VIA ECFS

January 13, 2016

Marlene H. Dortch, Secretary
Office of the Secretary
Federal Communications Commission
445 12th Street, S.W.
TW-A325
Washington D.C. 20554

Re: Improving Wireless Emergency Alerts and Community-Initiated Alerting [PS Docket No. 15-91]

Dear Ms. Dortch:

Enclosed for filing in the above referenced Notice of Proposed Rulemaking are the comments of the Rehabilitation Engineering Research Center for Wireless Technologies (Wireless RERC) and the Georgia Institute of Technology's Center for Advanced Communications Policy (CACP).

Should you have any questions concerning this filing, please do not hesitate to contact me via email at helena.mitchell@cacp.gatech.edu.

Respectfully submitted,

Helena Mitchell
Principal Investigator, Wireless RERC
Center for Advanced Communications Policy
Georgia Institute of Technology

Enclosure

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Improving Wireless Emergency Alerts and Community-Initiated Alerting	))	PS Docket No. 15-91

COMMENTS OF THE REHABILITATION ENGINEEERING RESEARCH CENTER FOR WIRELESS TECHNOLOGIES (WIRELESS RERC) AND THE GEORGIA INSTITUTE OF TECHNOLOGFY'S (GEOPRGIA TECH) CENTER FOR ADVANCED COMMUNCIATIONS POLICY (CACP)

Georgia Tech's Center for Advanced Communications Policy[1] (CACP) in collaboration with the Rehabilitation Engineering Research Center for Wireless Technologies[2] (Wireless RERC) hereby submits comments to the above-referenced Notice of Proposed Rulemaking, released on November 19, 2015. CACP is recognized at the state and national level as a neutral authority that monitors and assesses technical developments, identifies future options, and provides insights into related legislative and regulatory issues. CACP evaluates technological trends that can impact issues as diverse as emergency communications, vulnerable populations and social media. CACP is the home the Wireless RERC, funded by the U.S. Department of Education's National Institute on Disability, Independent Living and Rehabilitation Research (NIDILRR). The Wireless RERC mission is to research, evaluate and develop innovative wireless technologies and products that meet the needs, enhance independence, and improve the quality of life and community participation of people with disabilities. We believe it is essential that information and communications technologies (ICT) and services, especially those in and adjacent to the wireless technology industry, increase

[1] Georgia Tech's Center for Advanced Communications Policy (CACP) conducted WEA research supported, in part, by the Integrated Public Alert & Warning System (IPAWS) Project Management Office (PMO) under contract # HSFE5-13-R-0031; and the Department of Homeland Security's Science and Technology (S&T) Directorate under contract #HSHQDC-14-C-B0004. The opinions contained herein are those of the grantee and do not necessarily reflect those of the U.S. Department of Homeland Security, IPAWS PMO or S&T.

[2] The Rehabilitation Engineering Research Center for Wireless Technologies (Wireless RERC) is sponsored by the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR grant number 90RE5007-01-00). NIDILRR is a Center within the Administration for Community Living (ACL), Department of Health and Human Services (HHS). The contents of this filing do not necessarily represent the policy of NIDILRR, ACL, HHS, and you should not assume endorsement by the Federal Government.

their levels of accessibility for people with disabilities; as access to technology can enhance inclusive and independent living.

Over the past 14 years subject matter experts at CACP and the Wireless RERC have been actively involved with research and regulatory issues concerning accessible wireless technologies and services. Additionally, both entities have been studying the accessibility of wireless emergency alerting, notifications and messages for people with disabilities and the legislative and regulatory framework which lead to the creation of the WARN Act and subsequent WEA alerting capacities. The researchers that guide the progress of these efforts have the combined expertise in disability research and development and include research specialists, emergency management specialists, designers, engineers, and survey technicians who have held focus groups. Findings from our consumer surveys and focus groups, policy research, and development efforts inform the recommendations made herein.

From a regulatory review and literature review conducted under contract with the Integrated Public Alert & Warning System (IPAWS) Project Management Office (PMO), a framework was developed that identified influencing factors that, if not optimal, could negatively impact the effectiveness of WEA messages. For example, current WEA regulations limit the potential of the system. Most notably the 90 character maximum length and the geotargeting boundaries being too large (i.e., county wide). Additionally, the rules currently prohibit the use of URLs and dialable numbers. The accessibility provisions only addressed alert notification signals (i.e., vibration cadence and alert tone) but not access to the content of the message. For people with disabilities, these features would be especially useful as it would enable them to receive more information about the event in a format that is accessible to them, or made accessible via the assistive technology they have installed on their WEA capable device. Thus, we are pleased that the FCC is taking steps in this rulemaking to address and remedy these limitations.

The system limitations, as defined by the current regulations, move along what we have termed, the WEA Message Continuum, impacting the (1) creation of messages by alert originators, (2) the provision of WEA by wireless service providers and (3) the receipt of WEA messages by people with disabilities and the public, at large. However, the rules and

regulations alone are not responsible for limiting the effectiveness of WEA, but also the practices associated with sending and receiving the messages.

In WEA survey research conducted by CACP/Wireless RERC, the concerns mentioned by people with disabilities did not differ significantly from those posed by the general population. Following are specific recommendations, distilled from our research on alert originators, WEA capable devices/service, and public perception, that are pertinent to this NPRM.

- Rules governing WEA should be updated to increase the character limitation. Doing so should decrease the need to rely on abbreviations and acronyms in order to stay within the character limitation.
- Rules governing WEA should be updated to allow for the inclusion of URLs. This would be a step towards enabling the next-generation of WEA, as URLs can contain the additional information the public seeks, including American Sign Language (ASL) videos, emergency management websites or social media feeds, and more.
- Improve the geotargeting capabilities of the WEA system. This should increase the relevance of WEA messages to the recipients and likewise, increase their trust of the message, encouraging them to take the desired protective actions.
- Testing of the WEA system should extend beyond the providers' infrastructure to the mobile devices in use by the public. This should increase public awareness of WEA, as many users learned of WEA only after receiving a WEA message for the first time. The test message could include a link to the IPAWS PMO's frequently asked questions regarding WEA.

Paragraphs A.1.9-11: Increasing Maximum WEA Character Length

Paragraph A.1.9: *"Consistent with the CSRIC IV recommendations and the recent ATIS/TIA study, we propose to amend Section 10.430 of our rules to expand the maximum permissible length of WEA messages from 90 to 360 characters of alphanumeric text. … We seek comment on this proposal, and the extent to which it would serve the needs of state and local governments to provide more detailed alert information to the public sufficient to motivate appropriate and swift action to save lives and protect property."*

Emergency response is defined as the "actions taken a short period prior to, during, and

after disaster impact to reduce causalities, damage, and disruption and to respond to the immediate needs of disaster victims."[3] Generally, when faced with a threat, people will respond with alacrity given that they also perceive the threat as dangerous.[4] However, the timing of response is highly variable and often a function of the amount of information the person has on the emergency.[5] Therefore, the effectiveness of emergency alerts is dependent on the speed of which it is delivered and the level of information it contains.[6] As required by current FCC regulations, WEA messages are limited to 90 characters. The messages have to include the type of hazard, location, time until the threat has passed, and the necessary protective action information. Trying to get all of that information into one message can be difficult to accomplish and often alert originators rely on acronyms and abbreviations in order to stay within the character limitation.

Research conducted by the CACP Collaborative[7] for IPAWS, Project Management Office included a survey of 425 FEMA-approved IPAWS alerting authorities. The questions asked of the alerting authorities were intended to assist in identifying current best practices that could be used as benchmarks for emergency managers and other potential alerting authorities (e.g. first responders) regarding ways to assist the diffusion of WEA messages to people with disabilities and those with access and functional needs. Results from the survey indicated that only 31% of alert authorities used WEA. Many respondents expressed reticence regarding use of WEA because they needed additional training on when and how to use the system. We applaud the FCC NPRM inclusion on this important topic as our comments later in this filing point out the need for both alert authorities and the public.

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[3] Lindell, M. K., Tierney, K. J., & Perry, R. W. (2001). *Facing the Unexpected:: Disaster Preparedness and Response in the United States*: Joseph Henry Press.

[4] Lindell, M. K., & Perry, R. W. (1987). Warning mechanisms in emergency response systems. International Journal of Mass Emergencies and Disasters, 5(2), 137-153.

[5] Sorensen, J. H. (1991). When shall we leave? Factors affecting the timing of evacuation departures. *International Journal of Mass Emergencies and Disasters, 9*(2), 153-165.

[6] Davis, E., & Phillips, B. (2009). Effective Emergency Management: Making Improvements for Communities and People with Disabilities. *National Council on Disability*.

[7] The CACP Collaborative includes three centers at Georgia Tech: Center for Advanced Communications Policy (CACP), Interactive Media Technology Center (IMTC), and Center for Assistive Technology and Environmental Access (CATEA), that collaborate on research funded by the FEMA IPAWS Program Management Office (PMO).

Outside of limited usage of WEA and the need for more training, the concerns categorized under alert originators in large part focused on the message content. As an example, one respondent stated, "Those posting them [WEAs] should be mindful of the fact that the public at large likely do not fully understand their inside shorthand so that they can insure clarity." Several respondents mentioned issues with shorthand, jargon, or typical emergency vernacular, such as understanding the difference between a watch and a warning and that NWS meant National Weather Service. This is unfortunate, as anecdotally, in focus groups conducted on behalf of IPAWS, many participants indicated the National Weather Service was a trusted source of information over, for example, local news. Some felt that local news media might sometimes sensationalize weather emergencies for the sake of ratings. If the NWS had been spelled out in the WEA message, potentially many recipients wouldn't waste time confirming the veracity of the message.

Concerns over the use of jargon, abbreviations and acronyms were confirmed in a review of 9,135 archived WEA messages that found 99% of the messages included an abbreviation or acronym.[8] Below is a list of the issues that indicates that the 90 character maximum is not long enough as well as other potential impacts identified in the review of archived WEA messages:

- Use of jargon, abbreviations and acronyms – may cause translation issues for Deaf people whose primary language is ASL. Also many people of all abilities are unfamiliar with the meaning of acronyms commonly used in WEAs (i.e. NWS).
- Event type not included – though this was often on follow-up messages, this can be confusing to people who have just entered the impacted area and never received the initial message. This also indicates these messages may not be in compliance with WEA rules concerning required message components.
- No action/instructions given – this may impact people's ability to take appropriate protective actions in a timely manner.
- No sending agency included – this may impact people's trust in the veracity of the message.

[8] The IPAWS PMO provided the archive of WEA message to CACP Collaborative researchers in an Excel spreadsheet.

- Vague message – incomplete and vague information may cause people to disregard messages as useless. This also indicates these messages may not be in compliance with WEA rules concerning required message components.
- Text cut off – indicates that the 90 character maximum is not long enough.

While the majority of alerting authorities surveyed suggested that they do not have issues in drafting a message; of those that did have a problem, they stated that the 90 character limitation was the cause. Following are respondent quotes concerning the matter:

- "The message limitation creates confusion as the messages are not complete. They are difficult to create with the needed information: Who, what is the emergency, action to be taken, duration of the hazard, where to get more information."
- "It is sometimes difficult to get all the necessary information out with the character constraints of the system. The use of Web Links for further information is prohibited, as well. This makes it difficult to inform the public where to go for more information."

Given these data, we agree with the FCC's proposal to amend the rules "*to expand the maximum permissible length of WEA messages from 90 to 360 characters of alphanumeric text…for those networks and devices for which it is technically feasible to deliver and process 360-character messages…*" We further recommend that for the 4G LTE networks and any future network evolutions, the use of acronyms, abbreviations and truncated text be expressly prohibited. Making these amendments would be a benefit to both the alert originator and to the alert recipient.

Regarding legacy 2G and 3G devices and networks, we appreciate the FCC addressing the need to maintain and bridge the gap between the newer devices and networks and the older ones. According to the Wireless RERC's Survey of User Needs, 54% of respondents with disabilities use smartphones (30% still use basic phones).[1] It is important to note that some users with disabilities, particularly the elderly, may prefer basic phones, and/or may not

[1] Wireless RERC (2013). *SUNspot – Use of Wireless Devices by Adults with Disabilities*, Volume 2013, Number 03 – July 2013. Available at http://www.wirelessrerc.gatech.edu/sites/default/files/publications/SUNspot_2013-03_Wireless_Devices_and_Adults_with_Disabilities_2013-07-12%5B1%5D.pdf

upgrade their phones. Thus, it is essential that these consumers are still able to receive the legacy WEA messages.

Paragraph A.1.10: *"We also seek comment on how an increase in the length of WEA messages would affect the accessibility of such messages by individuals with disabilities, senior citizens, and persons with limited English proficiency.[9]"*

In our 2015 National Online WEA survey, respondents were asked how to improve WEA. Several categories of suggestions were derived from the content of the responses to this open ended question. The top three suggestions included:

- Education
- Need more information
- Location accuracy

The increased message length would benefit the accessibility of the content of the message by eliminating the need to use acronyms, abbreviations and truncated text. This would be especially beneficial to people who use ASL as their primary means of communication, as they may be using an adjacent service such as DeafLink's Accessible Hazard Alert System (AHAS™), to have the message translated. Additionally, a longer message will allow for plain language to be used in lieu of jargon when including actions to take. For example, a common phrase used in emergency alerts is to "take cover." To "take cover" is a meaningful command in the English language, but it does not translate into a culturally and linguistically competent message in ASL. It can be misinterpreted to mean take something to cover themselves.[10] Additionally, some emergency alert words, such as "evacuate," may not have an ASL sign. A human interpreter would use a sign with the same

[9] *See Ex Parte* Filing from Wireless RERC, to Marlene H. Dortch, Secretary, FCC, Re: Open Proceedings of the Emergency Alert System and the Commercial Mobile Alert System, April 25, 2011 at 28 (indicating that 46% of survey participants who were deaf found the 90 character message length "too short"), *available at* http://www.wirelessrerc.gatech.edu/sites/default/files/publications/Ex%20Parte%20WEC%20filing%20%28final%29.doc; http://www.wirelessrerc.gatech.edu/content/publications/emergency-communications-and-people-disabilities (last visited June 19, 2015).

[10] Mitchell, H., Johnson, J., LaForce, S., Lucia, F., Price, E., Morris, J. (2011). Ex Parte Comments filed in the Open proceedings of the Emergency Alert System [04-296] and the Commercial Mobile Alert System [07-287]. Federal Communications Commission: Washington, DC, April 25, 2011.

meaning as "evacuate," but it would bear no ecological relevance to the English word of "evacuate." The additional characters allow for more context to be provided, thereby increasing understanding of emergency response nomenclature.

Those who speak or are comfortable in languages other than English are also at risk during natural and/or manmade disasters. A 1987 tornado caused differentially higher mortality for Spanish-speakers due to (1) a mistranslation of the word "warning" and (2) that some Spanish-language television networks did not broadcast the emergency message.[11] A case study found a differential impact on college students evacuating during an emergency due to language difference at a school for the Deaf and hard-of-hearing. Many hard-of-hearing students at the college left their dormitories seeking more information on an impending tornado because the local news station had not yet made closed captioning available in their broadcasts. Meanwhile, students who were Deaf had understood the on-screen ASL interpreter's instructions to shelter in place. In this scenario, the students who were hard-of-hearing experienced higher risk of bodily injury because they could not understand the emergency information presented.[12] These examples provide support for the recommendation to extend the character length of WEA messages so that the content of the message can be clear and effective for people with a variety of language abilities.

Paragraphs A.2.18-20 and 22: Classifying Emergency Government Information

Paragraph A.2.18: *"We propose to amend the WEA rules to create an additional class of WEA message, "Emergency Government Information." We propose to define an Emergency Government Information message as an essential public safety advisory that prescribes one or more actions likely to save lives and/or safeguard property during an emergency. … We seek comment on our proposed definition of Emergency Government Information, and on whether enabling the delivery of Emergency Government Information messages would expand the alerting toolkit available to government entities in a meaningful way…"*

[11] Aguirre, B., Anderson, W., Balandran, S., Peters, B., & White, H. (1991). *Saragosa, Texas, Tornado May 22, 1987: An Evaluation of the Warning System*: The National Academies Press.

[12] Bricout, J. C., & Baker, P. M. (2010). Leveraging online social networks for people with disabilities in emergency communications and recovery. *International Journal of Emergency Management*, *7*(1), 59-74.

As mentioned above, we conducted a review of archived WEA messages. In that review, we found that some alert authorities used the system to issue boil water alerts. This indicated that some alert authorities may interpret when the imminent threat requirement for initiating a WEA is applicable. However, the vast majority of messages were weather related emergencies issued by the National Weather Service. In order to encourage the use of WEA for non-weather related local emergencies we recommend that more training be provided to alert originators that clearly defines and provides examples of when an imminent threat WEA message can be initiated. For example, the "Shelter in Place" WEA message that was distributed following the 2013 Boston Marathon bombing was an appropriate and effective use of the system. However, it did not require the addition of an alert category. An instance where WEA could have been initiated but was not was during Atlanta Snow Jam 2014. While the weather associated with the event did not appear severe enough to initiate a WEA message, unforeseen dangerous circumstances occurred:

- Grid lock on surface roads and highways left K-12 students trapped on school buses overnight;
- Parents unable to reach children at schools left teachers and students to shelter in place;
- Individuals sought shelter in Target stores and other locations along their commute; and
- There were 911 outages due to system overload.

Because of the icy roads and the above bulleted experiences, Georgia Governor Nathan Deal issued a state of emergency; however a WEA message was never issued. The individuals stuck in their vehicles could have used official information as to what to do and where to go. This example shows that some alert authorities may be unsure as to when a WEA message would be appropriate. We recommend further analysis as to whether there is a need for adding a standalone alert category, creating a subcategory (see our response below ¶ A.2.19-20), or perhaps more importantly increasing the amount of outreach and training on use cases for WEA's current imminent threat alert category.

Paragraph A.2.19 - 20: *"According to CSRIC IV, "[a]n Emergency Government Information message should only be used to provide information to assist citizens regarding actions to take resulting from an imminent threat to life and property. … should Emergency Government Information messages be used only to supplement Imminent Threat Alerts? … Would creating an additional category of alerts desensitize the public to other types of alerts? "*

Yes, it is a distinct possibility that adding a category of alerts could create message fatigue if restrictions are not attached to the use of Emergency Government Information messages. Unfortunately, the effectiveness in a warning system eliciting human response is not guaranteed. There are many instances of the public becoming complacent towards emergency alerts.[13] Concerning WEA, many articles in the trade and popular press suggested complacency as a potential barrier to the effectiveness of WEA messages, mostly citing the AMBER alerts in the middle of the night or early morning as the reason users may become annoyed with the system.[14, 15, 16, 17, 18, 19] Therefore, to ensure the addition of this new category is an enhancement to the system and not a detraction from its effectiveness, we recommend that Emergency Government Information messages not be standalone, but only be allowable as a subcategory of the existing WEA message categories: imminent threat, presidential and AMBER alerts. Additionally, this limitation will keep WEA messaging distinct from proprietary systems that don't carry such restrictions.

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[13] Sorensen, J. H. (2000). Hazard warning systems: review of 20 years of progress. *Natural Hazards Review, 1*(2), 119-125.

[14] Honker, D. (2012). Public Showing Mixed Reactions to Recent CMAS Messages. AWARE. Accessed on March 25, 2014. http://www.awareforum.org/2012/07/public-showing-mixed-reactions-to-recent-cmas-messages/ .

[15] Conley, K, Schram, J. & Golding B. (2013). Alarming wake-up for NYers Amber Alert on phones a 4a.m. shocker. The New York Post.

[16] DiBlasio, N. (2013). Cell alerts ring up controversy; Shrill alarms can annoy despite lifesaving benefits. USA Today.

[17] Salonga, R. (2013). Why cellphone were startling abuzz after San Joes baby's kidnapping. Contra Cost Times. http://www.contracostatimes.com/ci_22891962/why-cell-phones-were-startlingly-abuzz-after-san .

[18] Quintana, C. (2013). Overuse, false alarms threaten impact of Amber Alert. Santa Fe New Mexican. http://www.santafenewmexican.com/news/local_news/overuse-false-alarms-threaten-impact-of-amber-alert/article_cf506975-4bf1-5be8-85b1-3c0bcc96455f.html .

[19] Krell, A. (2014). Wireless Emergency Alerts: A Work in Progress? Emergency Management. Accessed on April 1, 2014. http://www.emergencymgmt.com/disaster/Wireless-Emergency-Alerts-Fair-Warning-or-Foul.html.

Paragraph A.2.22: "*We also seek comment on whether there are other classes of alerts that should be added to WEA. FEMA, for example, asserts that we should revisit the manner in which WEA messages are classified, and recommends that we amend our rules to create the following classes: Federal Alerts (authorized by the President), AMBER Alerts, Severe Weather Alerts, and Local Threat Alerts, each of which would have its own unique attention signal and vibration cadence*"

We support the concept of more clarity in defining the classes of alerts, primarily due to the confusion of current terminology on what constitutes "imminent threat." Whatever terminology is used, we recommend that the manufacturers and service providers be required to use the official language and not create their own versions. For example, we have seen WEAs refereed to on the devices as "Government Alerts," "Emergency Alert Messages" and "Safety Assistance" messages.

Further, we support the creation of new classes with unique attention signals and vibration cadences, a topic that some participants in focus groups also indicated would help them distinguish the importance of a message. While conducting of our research on WEA, we have found that there is inconsistency and often confusion by manufacturers and alerting authorities on how they refer to the alert categories. This may contribute to consumer confusion over what is or is not a WEA message.

Under contract with the DHS S&T, CACP conducted research regarding optimizing WEA message receipt for people with sensory disabilities. Specifically, we evaluated the vibration strength of WEA-capable devices and assessed the utility of adding a distinct light notification to WEA messages. First, in a focus group setting to gauge the most effective way to alert users, participants were asked which attention signal worked best – vibration, sound, or light. We found that the preferences for a specific type of attention signal varied by group. The majority of participants that were Deaf or hard-of hearing preferred a light and vibration attention signal, with the exception of the hard of hearing group that had some residual hearing preferring the vibration and sound signals. Individuals that were blind indicated a preference for the sound attention signal and occasionally the vibration attention signal. Those with low vision indicated they preferred a light and/or vibration signal.

There was a difference of opinion about whether the pitch of the alert was noticeable. Participants suggested specific types of pitches, and variation in pitches. One

hard-of-hearing participant reported that the WEA audible signal was too high, and felt a lower signal would be more audible. He was immediately contradicted by another participant, who felt that the low signals were not audible and liked the higher pitch. Another hard of hearing participant reported having been alerted to a WEA because *"The phone was constantly making a sound. I know it's not a regular phone message. It's very distinctive."* One individual recommended that the sound be something different that is never encountered in public, while another suggested the sound vary over its course, specifically mentioning an S.O.S. type of signal.

Participants were asked what they thought about the vibration signal on the WEA messages they had received. Despite the fact that WEAs *do* have a distinct vibrating cadence, most participants did not notice that the vibration was different from their incoming message vibration. Only five individuals reported that they'd noticed that it was any different from the normal vibration. Three participants even mentioned that they wished they had a way to differentiate the vibration from other signals their phone exhibited. A few suggested that the user be able to select the vibration to be something that was distinctive to them.

A minority of Deaf and hard of hearing participants (6) had specific memories of seeing the visual signals from WEAs. Others were not sure whether there was a visual signal or not. Some participants theorized that whether they noticed a signal would depend on how they positioned their phone. If the light source or screen was face up on the table, they would be more likely to see the visual signal. Some participants suggested that the visual signal should, at minimum, come from both sides of the phone. One participant specifically mentioned that the flashing light on her phone was too small to get her attention, and there needed to be a larger, brighter light source. Another participant suggested that the WEA light should be a different color than other visual phone signals. These suggestions were taken into account when developing the prototype signals to be tested. The final design incorporated bright lights that could be activated in different colors, as well as lit on the front (where a screen would be) and along the left side of the prototype.

After internal testing and several refinements to determine the optimal device specifications, a prototype was created the approximate shape and size of a smartphone. It

had the ability to trigger low, medium and high vibration strengths, two distinctive light cadences, and the WEA sound attention signal. The prototype was then end-user tested by people who were Deaf and hard of hearing, Blind, low vision, deaf-blind and those who were only conversant in American Sign Language. The conclusions from the utility of light output and vibration testing levels showed the benefits of both. The addition of a light cadence and different vibration strengths were important to the end user, and particularly dependent upon the individual's type of disability.

With that said, we find FEMA's proposal to provide "*…[a] unique attention signal and vibration cadence"* for each type of alert category compelling. Our research with people with disabilities certainly indicates a need to further distinguish WEA message attention signals from other notification signals received on their phone. Ideally, our research participants would want to customize the notification signals. The FCC might also query stakeholders as to whether there is a need for prescribing a specific light cadence for WEA messages. If the FCC determines to pursue this line of inquiry, we would recommend the following:

- Manufacturers should design all WEA-capable handsets with the ability to adjust:
    - The strength of the vibration signal;
    - Pitch and frequency of the sound attention signal; and
    - Include a light signal feature that is activated by WEA messages.

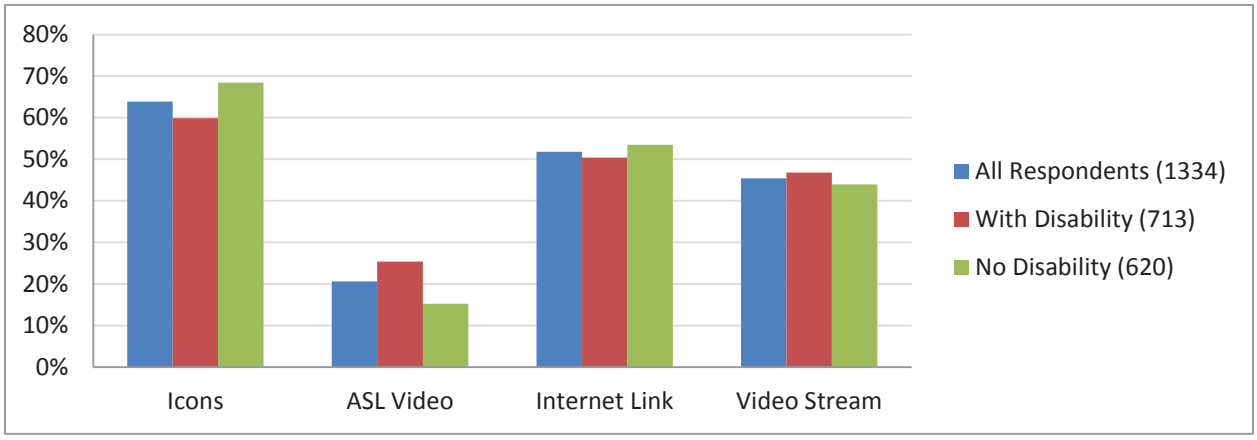
Paragraphs A.3.25-26, 28-30: Content in WEA Alerts

Paragraph A.3.25: *We propose to remove Section 10.440 from our Part 10 WEA rules, in order to allow embedded phone numbers and URLs to be included in WEA messages."*

We agree with the above-referenced proposal. In our 2015 National Online WEA Survey, questions were asked to gather data on the level of interest for several features not currently used in WEA messages. When given four options to choose from: icons, American Sign Language (ASL) Video, an internet link to additional information, and live audio/video streaming of news broadcasts, respondents indicated by checking all that apply, which would be of interest to them. Figure 1 shows that the majority of all respondents would like the inclusion of icons, graphics or maps in the alert message and an internet link (64% and 52%

respectively). A higher percentage of people without disabilities (68%) compared to 60% of those with disabilities prefer icons. Similarly, internet link preference was slightly higher for people without disabilities (54%) compared to respondents with disabilities (50%). Forty-five percent (45%) of all respondents indicated an interest in the inclusion of a live video or audio stream of news broadcasts, with respondents with disabilities showing a slight preference (47%) over those without (44%). Interestingly, concerning the inclusion of an ASL video presentation of the alert, 21% of all respondents indicated an interest, 25% of people with disabilities and 15% of those without disabilities, implying that some respondents that do not require ASL video still support its incorporation into WEA messages.

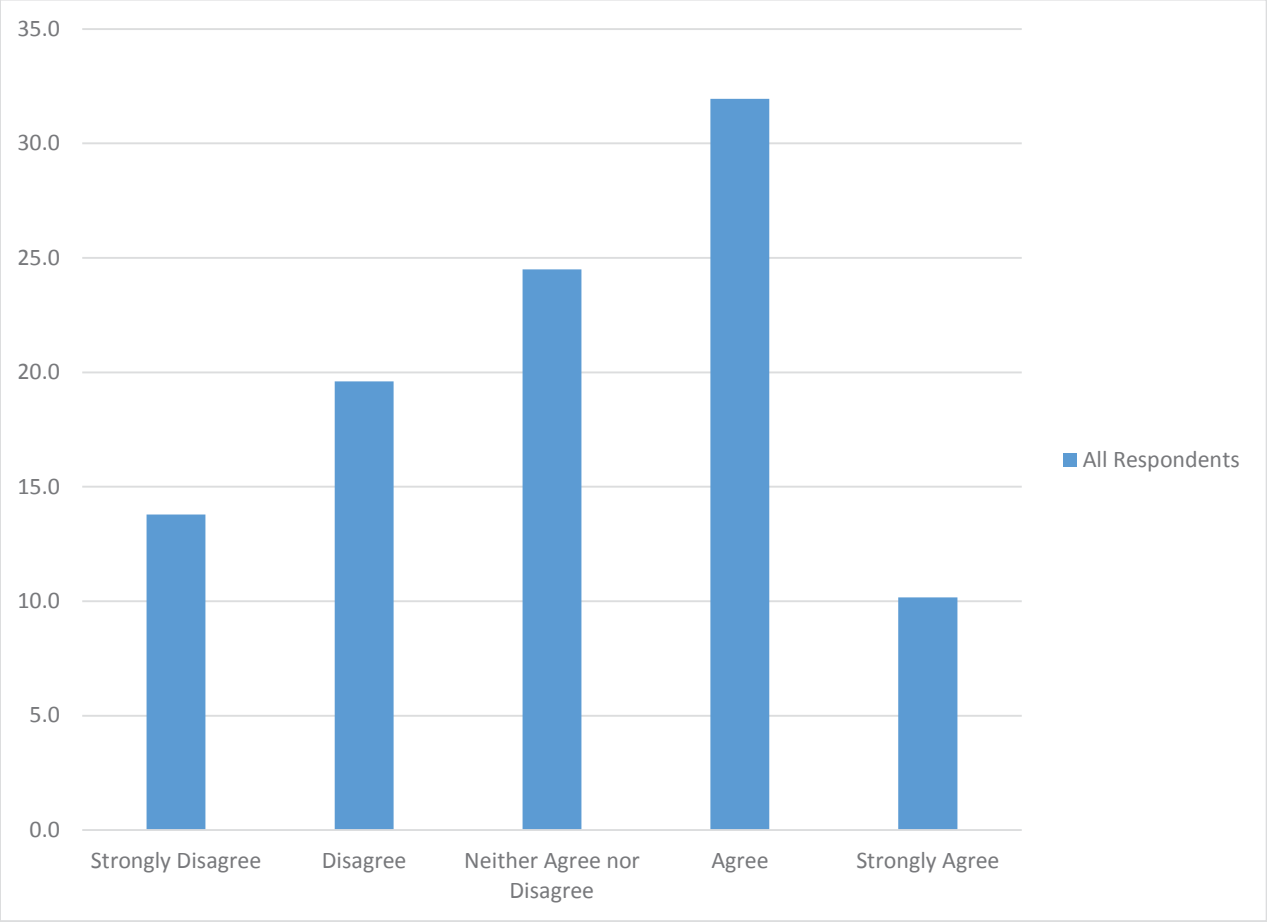
Figure 1: Alternate Ways to Present Alerts



<u>Paragraph A.3.26</u>: *"To what extent do individuals currently respond to the receipt of a WEA message by using the Internet to confirm the existence of the emergency condition in their area or to search for additional information?"*

The data collected in our 2015 WEA survey indicates a large variability regarding alert verification. Figure 2 shows that 10% of all respondents "strongly agree" and 32% of respondents "agree" that they took action after verifying the alert, while 20% "disagreed" and 14% "strongly disagreed" with the same statement. For many the primary ways they verified WEA was to contact a neighbor, family or friend in the area or to look outside.

Figure 2: Took Action after Verifying Alert



Paragraph A.3.28: *"Would it be possible to include interactive links in WEA messages, such that an alert recipient could provide real-time feedback to alert originators that would improve emergency responders' situational awareness and help ensure that adequate and appropriate resources are deployed to the scene of the emergency? … We observe that AT&T suggests that the use of phone numbers and URLs in WEA alerts should be limited to WEA AMBER Alerts. We seek comment on this alternative."*

We disagree with AT&T's recommendation to limit the use of phone numbers and URLs to AMBER alerts. We recommend that the use of URLs and dialable phone numbers be allowable on all categories of WEA messages. When WEAs were first proposed and the rules were agreed upon, the mobile industry was in a pre-iPhone, pre-App store, 3G only environment. There was significant concern about overloading of the cellular networks, which would be stressed in a time of an emergency. The final rules stated at "CMAS § 10.440 Embedded Reference Prohibition, a WEA message processed by a participating commercial mobile service (CMS) provider must not include an embedded Uniform Resource Locator

(URL), which is a reference (an address) to a resource on the Internet, or an embedded telephone number. This prohibition does not apply to Presidential Alerts."[20] Now that people purchase devices on networks beyond 3G, such as 4G LTE and XLTE, the premise on which URLs were prohibited may be unfounded. Therefore it is recommended that the FCC amend WEA rules to allow for the use of URLS and dialable phone numbers.

Regarding the ability of an alert recipient to provide real-time feedback to alert originators, we would recommend more vigorous examination into the pros and cons because of potential misinformation making it into the link. The prohibition of hyperlinks in the message severely limits ways to provide a feedback mechanism from the WEA message. As the message is sent in a broadcast manner, there is no way for the alert originator to know how many people see or read the alert. However, on the plus side the insertion of a hyperlink to a program or to a URL would provide a recipient of the message the ability to launch some process which might provide more information, link to social media for the event, and even allow users to share the event on their social media.

Twitter is frequently used during emergencies both in a citizen-to-citizen mode, as well as to connect citizens to first responders and emergency managers. Lessons learned from the U.S. Department of Homeland Security (DHS) on social media use during hurricane Sandy indicated that Twitter and Facebook were the most actively used during and after the storm (Department of Homeland Security, 2013).[21] Currently, because Twitter is more often used for gathering information during emergencies than are other platforms, leveraging Twitter to provide two-way communications via WEA to the whole community, especially people with disabilities and those with language differences, including those who are conversant in ASL could offer more gateways to vital lifesaving information.

Hashtags Help - Early Bird App: Proof-of-Concept Prototype

Early Bird, developed by the CACP Collaborative with funding from the IPAWS PMO, is

[20] Federal Communications Commission (2008). First Report and Order In the Matter of the Commercial Mobile Alert System: Washington, D.C., April 9, 2008. Appednix C. Available at http://fjallfoss.fcc.gov/edocs_public/attachmatch/FCC-08-99A1.pdf.

[21] Department of Homeland Security (DHS). (2013). Lessons Learned: Social Media and Hurricane Sandy. Virtual Social Media Working Group and DHS First Responders Group. DHS. Washington D.C.

an alternative method for testing social media as an embedded feedback mechanism associated with WEA messages. Our research and development team was looking for a way to provide additional information to people with disabilities as anecdotally, the current character limitation does not provide enough information for people with disabilities to take appropriate protective action. The Early Bird was created as a mobile application that displayed a unique hashtag (#) to provide additional information to users during times of emergency. It required a small software download to the smartphone. As a proof-of-concept prototype, it showed how a unique hashtag identifier, created at the time of message dissemination by an alert authority, could be linked to a variety of social media sources to provide important lifesaving information in greater detail than is possible with the 90 character limitation of WEA.

Sample WEA messages today

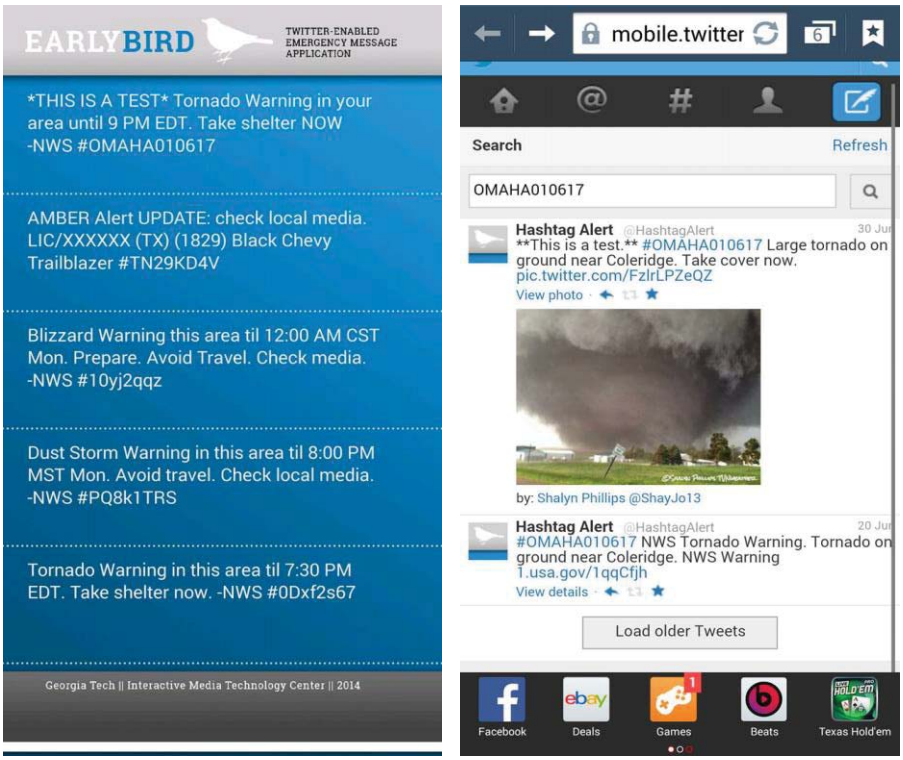
1. Tornado Warning in this area till 3:45 PM EDT. Take shelter now. –NWS
2. AMBER Alert: check local media. LIC/592716K (CO) 2000 Green Honda Accord

Sample WEA messages with hashtag

1. Tornado Warning in this area till 3:45 PM EDT. Take shelter now. –NWS #ATLTornado1
2. AMBER Alert: check local media. LIC/592716K (CO) 2000 Green Honda Accord #ATLAMB17

Early Bird was prototyped for the Android platform (See Figure 1) and monitored for incoming WEA messages with the embedded hashtags: it would only be activated after receipt of a WEA message. If one was found, the program launched the Twitter client on the phone's mobile browser, and loaded messages containing the hashtag. The individual did not have to have a Twitter account, or have a Twitter app on their phone to see the hashtags related to the disaster event. If the end user did have a Twitter account, they could choose to issue their own messages related to the alert, or they can reply to the tweets providing information on areas affected, help needed, and other kinds of requests. In addition, users could retweet the original message, or they could compose their own tweet that included the hashtag (potentially with an auto inclusion to reduce cognitive load on the user). Use of the hashtag would allow the alert authority to post more detailed information, along with pictures or links to more information on social media thereby allowing individuals to quickly gather pertinent information and increase the likelihood of making informed protective action decisions.

Figure 3: Screenshots of Early Bird Activated



To that end, local message originators would be encouraged to, in parallel or very soon after the WEA message is sent, utilize their unique hashtag in tweets with additional information about the nature of the emergency and additional steps necessary for the public. This could include links to more information for people with disabilities who might require a specific type of evacuation procedure, shelter locations or links to accessible content such as America Sign Language (ASL) interpretations of online and print documents associated with the event. Additionally, the emergency manager could perform a Twitter search and analysis on the messages being retweeted and originated with the hashtag, allowing for greater situational awareness, early detection of indirect impacts of the event (e.g. ice storm leads to traffic congestion, leads to children stranded on school buses for upwards of 18 hours) and increased efficiency of response efforts. In a future scenario, an emergency manager console program could be developed to complement Early Bird app that would provide the ability to track multiple hashtags simultaneously and provide maps based on the embedded geolocation in the tweets.

We conducted focus groups with people with disabilities in order to evaluate the utility of the Early Bird app from the end-user perspective. Groups were asked to imagine mechanisms in which they could have communication with first responders. Everyone reported that this would be a good idea. Most expressed that they would want more information about the exact nature of the emergency (e.g. "How fast is the storm traveling"), and what they should do to ensure their personal safety (e.g. "Where do I need to go"). There was a division among the groups as to the mechanism of two-way communication. Those who were hard-of-hearing would prefer that this type of communication be text-based, stating it would be difficult for them to access information by phone. Participants who were Deaf and conversant in only ASL preferred that the information would be in sign language. Participants who were blind preferred a dial-in number where they could speak with an actual person or hear a recorded message, while those with low vision seemed to prefer a smart phone app.

Paragraph A.3.29 -30: *"We also seek comment on the efficacy of using embedded URLs to enhance accessibility of WEA for people with disabilities, senior citizens and persons with limited English proficiency …how the inclusion of URLs and phone numbers may facilitate access to information."… Finally, we seek comment on whether it would serve the public interest to adopt rules governing the provision of multimedia-based alerts, including alerts that contain high-information maps that demonstrate the location of the alert recipient relative to an area affected by an imminent threat… For example, NWS strongly supports the incorporation of graphical content in WEA messages, stating that this improvement would provide greater clarity in WEA messaging."*

Survey respondents indicated that WEA messages needed additional features (Table 1) to be more effective and give sufficient information that would encourage protective actions. Over 70% of respondents liked the idea of including icons, graphics or maps in the WEA message; and 67% of respondents wanted a link to more information.

Table 1: Additional Features for WEA Messages (all respondents)

Feature	N	Percent
Icons, graphics, and maps	1150	73%
Internet Link	1056	67%
Live Video/Audio Streaming	651	41%
ASL	178	11%

Other	151	9%

Source: 2013 -2014 Wireless RERC Survey Data

When looking only at data for people with disabilities, 32% desired the use of the icons, graphics and maps; 31% wanted a link to more information; 22% live video/audio streaming; 10% ASL interpretation; and 75% selected "other." Table 2 shows the preferences for additional features by sensory disability type (blind and low vision, hard-of-hearing, and deaf whose primary language is ASL).

Table 2: Additional Features for WEA Messages (by sensory disability)

Feature	Blind/Low Vision	Hard of Hearing	Deaf ASL Users
Icons, graphics, and maps	57%	67%	0%
Internet Link	72%	63%	29%
Live Video/Audio Streaming	53%	42%	29%
ASL	7%	15%	89%
Other	16%	18%	0%

Sources: 2013-2014 Wireless RERC and IPAWS Survey Data

Not surprisingly, 89% of the respondents who are Deaf and communicate primarily via ASL found an ASL video alert to be of interest, while 67% of the hard-of-hearing found icons, graphics and maps to be of interest. These results coincide with the respondents difficulties. The hard-of-hearing mentioned that live video stream and text alerts would be more useful because they are not fluent in ASL. Likewise people who are blind or have low vision showed a clear preference for links to more information; inferentially, because those with vision disabilities are able to gain access to printed material online via screen reader software or magnification tools.

Paragraph A.4.33: Providing Multilingual WEA Messages:

"In raising the issue of multilingual alerts, we note that the Multicultural Media, Telecom and Internet Council (MMTC) has highlighted the importance of providing information about emergencies in languages other than English on numerous occasions"

We strongly agree with MMTC regarding the importance for additional emergency

information in languages other than English as a way to provide life-saving emergency alerts to ensure that all individuals have the ability to quickly understand the message – whether the primary language is English, Spanish, Chinese, Vietnamese or one of the many other spoken languages in the U.S. Further, for those who use American Sign Language (ASL), it is equally critical that they are being provided access to the information necessary to make informed decisions. Consequently, there is a great need within the Deaf community for ASL interpreted messages of government issued emergency alerts, including WEA messages. The following discussion presents factors that contribute to why we recommend that consideration of ASL translation of WEA messages be included in the discussion of the provision of multilingual alerts.

For hundreds of thousands of people in the United States, (ASL) is their primary form of communication, encompassing individuals with an array of capacities. Representing a diverse group of individuals, the Deaf community includes those who were born Deaf, became Deaf later in life, or were born into families with Deaf members. There are individuals who were born Deaf that have an excellent command of English. However, for many people born Deaf, English is (at best) a second language that may not be able to provide them with access to "clear and effective" communication as required by the Americans with Disabilities Act (ADA).

A common misconception of ASL is that it is similar to spoken English. In fact, ASL is a completely separate language, not related to English and bears no grammatical, syntactical, or idiomatical relationship to English.[22] For example, the English language uses suffixes, such as –ed and –ing, to indicate events that have occurred or are occurring. These elements are expressed differently in ASL. ASL speakers spatially communicate time by signing along an invisible timeline, running in front of and behind their body. As well, the sentence order of ASL and English can be very different. An English speaker may say, "The boy loves his dog," whereas an ASL speaker may say "BOY LOVE DOG" or "DOG, BOY LOVE" or even "BOY LOVE DOG BOY".[23,24]

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[22] Neidle, C. J. (2000). *The Syntax of American Sign Language: Functional Categories and Hierarchical Structure*. MIT Press.

[23] Ibid.

ASL is a visual, conceptual language (see example in Figure 4) that uses a system of iconic and arbitrary elements to communicate. These elements follow systematic rules and manifest as signs produced by the hands of the speaker.[25] Head tilts, eye gazes, eyebrow movements and other body motions are also important and meaningful signals used to communicate in ASL. These movements do more than add emphasis to what is being communicated; they are also important in conveying the grammatical structure of a sentence (Bahan 1996).[26]

Figure 4: The concept of help is conveyed by showing one hand supporting the other and lifting up, as in assisting or help.

ASL sign for "Help". Retrieved August 8, 2014 from hearmyhandsasl.com

Another common misconception is that ASL is simply English translated into signs; however, this is certainly not true. Signed English and Finger Spelling may be considered a visual expression of English, however ASL is a language all its own.[27] ASL is rooted in French

(Continued from previous page)

[24] This example is being used to illustrate the differing word order. Because ASL is a visual language, when it appears in writing, like above, it is called "glossing" because it lacks the full interpretation/meaning that would be conveyed with facial expression and posture, as well as the signs.

[25] Ferguson, C. A., Heath, S.B., Finegan, E., and Rickford, J.R. (2004). *Language in the USA: Themes for the Twenty-First Century*. Cambridge University Press.

[26] Bahan, B. J. (1996). *Non-Manual Realization of Agreement in American Sign Language (Doctoral Dissertation).* Boston University.

[27] Bornstein, H., Saulnier, K.L., Hamilton, L.B., and Miller, R.R. (1983). *The Comprehensive Signed English Dictionary*. Gallaudet University Press.

Sign Language and many words, phrases, or idioms in English do not exist in ASL.[28,29] For example, as noted by the National Association of the Deaf, "a direct translation of the English idiom 'have to' would mean 'possess' in ASL."[30] While there are individuals who are Deaf or hard of hearing that rely on various forms of communication like Signed English, Pidgin Signed English, Cued Speech, or speech reading, English is as much a foreign language as Hindi or German, for individuals whose primary language is ASL. As a result, many ASL communicators in the Deaf community have difficulty interpreting spoken or written English.[31,32]

Therefore, we content that emergency alert messages delivered via text messages can present confusion to ASL communicators who may struggle to interpret the written English messages. Comparable to other groups of individuals, one size does not fit all; and in this case, English text as a sole means of communication is not entirely accessible. Given the language diversity within the Deaf community, this should not be interpreted to mean that ASL can substitute the provision of text as an accommodation. In fact, in order for these messages to be accessible to the entire community of Deaf and hard of hearing, ASL and text should be used together.

Paragraph B.37: WEA Geo-Targeting

"We propose to revise the Commission's rules to require that Participating CMS Providers must transmit any alert message that is specified by a geocode, circle, or polygon to a target area not larger than the specified geocode, circle, or polygon."

Another limiting factor for WEA effectiveness is pertinence of the message. This was mostly related to the geotargeting capabilities of the WEA alerts needing to be fine-tuned.

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[28] Woodward, James and Susan Desantis. (1977). "Negative Incorporation in French and American Sign Language." *Language in Society*. 6(3): 379-388.

[29] National Association of the Deaf. (2000). *Legal Rights, 5th Ed.: The Guide for Deaf and Hard of Hearing People*. Gallaudet University Press, Washington, D.C.

[30] Ibid.

[31] Mitchell, Ross E, and Karchmer, M.A. (2011). "Demographic and Achievement Characteristics of Deaf and Hard-of-Hearing Students." *Oxford handbook of Deaf studies, language, and education*. 1: 18-31.

[32] Schein, Jerome D. (1989). *At Home among Strangers*. Gallaudet University Press Washington, DC.

Research indicates that clear and concise warning messages, that include specific locations regarding the hazardous incident, can increase the likelihood that people take protective action.[1],[2] Advancing to an environment where geotargeted alerts are the norm will ensure that all citizens are given vital information in a timely fashion, especially people with disabilities. It is particularly important as it relates to Function IV within Executive Order (E.O.) 13407, which specifically mandates that the Integrated Alert and Warning System (IPAWS) *"include in the public alert and warning system the capacity to alert and warn all Americans, including those with disabilities and those without an understanding of the English language."*

Our survey of people with disabilities found that while nearly 25% of those that received a WEA alert took immediate protective action, nearly the same amount (23%) did not, due to not being near the event. A potential consequence of the geotargeting boundaries being county wide is that individuals will receive emergency messages even when the emergency event is miles away and heading away from them. This may be especially true for very large counties where many individuals will receive an emergency message for which, to them, there is not an immediate threat. One respondent wrote, "Stop overwarning me. I later checked, and I was nowhere near the alerted warning I found later was issued from the National Weather Service." If this happens too often, the effectiveness of WEA will be minimized because too often the alert will not be pertinent to the recipient. Without more granular geotargeting capabilities WEA runs the risk of falling prey to the cry wolf syndrome and people may begin to ignore the messages or opt out of the system. Therefore, we agree with the FCC's above-referenced proposal to make the geotargeting of WEA messages more precise.

In research conducted under the IPAWS contract, we explored the potential for developing and deploying emerging and conceptual technologies for geotargeting. Improvements such as geo-fencing and anthro-locating were identified as possible ways to

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[1] Dewitt Latimer, "Deciphering the New Federal Integrated Public Alert and Warning System,"*Educase* 16 (2009): 1-13.

[2] Michael K. Lindell and Ronald W. Perry, "The Protective Action Decision Model: Theoretical Modifications and Additional Evidence," *Risk Analysis* 32 (2012): 616-632.

help direct geotargeted alerts to people with disabilities and those with access and functional needs. Anthro-locating is a term we created to describe the concept of sending targeted emergency messages to the individual person based on their location. As a conceptual idea, anthro-locating would require a method of geographically locating people in order to send them an emergency message when they enter or near a hazardous area. The closest idea to anthro-location is to send emergency messages to devices in a hazardous area. Ideally, alerts would 'anthro-locate' meaning target the person and not the technology. Potentially the use of sensor networks and the harnessing of dynamic data about individuals' movements would allow for anthro-locating. For example, through the use of location apps (e.g. foursquare), GPS technology, registered/public information and social media updates; systems (i.e. algorithms) may be able to not only locate an individual with precision, but predict their next move. Through the use predictive analytics, the system could warn groups of people that may be moving into the impacted area. As users move from technologies that are carried, to technologies that are worn, we move closer to the concept of anthro-location. Potentially, one-day implantable and ingestible technologies could move from the healthcare domain into popular use. If the public ever accepts such technology as normative, then anthro-location could be realized.

Geo-fencing is a geographically targeted virtual "fence" around a specific location that will allow for emergency alerts and information to mobile devices that cross into or out of the virtual barrier. The ideal cases for implementing geo-fencing include college campuses and independent living centers.

<u>Geo-fencing</u>

- Geo-fencing creates a virtual fence around a geographic location that can allow for the hyper-localization of emergency alerts and information to mobile devices that cross into or out of the virtual barrier.
- Ideal use-cases for geo-fencing include college campuses and independent living centers.

- In both the aforementioned environments, administrators are charged with maintaining a safe environment for their visitors, residents and personnel. Both also have unique populations.

Geo-fencing could be used to geo-target a population to provide the alert in the optimal format. Perhaps piloting geo-fencing alerts sent in ASL Video format to a school like Gallaudet, or pilot geo-fenced alerts to an independent living center. The geo-fenced alerts could supplement other alerting methods and add redundancy, increasing the likelihood of receipt and serve as a form of verification. When geotargeting is used for a specific, high traffic, high threat potential and/or highly vulnerable areas such as airports, stadiums, schools/campuses, hospitals, and nursing homes/independent living centers opportunities can emerge to disseminate to the location in a more timely and efficient manner.

Paragraph C.1.44: Promoting State and Local Testing and Proficiency Training

"CSRIC IV concluded that a localized test to opt-in participants' WEA-enabled device would achieve alert originators' goals of providing systems verification, as well as opportunities for alert originator proficiency training, and enhancing public awareness of the WEA service."

As discussed earlier a survey of 425 FEMA-approved IPAWS alerting authorities found that (1) they needed more training and (2) many respondents expressed reticence regarding use of WEA because they needed additional training on when and how to use WEA. We agree with the CSRIC IV recommendation regarding localized testing of WEA messages. In our recent 2015 survey regarding WEA, a majority of all respondents (60%) had heard of WEA prior to the survey. In the 2013-2014 WEA survey data, 59% of all respondents had heard of WEA. This indicates that despite increased WEA-capable phone penetration, WEA awareness levels have remained flat. Further, respondents without disability were twice as likely to report having heard of WEA (69%) than those respondents with disability (53%) ($p<0.01$).

Respondents were also asked where they learned about WEA and offered 11 selections, two of which were open-ended text responses ("Community Organizations" and "Other"). A significant number of all respondents (47% with disability and 32% without disability) did not answer this question. In the 2013-2014 WEA Survey data, of all of the respondents that *did*

know about WEAs, the top three sources/ways of finding out about the availability of WEA messages were:

1. An emergency management agency (55%);
2. After receiving a WEA message for the first time (37%); and
3. Someone told them (17%).

In 2015, the top three selections for all respondents were similar but in a different order:

1. After receiving a WEA message for the first time (19%);
2. An emergency management agency (14%); and
3. Someone told me (6%) and Other (6%).

These data suggest that there is significant room for growth regarding educating people with disabilities on the availability of WEA. Ideally the source of information should be official, as hearsay (i.e. someone told me) may be colored by that person's experience (good or bad).

Therefore, we recommend that tests of the WEA system extend beyond the providers' infrastructure to the mobile devices in use by the public. As stated by CSRIC IV, its effects could be two-fold. On one hand it allows the alert originators the opportunity to use the system and become comfortable with it when not under pressure of an actual emergency event and it also provides a means of raising awareness about WEA messages. However, regarding the latter, we recommend that the test messages be sent to *all* WEA-capable devices in the localized area and not to only opt-in participants. Seemingly, those that have opted-in to receive test messages have some level of awareness regarding WEA.

To optimize the use of test messages as a tool to raise awareness about WEA, it should be sent all WEA-enabled devices that have not opted-out of the service. This should increase public awareness of WEA, as many users of WEA learned of WEA only after receiving a WEA message for the first time. The test message could include a link to the IPAWS PMO's frequently asked questions regarding WEA or another official source that provides WEA information in accessible formats. Another factor that would be helpful to the alert originators and to the public are the IPAWS training modular which offer great insight into better understanding

alerts and warning. They can be found on the FEMA IPAWS website: IS0251 IPAWS for Alerting Authorities and IS-00248 IPAWS for the American Public.

In conclusion, we look forward to the proposed WEA enhancements which will ensure timely response and recognition of messages to safe guard all citizens. The recommendations made herein are intended to facilitate the maturation of WEA messages towards full accessibility for people with disabilities.

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