Outline of White Paper

911 Telephone Response Systems

January 25, 2011

1. Identification of Problem

“As the deaf community moves away from legacy TTY to modern text communications technologies such as cellular phone or PC-based instant messaging, they lose the ability to reliably reach 911 emergency services and have their street address or geographic location automatically provided.”

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https://cisco.webex.com/ciscosales/lsr.php?AT=pb&SP=MC&rlID=48559847&rKey=c929138d07e1c2f8

2. History of US/Canada 911 Telephone Response Systems
   a. Overview
      i. 1968: First 911 call system implemented in New York City. System was capable of hardwired call forwarding to Public Safety Answering Points (PSAP), but was not always the correct PSAP for the caller’s street address.
      ii. Mid-1970’s: Automatic Number Identification (ANI) and Selective Routing were added. Selective Routing was able to forward 911 calls to the correct PSAP, based on the 7-digit calling phone number.
      iii. 1980: Automatic Location Identification (ALI) was deployed in Orange County, CA.
      iv. 2010: More than 95% of voice calls provide ALI.
   b. Cellular
      i. 1983: First US cell telephone service. 911 not supported on early cell service; each state had different emergency numbers for cell callers.
      ii. Early 1990’s: FCC Phase 0 – 911 cell calls supported, but routed to single state police or highway patrol PSAP for entire state (calls had to be re-routed significantly increasing response time).
iii. 1998: FCC Phase I – 911 operators have ANI capability and able to view nearest cell tower location via text longitude and latitude coordinates, although calls still routed to single state police or highway patrol PSAP for entire state.

iv. 2001: FCC Phase II – 911 operators have ANI and phone geographic location on street map display (within 50-300 meters). Location within 125 meters for 67% of calls. Usually routed to correct local PSAP.


c. Wireline Support
i. No emergency operator deaf caller support from 1876 through 1990. Deaf person had to ask hearing person to make emergency call.

ii. After ALI support became more common in early 1990’s, deaf callers were instructed to tap a pencil on the mouthpiece of the phone to alert PSAP operator. Most deaf callers as well as PSAP operators were not aware of this process. Since ALI did not work on all calls, PSAP operators wouldn’t always know where to route police even if they were aware what the tapping meant.

iii. FCC mandated in the mid-1990’s that all PSAP operators be provided with a TTY and TTY related training. Deaf callers were supposed to continue to tap the TTY spacebar so PSAP operators knew to manually connect their TTY. TTY system is still in use today.

d. Cellular and VoIP Support
i. Some cell phones are equipped with 2.5mm audio jack for external TTY.

ii. Original analog cell system could carry TTY modem tones reliably (less than 1% character error rate).

iii. Original digital cell phones in late 1990’s used fixed voice compression and could not carry TTY calls. Cell carriers instructed deaf customers to stick with analog phones until the deaf community lobbied for FCC to intervene.

iv. Current digital cell phones have a TTY setting which turns off voice compression (character error rate at 1% and 1-3% for real life calling).

v. Voice over IP (VoIP) phone often use voice compression which cannot carry TTY modem tones reliably (4-9% character error rate). Some VoIP carriers such as Vonage give customers option to turn off voice compression, enabling reliable TTY use.

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https://cisco.webex.com/ciscosalts/lsr.php?AT=pb&SP=MC&rID=48559847&rKey=c929138d07e1c2f8

Related Resources:
http://en.wikipedia.org/wiki/9-1-1
http://www.fcc.gov/pshs/services/911-services/Welcome.html
http://www.nad.org/issues/emergency-preparedness/next-generation-9-1-1
http://www.ada.gov/anprm2010/nextgen_9-1-1%20anprm_2010.htm
3. **Issues of Concern**
   
a. TTY “apps” on smart cell phones cannot be used for 911 calls
   
i. Many models of cell “smart phones” have TTY software application. The user is able to text type from the cell phone keypad and the cell carrier network server converts to TTY modem tones for Public Switched Telephone Network (PSTN) call to legacy TTY device.
   
ii. US/Canadian 911 Selective Routers only use 7-digit phone numbers so 911 calling is localized. The system does not support 10-digit phone numbers with area codes. The cell phone TTY app will route call to PSAP associated with where the carrier’s TTY-PSTN gateway is physically located, not the PSAP where the 911 caller is located.

b. 911 calls via VRS or IP Relay are possible and used frequently, but have location identification problems
   
i. Legacy PSTN (wireline or cellular) TTY calls to a state Telephone Relay Service (TRS) include ALI to the TRS operator who then uses ALI to route the emergency call to the correct PSAP. The operator will have correct street address (or geographic location for cell phone).
   
ii. VRS and IP Relay customers are issued 10-digit PSTN numbers (since 2008). Many VRS providers do support 911 calls (reluctantly) and use a third party emergency 911 service such as Intrado to route call to correct PSAP, based on 10-digit number. It is the caller’s responsibility to update the 911 location database when they have a change of address. If the customer is using a mobile device away from home, the fixed address will always be incorrect. Mobile callers have to tell VRS operator the correct street address. However, a voice call directly to 911 from that same cell phone would provide the correct geographic location (it’s only a problem for deaf VRS callers).

c. Text messages generally cannot be used for direct 911 text calling
   
i. There is currently no method to make a 911 call directly using text only. Cell phone text messaging is a store-and-forward technology dependent on cell carriers and their networks; it is not real time nor is it possible to guarantee delivery of a cell phone text message.
   
ii. FCC is considering various Real Time Text (RTT) alternatives for VoIP and cell smart phones. RTT would be supported directly by PSAP for 911 callers. Do Generation “X” and “Y” deaf care if RTT is sent one character at a time, or an entire line at a time?

d. Deaf individuals do not have appropriate resources related to 911 procedures

e. Given the current FCC activity related to 911, where should NTID focus its influence on impending policy changes?

f. Better understanding and improvement of RIT’s emergency response communication systems

**Related Resources:**

4. Current Status of Next Generation 9-1-1
   a. FCC News Release, FCC Takes First Step to Help Revolutionize America’s 9-1-1 Services for Consumers, First Responders, December 21, 2010

      “The FCC today took an important step to revolutionize America’s 9-1-1 services for consumers and first responders by adopting a Notice of Inquiry (NOI) seeking public comment on how Next Generation 911 (NG911) can enable the public to obtain emergency assistance by means of advanced communications technologies beyond traditional voice-centric devices. The FCC has undertaken this proceeding in response to a recommendation in the National Broadband Plan seeking to harness the life-saving potential of text messaging, email, video and photos from mobile and landline broadband services.”

Related Resources:
http://www.fcc.gov/pshs/summits/911/improving911callcenterops2.html
http://www.fcc.gov/pshs/advisory/csric/1stmeeting-ng911.ppt.ppt
http://www.ntia.doc.gov/
http://www.911dispatch.com/911/nextgen_911.html

5. RIT’s Unique Perspective
   a. How can we contribute to the policy recommendations and/or technology innovations?

   b. CISCO Project
      i. Center on Access Technology (CAT) will be hosting a national discussion on 911 Telephone Response System in May 2011. Looking for agenda ideas and participation.