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Washington, D.C. 20554

In the Matter of)
)
Facilitating the Deployment of Text-to-911 and) PS Docket No. 11-153
Other Next Generation 911 Applications)
)
Framework for Next Generation 911) PS Docket No. 10-255
Deployment)
)
)

**Reply-To Comments of the Rehabilitation Engineering
Research Center on Telecommunications Access**

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1 Introduction

The Telecom RERC (RERC-TA) is a joint project of the Technology Access Program at Gallaudet University and the Trace Center at the University of Wisconsin-Madison, in partnership with Omnitor in Sweden. The RERC-TA is funded by the U.S. Department of Education, National Institute on Disability and Rehabilitation Research, to carry out a program of research and development focused on technological solutions for universal access to telecommunications systems and products for people with disabilities.

In this filing we respectfully submit our initial analysis and comments on the recently released ATIS/TIA JSMS911 J-STD-110 standard¹ (Section 2). We also submit our concerns about domestic roaming and its impact on the interim text-to-9-1-1 solution for people with disabilities who have no other means of contacting 9-1-1 (Section 3). Finally, we submit a supplemental document (attached separately to this filing) highlighting the technical and operational challenges associated with receiving interim text-to-9-1-1 messages through TTYs at legacy PSAPs, as well as the challenges associated with receiving modern real-time text-based communications via TTYs at legacy PSAPs, and lay out the framework for a feasibility study. The RERC-TA strongly recommends that TTYs are considered only as a method of last resort at PSAPs if all efforts to provide IP-based equipment fail, and before any decisions are made on such use of TTYs, a feasibility study must be carried out according to the considerations laid out in the supplemental report.

¹ Joint ATIS/TIA Native SMS to 9-1-1 Requirements and Architecture Specification, March 2013. Online: <http://www.atis.org/docstore/product.aspx?id=27924>

2 Comments on ATIS/TIA JSMS911 J-STD-110

"Joint ATIS/TIA Native SMS to 9-1-1 Requirements and Architecture Specification."

This section contains our comments on the J-STD-110 document. This standard is good and thorough. There are, however, some points that need improvement and it is necessary to provide further details or references to documents where such details are documented. The Emergency Access Advisory Committee (EAAC) has provided a large volume of advice on this topic in its interim text-to-9-1-1 report². The RERC-TA recommends that the questions posed in the analysis in this document are answered and a new version of the standard is created in collaboration with the EAAC, taking the comments in this document into consideration.

2.1 Comments in brief:

Our comments are mainly focusing on the following topics:

A. Users shall not be asked to make voice calls.

Some cannot, and will become very frustrated by that request.

B. A call case is missing for call back from PSAP after an earlier session has been closed. This call case needs to be added.

² Report of Emergency Access Advisory Committee (EAAC) Subcommittee 1 on Interim Text Messaging to 9-1-1. Submitted on March 7, 2013. Filed in PS Docket 11-153 on April 4, 2013.

C. The TTY procedures need to be much more specific and in line with current telecommunicator procedures for TTY. Currently they introduce risks for corruption and loss of text and require very special telecommunicator procedures. The attached supplemental report provides details, but not all limitations of the TTY can be overcome.

D. The Interim PSAP mode with HTTP interfaces has a risk of becoming unmanageable because of lack of standards. At worst, each PSAP will need to have multiple interim applications. That situation needs to be avoided.

2.2 Comments in detail:

2.2.1 Do not ask the user to make a voice call!

The user shall not be asked to make a voice call. That is confusing when someone is unable make a voice call.

Change to some more appropriate wording in Sections 3.1.1, 4. point 4, 4 Point 5, 4Point 7c, 4 Point 29,. 5.2.4, 5.2.5 Point 4, 5.3.4, 5.3.5 Point 5, 6 Point 10. 6. Point 11.

2.2.2 Translations must be done when sending to Legacy PSAP with TTY

Section 4. Assumptions, Point 10. Extend the first sentence by "except for characters which cannot be represented on the TTY in Legacy PSAPs.

Add a separate chapter or document about the use of TTY as SMS terminal in legacy PSAPs.

Reason:

Messages cannot be delivered as is to legacy TTY PSAPs. TTYs have a limited character set and the messages will need to be translated to this character set resulting in loss of information.

TTYs have only one case for letters. And @ # % & \ * _ < >, which are part of the SMS character set, cannot be represented on the TTY. This, for example, makes it not possible to transfer orders about door intercom handling via the phone, including the # and * characters, without risk of misunderstandings. These characters need to be automatically converted to other characters, represented on the TTY. A standardized translation is provided in ITU-T V.18 Annex A, but the representation of the at-sign @ as "X" may need rethinking.

This is not on the topic of chapter 4, point 10, but it needs to be mentioned there and fully elaborated in a separate chapter or document about the use of TTY as SMS terminal in legacy PSAPs³.

2.2.3 Use case for call back is missing

Section 5. Use cases. Use cases for call back is missing. When the PSAP need to contact the user again after having terminated the first dialogue or if it was disconnected, it must be possible to establish a dialogue initiated from the PSAP. This will need to include for example routing considerations, e.g. how the call out from a TTY in a legacy PSAP will be routed to the proper TCC and then further on to the SMS user.

³ Gunnar Hellström. Procedures for the TTY as text terminal in legacy 9-1-1 PSAPs. Supplemental report, attached to this filing.

Add Use case 4 "Call back to user." elaborated for the three main PSAP type cases: Legacy, Interim and NG9-1-1.

Add Call Back considerations also in chapters 6, 7, 8, 9 for the three main PSAP types (only Annex B covers Call Back already)

2.2.4 Strict dialogue and turn taking control is needed with the legacy PSAP TTY

The document is not clear about how TTY communication with Legacy PSAPs is to be performed and controlled to get it flowing and keep risk of loss and corruption and confusion low.

Gunnar Hellström, Omnitor, co-chair of the TTY Transition sub-group of the EAAC, has written a document on this topic with proposals on how to handle it in the TCC TTY-IWF, which is attached to this filing. This document is proposed to be taken as input for a document complementing J-STD-110 with details on the TTY PSAP communication and referenced from a new edition of J-STD-110.

Part of this consideration is that NENA has a TTY/TDD Standard Operating Procedure document 56-004⁴ that needs to be followed and contains the information about dialogue control that is needed. These considerations are embedded in the "TTY as a PSAP text terminal" document.

The PSAP must be given chance to provide a complete response on the TTY before the first message is sent to the PSAP. Otherwise collision will occur and the message contents corrupt or lost. TTY is a two-way-alternating protocol with turn

⁴ NENA56-004 TTY/TDD Standard Operating Procedure (SOP)

indicators sent on the human presentation level. The TCC may do no or only minor initial prompting of maximum one character at a time a few seconds apart until the PSAP starts transmitting a text greeting, normally ending by "GA".

This influences a number of places. Reference to the "TTY as a PSAP text terminal" [PSAP-TTY] document is proposed for all of them.

2.2.4.1 "GA" is the usual end-of-message indicator from TTY

Section 7.3.4 Reference point XT2. Insert at appropriate position "The TCC waits for a completed initial answer from the PSAP, ended by "GA" as is the habit in TTY usage and further described in [PSAP-TTY].

2.2.4.2 Insert dialog control

Section 8.1. Assuming that the dialog establishment in step 9 is just on the call level, a step must be inserted before media content step 12. Before sending media to the PSAP, there must be an answer from the PSAP ended by "GA" and a short pause, (or no GA but a longer pause if the call taker forgets about the "GA").
Inset that before step 12.

2.2.4.3 Dialog control - wait for turn and insert turn indicator towards PSAP

Section 8.1 Step 12.

Before transmitting, the TTY-IWF must check that there is no reception of TTY tones going on. If so, wait first for turn. See "TTY as a PSAP text terminal" [PSAP-TTY] for details.

At the end of each completed message transmission to the PSAP, the characters " GA" need to be inserted, to indicate that the PSAP is in turn.

An exception is that if it is detected that the session is about to be closed, but the PSAP has not indicated that yet, then the characters " SKGA" shall be added last. And if the PSAP has sent " SKGA", then next from the TTY-IWF shall be ended by " SKSK".

2.2.4.4 End of message detection must be defined and stripped off

Section 8.1 Step 13. Add that end of message from the PSAP is detected when GA or SKGA or SKSK is received followed by a short pause (1 sec ?). Then that delimiter shall be stripped off when creating the message to send to SMS user. More details can be found in the attached supplemental document on procedures for the TTY as text terminal in legacy 9-1-1 PSAPs.

2.2.4.5 The TTY-IWF must not transmit TTY if TTY is received.

Section 8.1 Point 14. Add that the TTY-IWF must check that transmission of TTY-tones is not going on from the PSAP before transmitting to the PSAP. The state of turn must also be monitored and obeyed in order to avoid loss and corrupted text.. See the attached supplemental document on procedures for the TTY as text terminal in legacy 9-1-1 PSAPs.

2.2.4.6 Messages out of turn must be allowed but be kept under control

Section 8.1 Point 15 Add: There is a high risk that the SMS user gets eager to get a response, and sends messages out of turn. This needs to be enabled, but in a

controlled fashion so that risk for collision with resulting loss and corruption is minimized. See the attached supplemental document on procedures for the TTY as text terminal in legacy 9-1-1 PSAPs for details.

2.2.4.7 Level 3 procedure descriptions for the TTY case need additions

Section 9.1.1 Points 17, 18, 19. Add similar description as for 8.1 for precautions for turn taking, code conversion etc. as specified in [PSAP-TTY].

Also indicate in Point 17 in Figure 13 that after connection, the PSAP is expected to answer with a TTY greeting phrase ended by " GA".

2.2.4.8 Dialogue control and other details of TTY communication cannot be left for further study.

Section 9.1.2 Points 1 to 17, and especially point 6.

Point 6, says that the details of end of message detection etc. is out of scope for the document.

This cannot be left saying that it is out of scope. Reference to specification of next level of detail is urgently needed.

Change the text about end of message detection to:

Details of the handling in the TTY-IWF regarding end-of-message detection, adding and stripping of turn-taking tokens, turn-taking, avoidance of collisions, conversion of character codes and other steps in the process needed for transmission of messages to and from the legacy PSAP TTY are described in the document " **Procedures for the TTY as text terminal in legacy 9-1-1 PSAPs.**"

2.2.4.9 Include the strict dialogue control also in the call back use cases

New sections need to be added for the missing Call back use case. They will also need to take the dialogue order with legacy PSAP TTYs into consideration and refer to “**Procedures for the TTY as text terminal in legacy 9-1-1 PSAPs.**” For that case, the TTY-IWF in the TCC will need to answer the call with a fixed text greeting message towards the PSAP, prompting the PSAP call taker for the first message to be sent to the SMS user.

2.2.5 Dialogue control for the NG9-1-1 case

Section 9.2.1 Step 27 and 9.3.1 Step 23.

The user level dialogue establishment for the NG9-1-1 case should be thought through, so that the working procedures will work well both for calls with audio, video, real-time text and MSRP text messages as well as for SMS translated to MSRP text messages and for users with Legacy TTYs. Unsolicited text messages that shall not be tied to any session might also occur in the NG9-1-1 working environment.

The NG9-1-1 call taker will have these different kinds of calls with text to handle, and will need support by the system to handle them well. In some cases the call taker will be expected to respond with text before any text or other media is received.

It is likely sufficient to just transmit the first SMS to the PSAP as 9.2.1 step 27 indicates, but the other coming call types should be compared and verified and planning should be done so that operation gets as straightforward as possible for the calltaker. Some initial information text before the first SMS message might be appropriate to add in the TTY-IWF and even some call type indicator provided locally

to the calltaker throughout the call. The media and codecs used in the call should also be stored in the NG9-1-1 and be available for composing the INVITE in a possible call back with only MSRP text as default. Note however that the calltaker must also have the option to decide to call back with a voice call.

Conclusion: Insert introductory information text to the PSAP in Section 9.2.1 Step 27 and 9.3.1 Step 23 if so is decided. Indicate in call back use case that information about media used in the incoming call is used as default for composing the call back that for the SMS case will be an MSRP text-only call.

2.2.6 SMS maximum length handling should be mentioned

It should be mentioned somewhere in the document if the maximum length per SMS has any influence in the procedures. Both SMPP and modern handsets seem to handle chained messages so that the limit per message fragment is usually invisible for the user and the J-STD-110 procedures, but this fact should be mentioned.

2.2.7 The sequence diagrams are fuzzy.

The sequence diagrams are not sharp enough. Lower compression in .pdf creation is needed.

2.2.8 Will all interim PSAPs need to have a number of different HTTP user interface applications?

Sections 7.1 and 7.3.6. There seems to be a risk built into the architecture that all PSAPs using the interim HTTP based solution will need to support a number of different such applications from different vendors to cover users of all wireless

operators. It is a severe source of concerns in modern PSAP operation that more and more special but similar applications need to run side-by side in PSAPs. It must be a requirement that the SMS communication can be handled through just one user interface application in the interim PSAP.

If there are plans to avoid this problem, where are then the multiplexing points in the architecture?

Here are a set of logic statements explaining the situation, with some questions and assumptions included.

1. The SMSCs are at least one per wireless operator with own network.
2. The addressing from SMSC to TCC in the SMPP protocol is just "911" or something corresponding. The routing by PSAP is not available at this point.
3. The message will therefore go to one TCC for all of USA or one TCC per wireless operator. *What is the current intention?* Let us assume one per wireless operator.
4. On the other side of the TCC, it goes in the xt5 reference point by a vendor specific protocol to the most appropriate PSAP. "Vendor specific" can be assumed to mean "Interim PSAP system vendor specific." *Is this correct?*

5. In 7.1 it is stated that the protocols used between functional elements in the TCC are not standardized in J-STD-110. *Will they be standardized in other standards?*
6. Assuming not, then the HTTP IWF has no standardized interface towards other elements in the TCC, and a number of vendor specific protocols towards the PSAPs.
7. When routing is decided, and it is found out which PSAP shall receive the text message, there need also to be a way to decide what vendor specific protocol to execute in the HTTP IWF, assuming that there will be just one per PSAP.
8. Figure 9, points 8 and 9 should indicate how to decide which vendor specific protocol the HTTP IWF shall use with the specific PSAP.
9. The TCC needs to install one HTTP IWF protocol module suitable for each vendor specific protocol and ways to select between them. The Interim PSAP system vendors need to get involved in developing these modules.
10. If there is one TCC per wireless carrier developed by different implementors, then each TCC will contain a different set of undocumented internal protocols.
11. This sums up to a situation that will be hard to manage because of the number of variants of the HTTP IWF modules that need to be maintained. It will be

the number of different TCC times the number of different vendor specific protocols.

Conclusions on the HTTP user interface applications: If the assumptions above are correct, the following can be concluded:

- It would vastly ease management of the system if a standardized protocol were used for reference xt5, and also for the internal protocol between TCC functional elements.
- For PSAP operational reasons, it must be avoided to require the PSAPs to run a number of different Interim text Applications in parallel.

3 Concerns about Roaming

The RERC-TA would like to express its concern that not addressing domestic roaming situations as part of the interim text-to-9-1-1 solution could potentially exclude people with disabilities, as well as non-disabled consumers, who have no alternate means of contacting 9-1-1. The EAAC SC1 report notes in its executive summary that further study is needed whether domestic and international roaming can be resolved as part of the interim solution; however, at this point it is not even clear how serious the problem is in the first place, due to lack of data. The lack of information is untenable, and the RERC-TA respectfully suggests that it is necessary for carriers to submit statistics on the number of times users attempted to text 9-1-1 during a roaming situation to the FCC. Doing this will allow stakeholders to establish the percentage of text-to-9-1-1 failures due to roaming. Only then it can be determined what measures need to be taken. In addition, the user view of the EAAC

SC1 report on the interim text-to-9-1-1 solution states clearly that users expect to receive bounce-back messages in cases of failures, and this includes roaming. Under no circumstances should a text message to 9-1-1 be allowed to disappear into a black hole with no notification to the user whatsoever – irrespective of the cause. This can create dangerous confusion in the stress of an emergency, as evidenced by the comment by Michael Keathley⁵, who did not receive any response to his text to 9-1-1.

4 Conclusion

The RERC-TA respectfully submits these comments, which contain an initial analysis of the ATIS/TIA JSMS-110 standard, our concerns about not addressing roaming as part of the interim text-to-9-1-1 solution, and a supplemental report on using TTYs at legacy PSAPs for receiving SMS and real-time text communications. It is especially important that our concerns about using TTYs are resolved before any decisions are made on their implementation as part of the interim text-to-9-1-1 solution.

⁵ Filing by Michael Keathley, PS Docket 11-153, March 8, 2013.

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