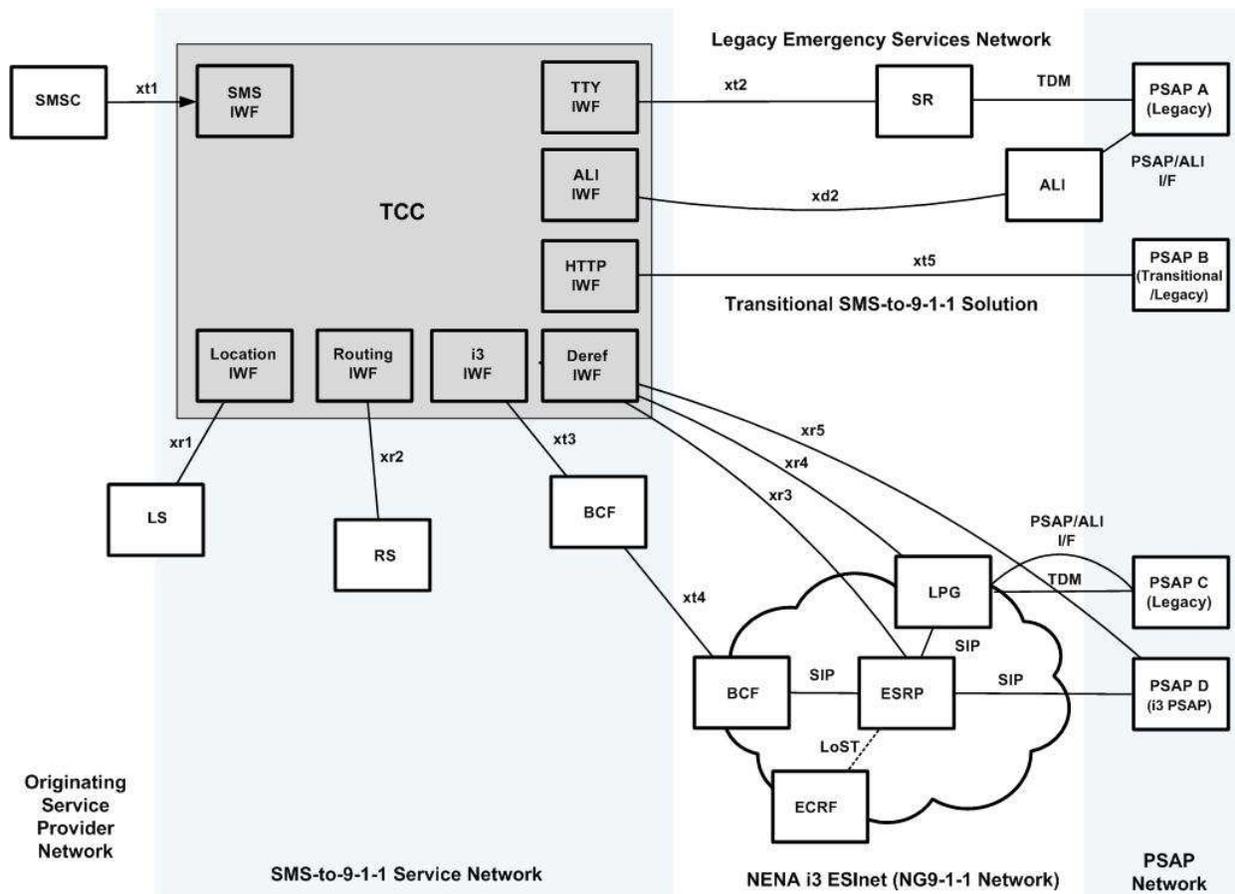
1. Bob uses his mobile phone to dial 9-1-1 to report an emergency situation.
2. The call is answered by Carol similar to the existing voice service to 9-1-1.
3. Bob describes his emergency and indicates that he would like to switch to text messaging.
4. If the PSAP supports text messaging, Carol sends a message to Bob at his callback number, and hangs up the voice call. This message uses a routable address (i.e., short code or other type of routable SMS address) to uniquely identify the PSAP that initiated the message. If the PSAP does not support switching to text messaging, Carol indicates so on the voice call.

5. If Bob receives a text message from Carol, he responds to it with his own message.
6. If Carol receives a message from Bob, Carol then exchanges more messages with Bob.
7. Carol obtained the initial location information of Bob's device from the voice call. From the message exchange, Carol determines the exact location.
8. Carol sends a message to Bob advising that help is on the way. Carol keeps exchanging messages with Bob until the emergency concludes.

Appendix C: Joint ATIS/TIA SMS to 9-1-1 Architecture

This Appendix provides information about the current architecture of the ATIS/TIA industry standard for wireless carrier native SMS to 9-1-1²⁴. This architecture is still in development and may be subject to change prior to publication of the standard. Please note that the Joint ATIS/TIA SMS to 9-1-1 architecture utilizes different terminology than the terminology used in this report.

In the following diagram, the Interworking Functions (IWF) boxes within the TCC box correspond to the C/E gateways described in this report. The SMS IWF, Location IWF, and Routing IWF would be associated with the C gateway. The TTY IWF, ALI IWF, HTTP IWF, and i3 IWF would be associated with the E gateway.



²⁴ This diagram currently in draft status as contained in the draft of J-STD-110, *Joint ATIS/TIA Native SMS to 9-1-1 Requirements and Architecture Specification*, and future changes may be made to this diagram prior to final approval. For additional information regarding this diagram or draft standard J-STD-110, please contact the ATIS Document Center Administrator at doccenter@atis.org.

Revision History

Date	Version	Description
3/1/13	1.0	Version presented for approval at the full EAAC meeting on March 1st 2013.