500 10th Street NW
Atlanta, Georgia 30332-0620
Phone: 404.894.4804
Fax: 404.385.0269
www.wirelessrerc.org

VIA ECFS

December 8, 2016

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

Re: Wireless Emergency Alerts [PS Docket No. 15-91]

Dear Ms. Dortch:

Enclosed for filing in the above-referenced Further Notice of Proposed Rulemaking are the Comments of the Rehabilitation Engineering Research Center for Wireless Inclusive 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

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

In the Matter of	)	
	)	
Wireless Emergency Alerts	)	PS Docket No. 15-91
	)	
Amendments to Part 11 of the Commission's Rules Regarding the Emergency Alert System	)	PS Docket No. 15-94
	)	

COMMENTS OF
GEORGIA INSTITUTE OF TECHNOLOGY (GEORGIA TECH), CENTER FOR ADVANCED COMMUNICATIONS POLICY (CACP)
AND THE REHABILITATION ENGINEERING RESEARCH CENTER FOR WIRELESS INCLUSIVE TECHNOLOGIES (WIRELESS RERC)

Georgia Tech's Center for Advanced Communications Policy[1] (CACP) in collaboration with the Rehabilitation Engineering Research Center for Wireless Inclusive Technologies[2] (Wireless RERC**)** hereby submits comments to the above-referenced Further Notice of Proposed Rulemaking (FNPRM), released on September 29, 2016. CACP focuses on key issues that influence the development, implementation, and adoption of cutting-edge, advanced communications technologies. CACP work includes assessment of policy issues and production of regulatory filings, identification of future options for innovation, and articulation of a clearer vision of the ever-changing technology landscape. Center research areas include wireless communications and platforms; accessible technology design and use for people with disabilities; emergency alerts and communications; higher education policy and evaluation;

[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 U.S. 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 Inclusive Technologies (Wireless RERC) is sponsored by the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR grant number 90RE5007-01-00). NIDILRR is 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.

workforce development and employment for people with disabilities; new communications modes such as social media and online participatory platforms; STEM (science, technology, engineering, and mathematics) education, and the cultural impact of technology shifts. CACP, in its role as an objective and neutral source, collaborates with government, industry, and academia at the national, local, state, and international levels.

CACP is the home the Wireless RERC, funded since 2001 by the National Institute on Disability, Independent Living and Rehabilitation Research (NIDILRR), a Center within the Administration for Community Living (ACL), U.S. Department of Health and Human Services (HHS). The Wireless RERC mission is to *integrate established wireless technologies with emerging wirelessly connected devices and services for a transformative future where individuals with disabilities achieve independence, improved quality of life, and enhanced community participation.* We believe it is essential that information and communications technologies (ICT) and services, especially those in and adjacent to the wireless technology industry, increase their levels of accessibility for people with disabilities; as access to technology can enhance social inclusion, civic and community engagement, and independent living.

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 WEA messages for people with disabilities and the WEA legislative and regulatory framework since IPAWS and WEA were concepts. The researchers that guide the progress and outcomes of these efforts have the combined expertise in disability research and development and include research specialists, emergency management specialists, focus group and survey technicians, designers and engineers. The comments respectfully submitted below are based on subject matter expertise developed over the past 15 years. Findings from our consumer surveys and focus groups, policy research, and development efforts inform the recommendations made herein.

Specifically, our WEA survey research (2013-2015) revealed issues consistent with those included in the FNPRM. Suggestions based on message content were mostly only relevant to the alert originators and mimicked decades of research on the subject: (1) be mindful of the relevance of the message, (2) provide specificity, do not include jargon or acronyms and (3)

make the length of the message longer. The preceding has been addressed in the Final Rule amendments concerning the FCC Rulemaking *In the Matter of Improving Wireless Emergency Alerts and Community Initiated Alerting* [**PS Docket No. 15-91**] that, among other things, increased the maximum character length and required more precise geotargeting of WEA messages. However, alert originators should still receive training to discourage the use of acronyms and jargon. While the increased message length, in theory, will reduce reliance on abbreviations and acronyms, in practice it may not. The other suggestions, pertinent to this FNPRM were synthesized into two categories: suggestions to device manufacturers and wireless carriers.

Table 1: Suggestions

	Device Manufacturers	**Wireless Carriers**
Education	- Provide uniformity of options across devices	- Provide more visibility on carriers' involvement in WEA – many are unsure if their carrier participates
Distinction	- Use a standard distinct WEA icon across different devices to enable the public to identify them from other text messages	
Timing	- Provide opt-out times for certain alerts (e.g. no AMBER from 1am – 5 am)	- Standardize the release of alerts (some alerts repeated multiple times, while others only once)
Other features	- Enable the ability to save alerts - Provide sound options for certain hours of the day - Test alarm feature	- Provide better geo-location

WEA survey respondents with disabilities expressed concerns with the receipt of WEA alerts, system consistency and requests for additional features. Some of their representative comments are below:

Issues with Receipt of WEA

"Those posting them should be mindful of the fact that the public at large likely do (sic) not fully understand their inside shorthand …"

"Hard of hearing people need to be able to customize the audio alert because no one frequency will work for all kinds of hearing loss."

"The question is do you have a friendly deaf visual alarm with clear message…"

Education about WEA

"You need to publicize them more widely to make sure that everyone knows about WEA messages."

"WEA is very beneficial to everyone. More information about WEA MUST be promoted in ALL medias."

System Consistency

"Only one of my cell phones receives WEA Alerts… and both are on the same carrier…"

"Stop over warning me. I later checked, and I was nowhere near the alerted warning I found later was issued from the National Weather Service. Plus, I do not know what a Flash Flood Warning means."

Additional Features

"I'd love to see them be opt-IN! Getting them at 3 am just caused me (and many others) to disable the function entirely."

"Show my location on a map relative to the warned area and/or improve geotargeting through some form of geofencing. iPhone users should have a capability to opt-out of Severe alerts while still receiving Extreme alerts as with the Android. The WEA tones should be user configurable for the different types of alerts instead of one screaming tone for all alert types. Users should also have the ability to configure WEA so that it sets off a flashing strobe if desired."

The following recommendations, responding to specific sections of the FNPRM elaborate on the themes identified above.

Section A. Ensuring the Provision of Effective WEA Alert Messages

The Commission's Part 10 rules do not define participation "in whole" or "in part," and do not specify the difference between them.

Paragraph 106: We agree with the definitions outlined in the FNPRM. Based on rules requiring providers to inform current and prospective customers about their level of participation, in whole implies all devices across the entire service area.

Paragraph 108: Defining mobile devices to encompass any mobile device connected to a Participating CMS Providers' network that is capable of receiving WEA Alert Messages…We seek comment on the technical characteristics needed in a device to allow it to receive WEA Alert Messages.

The Wireless RERC supports expanding WEA devices to be inclusive of current and emerging technologies. As such, we reiterate and add to comments (LaForce, et al., 2016) made in earlier rulemakings. We support extending WEA rules to include tablets and other mobile devices, including wearable and other nontraditional communications devices. In our 2015 WEA Survey, we asked about the use of wearable devices and found that respondents with and without disabilities use wearable technology at the same rate, 14%. As an emerging technology, these numbers will most likely continue to rise. Additionally, wearable technology has the unique benefit of proximity to the wearer, often touching skin. This nearness may enable speedier acknowledgment of an incoming WEA message. Especially for people with hearing loss or those who have their phones silenced who may miss a WEA message if the device is in a jacket, pants or purse pocket. In sum, given that wearable technology is a growing market among both people with and without disabilities, and its ability to improve alert acknowledgment, we support the integration of wearable technology into the WEA/IPAWS environment.

Regarding tablet computers, provision of WEA messages is currently inconsistent. The iPad Air 2 and above can receive WEA messages, but WEA-capability on Android tablets is unclear. If some support them, most do not. However, in the Wireless RERC's Survey of User Needs, respondents who use augmentative and alternative communication (AAC) devices reported higher rates of tablet ownership than others with disabilities (Wireless RERC, 2014). Thus, the Wireless RERC supports consideration of tablets that consumers use to access mobile services as "mobile devices" under Part 10 WEA rules. However, for WEA's received on tablets and wearables to be effective, visual, haptic, and audio signaling capabilities will likely have to be incorporated into the technologies to support the WEA notification signal requirements.

Paragraph 110: We seek comment on whether, in the event we adopt new definitions for participation in WEA, it would be appropriate to require CMS Providers to refresh and renew their election to participate in WEA.

Absent the proposed definition, providers determined what constituted "in whole" and "in part." Thus, the current election notices may be inconsistent with the proposed definitions. If the outcome of this rulemaking defines WEA participation, then all providers should be required to renew their elections to ensure congruence with the new definitions. Further, providers should be required to inform the Commission electronically and in writing of (1) list of devices as of the date of election that are WEA-capable, and (2) network areas of WEA service. The Commission should display the above information prominently on the FCC website so that consumers and researchers have access to the information. The data collected will assist determining business growth, design opportunities, and policy and technology gaps. There is currently not a central place for users to review WEA-capable devices across differing dimensions such as service provider and accessibility features. Having such information would empower the user to be able to purchase a WEA-capable device that is appropriate for them financially (i.e. service plan of choice) and optimized for their user needs and preferences. The GARI- Global Accessibility Reporting Initiative (GARI database), is a searchable cell phone database that shows phones with accessible features. It almost meets our proposed search needs, however, absent from their searchable database are two key search options: (1) service provider and (2) WEA-capable as an option under the "Hardware & System Information" category. The GARI- Global Accessibility Reporting Initiative database (GARI database) is a collaborative effort between the Mobile Manufacturers Forum (MMF) and CTIA-The Wireless Association®. While the FCC does not have jurisdiction over those organizations, they may be responsive to encouragement by the FCC to enhance the database features in support of raising awareness about WEA and enabling consumers to make informed choices.

Alert Message Preservation

Paragraph 116: We propose to amend Section 10.500 to state that WEA-capable mobile devices must preserve Alert Messages in an easily accessible format and location until the Alert Message expires. We seek comment on this proposal.

The 2015 WEA Survey collected data on WEA awareness, accessibility, trust and validation of message content, frequency of receipt of WEA messages, actions taken upon receipt, and future features for the next-generation of WEA (NG-WEA). One open-ended question asked if the respondents had problems understanding the message. The responses were provided in a free-form, text box on the survey. Coding and analysis of the responses

revealed several recurring themes. Among them were difficulty understanding the message because **"the message disappears"** and **"need to be able to repeat the message."** With the increase in the maximum character length of WEA messages, the inclusion of URLs and dialable numbers, we anticipate an exponential increase in the need for people to be able to recall and review the message. As such, we agree with the FCC's proposal to amend the rules to require that WEA messages be saved until the message expires. As user's experience WEAs as text messages, the place one would likely search for the message would be in their text message inbox. We recommend that WEA-messages be saved in the text message inbox.

Section B.1: Incorporating Future Technical Advancements to Improve WEA - Multimedia Alerting

Paragraph 129: Usability study recommendation regarding symbology.

> Research on universal usability focuses on user experiences and stretches the bounds of current thinking in several ways. It makes explicit the need to accommodate users with different skills, knowledge, age, gender, disabilities, literacy, culture, income, etc. Design for diverse users can take extra effort, but there is a growing evidence that accommodating the needs of diverse users can improve designs for all users. … The business case for universal usability is increasingly clear: advanced designs expand the audience and enable greater levels of success for all users. (Lazar, 2007, p. ix)

The Wireless RERC development principles include the early input of people with disabilities in the design of prototype software or hardware. As such, even before development begins, exploratory focus groups are held with the target population to gain insights on the user experience, what they prefer, expect and absolutely require for the proposed technology to be attractive and usable. Early and continued input allows for the development process to progress with certain assurances about the utility of the technology. The obvious benefit comes at post-production deployment of a technology that has a high probability of user acceptance. Before deploying the universal use of symbology in the WEA message, we echo CSRIC IV and V's recommendation to conduct user-experience studies. However, we urge that the studies be inclusive of people with a variety of disabilities, whose primary language is non-English (spoken or signed), and people with varying levels of literacy. If the symbology is meant to improve message comprehension, the test participants need to

reflect the users that stand to benefit the most.

By example, in 2016, the Wireless RERC conducted a usability study that included 16 IPAWs approved hazard symbols to determine if message comprehension was impacted by the inclusion of American Sign Language (ASL) and/or symbology. We simulated WEA text messages, in standard format and included an ASL video translation and the IPAWS symbology. Twenty-two participants whose primary language is ASL, individually received three, randomly selected test messages and were asked:

1. What did the message say?
2. What would you do if you received this message in an actual emergency?

Results indicated that some of the symbols helped with text comprehension. The symbols most often understood included Flood Warning, Hurricane Warning, Tornado Warning. The other symbols were not consistently assigned the same meaning by all participants, indicating that it will be interpreted differently and is not a "universal symbol." Most importantly, some of the symbols were misinterpreted. For example, the shelter in place symbol which is intended to elicit a behavioral response was interpreted by our participants as "It's a house." Additional unknown symbols included Civil Emergency, Evacuation Immediate, and Hazardous Materials. We found that participants recognized symbols only for events that typically happen near them and none of the participants understood that "All Clear" meant that the emergency was over. From this preliminary study, we concluded that user outreach and education would be integral to the utility of the symbology.

Finally, in developing content for diverse users such as those who are visually impaired, the symbols should incorporate a text component (alt text) and/or an audible description to increase accessibility across mobile devices. For example, Apple, Inc.'s audible described emojis.

Section C.2: Developing Consumer Education Tools - Promoting Informed Consumer Choice about the Receipt of WEA Alert Messages

Paragraph 155: We propose to require Participating CMS Providers to implement changes to the WEA application that would provide the public with more granular options regarding whether they receive WEA Alert Messages.

Wireless RERC and CACP focus group findings concerning WEA experiences support

providing consumers with opt-out option customization. A specific recommendation stated that opt-out times for alert types should be provided. For example, no AMBER alerts between 1:00 am and 5:00 am. However, we recommend that the opt-out feature disables the alert notification signals and the message is saved to the device for later retrieval. Essentially, in this scenario, for certain periods the messages would be silent.

Paragraph 156: Would it be helpful to offer consumers a full explanation of the kinds of emergency situations about which they will receive information by virtue of remaining opted in to receive Alert Messages of that category?

Yes, we recommend that more of an explanation or examples beneath each option is added to the device. It's not likely that when an individual takes action to opt-out on their device that they are going to access reference materials (i.e., provider website or user manual) to determine what each option means. They may interpret the meaning and potentially make an uninformed selection.

Paragraph 157: We seek comment on whether we should require Participating CMS Providers to offer their subscribers a more granular suite of choices for Imminent Threat Alerts and AMBER including the ability to modify the attention signal and vibration cadence that is presented when an Alert Message is received when the phone is idle.

The findings of our 2015 WEA survey support user personalization of the WEA attention signals. People with sensory disabilities have differing levels of vision and hearing which can affect the perception of the notification signals. Additionally, people with and without disabilities do not always have their phones on their person. It may be in a purse/bag or sitting on a table. Even those that do carry their phone in a pants or jacket pocket reported missing calls and texts. The data presented below concerning the vibration, sound, and light attention signals indicate a strong need to improve their effectiveness for both people with and without disabilities. We recommend that mobile phone manufacturers design WEA-capable handsets with the capability to adjust the strength of the vibration and sound and to include a light feature (Center for Advanced Communications Policy, 2015).[1] The vibration motors in current WEA-capable handsets may not be strong enough to alert users of WEA messages reliably, and

[1] Prototype for increased vibration rating scale and light signaling were produced under contract with the U.S. Department of Homeland Security, Science and Technology (DHS S&T) Directorate. The full technical report, *Optimizing Ability of Message Receipt by People with Disabilities: Prototype Findings Report/Vibration Scale Final Report*, can be found here: http://www.cacp.gatech.edu/sites/default/files/WEA-Optimizing.pdf

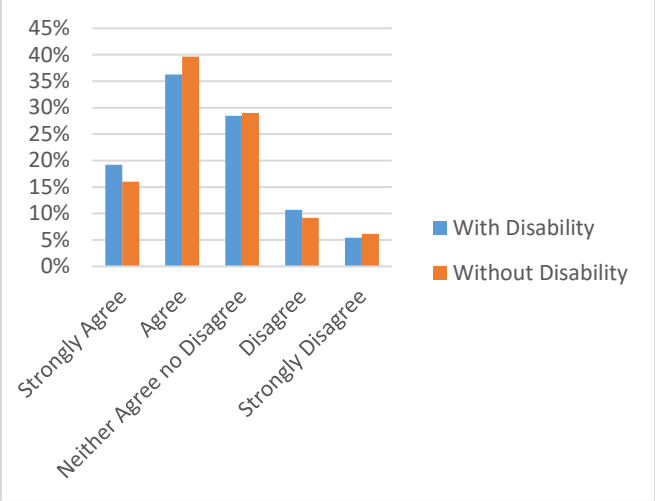
thus manufacturers would need to design phone models with the goal of increasing the effectiveness of vibration and the other signaling features in mind. Supporting data from the survey is presented below.

Respondents who had received WEA messages (871 respondents) were asked to indicate their agreement with three statements related to WEA attention signal effectiveness. As an example, the statement related to the vibration signal was: "The vibration produced by the alert was effective in getting my attention." The effectiveness of the vibration and sound signals varied based on whether the respondent had a disability; however, the visual signal did not (Figure 1 – Figure 3).

Figure 1 shows that neither group found the vibration signal particularly effective in getting their attention. Sixteen percent (16%) of those with disabilities strongly agree or agree that the vibration signal gets their attention, while 55% of the same group disagree or strongly disagree. For those without disabilities, 15% strongly agree or agree that the vibration gets their attention, while 56% disagree or strongly disagree with this statement. These distributions appear close, however, they are impacted by the percentage of respondents with and without disabilities who had received WEA messages in the past. Respondents with disabilities were statistically less likely to own a cell phone and have received a WEA message, than their non-disabled counterparts.[2]

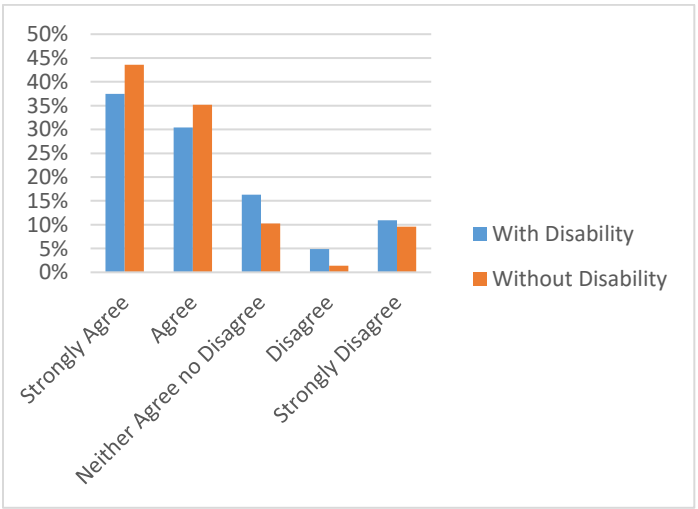
[2] Descriptive analysis indicated that respondents with disabilities owned mobile phones at a similar rate to their non-disabled cohorts; 96% and 99%, respectively. Chi-square distribution comparison between these rates, however, showed that people without disabilities were seven times more likely to own a cell phone than people with disabilities ($p < 0.001$). The data shows that significantly more respondents without disability report they have received WEA messages (72%) than those respondents with disability (60%) ($p<0.01$). Between the two respondent groups with sensory disability; more respondents that are blind or have low vision report receiving these types of messages (64%) than respondents that are deaf or hard of hearing (54%).

Figure 1: Vibration Alert Effectiveness (by disability status)



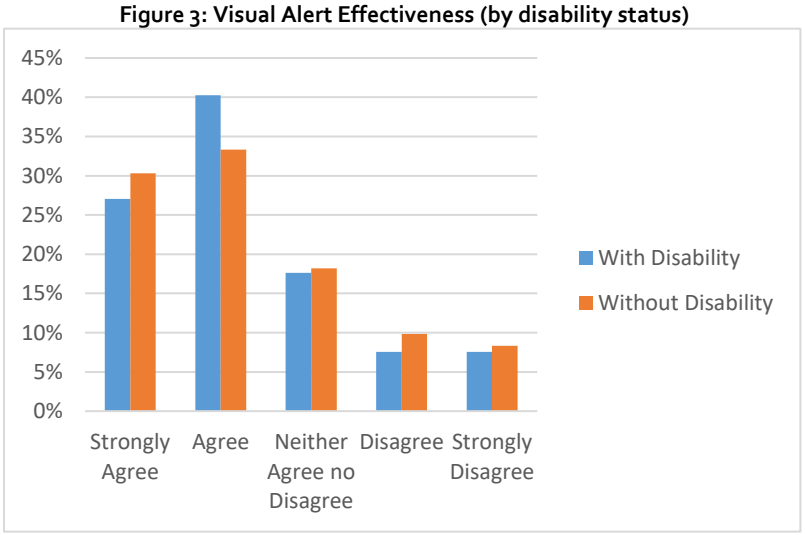
Similarly, neither group found the sound alert effective in getting their attention. Sixteen percent (16%) of those with disabilities and 11% of those without disabilities strongly agreed or agreed that the sound alert was effective in getting their attention (Figure 2). Sixty-seven percent (67%) of those with disabilities and 56% of those without disabilities disagreed or strongly disagreed with that statement. As above, these distributions are impacted by the differences in the percentage of respondents who had received WEA messages in the past (60% of respondents with disabilities vs. 72% of respondents without disabilities). Even though a greater percentage of respondents without disabilities had received WEA messages, respondents with disabilities were more likely to report dissatisfaction with the effectiveness of the vibration signal.

Figure 2: Sound Alert Effectiveness (by disability status)



Finally, the majority of respondents did not report that the visual signal was effective in getting their attention. Sixty-seven percent of respondents with disabilities and 66% of respondents without disabilities disagreed or strongly disagreed with the statement, while 16% of those with disabilities and 18% of those without disabilities strongly agreed or agreed.

Figure 3: Visual Alert Effectiveness (by disability status)



Paragraph 158: In the alternative, we seek comment on whether to require all Participating CMS Providers to adopt a standardized opt-out menu, as recommended by NWS, and in a manner consistent with CSRIC V's recommendation.

The Wireless RERC supports the use of a standardized opt-out menu. The NWS proposal to consistently include three levels of alerts, extreme, severe, and AMBER, provides the reluctant user with the option to only receive extreme alerts. However, when the user is only provided with two options, AMBER and Emergency Alerts, they may opt out altogether. Further, we recommend that the settings title also be consistent. Some refer to WEAs as "Government Alerts" while others title them "Emergency Alerts." To be consistent with outreach efforts conducted by IPAWS online, in person, and via the public service announcements (PSAs), we suggest requiring the use of "Wireless Emergency Alert (WEA) Settings" on the device, in the user manuals, and on provider websites. Using consistent terminology will help allay confusion about whether the messages being received are WEAs or if they are originating from a third party app or subscription service.

Section D.1: Annual WEA Performance Reporting

Paragraph 161: We propose to amend Section 10.350 to require Participating CMS Providers to submit annual reports to the Commission that demonstrate the following

system performance metrics Geo-targeting, Latency, Availability and Reliability. The annual percentage of WEA Alert Messages that the Participating CMS Provider processes successfully, and a summary of the most common errors with Alert Message transmission.

Yes, the Wireless RERC agrees with the above-referenced proposal. It will allow for data to be collected and analyzed to set a baseline from which to measure implementation progress and effectiveness of WEA with regards to system performance.

In conclusion, we look forward to the proposed advancements of WEA to improve message receipt, comprehension, and actionable information. The recommendations made herein are intended to maximizing message diffusion and ensure the same timely and effective access to alerts and warnings for people with disabilities.

Respectfully submitted,

Helena Mitchell, Ph.D., and
Salimah LaForce
Wireless RERC / Center for Advanced Communications Policy
Georgia Institute of Technology
500 10th Street, 3rd Fl. NW
Atlanta, GA 30332-0620
Phone: (404) 385-4640

Dated this 8th day of December 2016

References

Center for Advanced Communications Policy. (2015) Optimizing Ability of Message Receipt by People with Disabilities: Prototype Findings Report/Vibration Scale Final Report. Washington, D.C.: U.S. Department of Homeland Security, Science and Technology Directorate

LaForce, S., Mitchell, H., Touzet, C., Bennett, D., Lucia, F. & Price, E. (2016). Comments filed in response to *Amendment of Part 11 of the Commission's Rules Regarding the Emergency Alert System* [15-94]; *Wireless Emergency Alerts* [PS Docket No. 15-91]. Federal Communications Commission: Washington, DC, June 8, 2016.

Lazar, J. (2007). *Universal Usability Designing Computer Interfaces for Diverse User Populations.* West Sussex, England: John Wiley & Sons Ltd.

Wireless RERC. (2014). SUNspot – People Who Use Augmentative and Alternative Communication Devices and Their Use of Mainstream Wireless Devices [Volume 2014, Number 01 – January 2014]. Retrieved from http://www.wirelessrerc.gatech.edu/content/publications/2014-sunspot-number-01-augmentative-and-alternative-communication-device-users