Wireless Emergency Alerts (WEA) / Emergency Alert System (EAS) Survey Comparison

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Background

The Emergency Broadcast System (EBS) established in 1963 was an analog system that was a joint government-industry effort to respond to the presidential requirement to be able to address the nation in the event of a national threat or emergency. It allowed for the first time state and local authorities to use EBS for early warning to communities about regional, state, county and local emergencies. As a result, all broadcast stations were permitted to transmit on local frequencies during an emergency. The technical requirements for operating in an analog transmission system did not change until the mid-1970's. In November 1994, the Federal Communications Commission (FCC) adopted rules that replaced EBS with the Emergency Alert System (EAS). EAS, required cable systems as well as broadcast stations to participate in national alerts and required testing to deliver effective instantaneous emergency information to the public. In 1997, the Commission extended EAS to wireless cable systems. This was done to ensure that cable viewers had the same access as broadcast viewers and listeners to emergency information and notifications. Since then, the FCC has introduced several stages of rulemakings to stimulate the modernization of EAS.

Beginning in 2004, the FCC initiated new rulemakings to review EAS, seeking comments on how EAS could be improved given the move from analog to a digitally-based alert and warning system. With the proliferation of advanced technologies such as wireless, the FCC also asked how EAS could be more effective for warning the American public, and how it could provide equal access to information and alerts for individuals with disabilities.[i] Over a period of three years stakeholders representing people with disabilities filed comments with the FCC that addressed the accessibility of next generation, digitally based alert and warning systems for people with disabilities.

Generally, commenters agreed that all wireless device users would benefit from a multi-modal approach. Specifically, commenters suggested the possibility that the alerts could be transmitted by text messages, audio recordings, video or graphics opening up the potential to accommodate various levels of sensory, cognitive and language abilities.

In 2005, the FCC adopted rulemaking to make EAS alerts more accessible, ensuring that people with disabilities would have equal access to public warnings and emergency communications. In the summer of 2006 Executive Order 13407 directed the modernization of public alert and warning systems. In the Fall of 2006 Congress passed the *Warning Alert Response Network (WARN)* Act. Its aim was to establish an integrated public alert warning system *separate* from the EAS. Among the many required provisions for the new system would be its ability to alert people with disabilities. As a result of the WARN Act, in 2007 the FCC released an Order [PS Docket No. 07-287] that created the Commercial Mobile Alert Advisory Committee to develop recommendations on technical standards and protocols to facilitate the ability of commercial mobile service (CMS) providers to voluntarily transmit emergency alerts to their subscribers.

In mid-2007 the FCC's Second Report and Order, proceeded with establishing the framework for the Next Generation EAS which was to include new and innovative technologies and distribution systems that would provide redundancy and resiliency for delivering emergency alerts. It also included provisions to include persons with sensory disabilities and those non-English speaking citizens. Most importantly the goal was to ensure that EAS reach the largest number of affected people by multiple communications paths as quickly as possible. In 2008 the First Report and Order [PS Docket No. 07-287] to create the Commercial Mobile Alert System (CMAS) was released by the FCC. As part of its requirements the CMAS First Report and Order required a specific alert tone and vibrating cadence as their accessibility

measures. Provisions to alert people with disabilities and the elderly were also included in the rulemaking.

Later that year after a review of all comments filed in both proceedings, the Wireless RERC research team noted it was the only commenter (out of more than 250) specifically filing on the subject for the inclusion of accessibility provisions in CMAS. It is pertinent to point out that comments filed by the Wireless RERC research team in the CMAS First Report and Order/ Further Notice of Proposed Rulemaking were included in the CMAS Second Report and Order: "*According to the Wireless RERC, there is a need to develop a thorough testing regime to ensure that the CMAS will be accessible and inclusive of all people, including those with disabilities.*"

In 2011, the National Telecommunications and Information Administration (NTIA), the Federal Communications Commission (FCC), and the Department of Homeland Security (DHS) agreed that DHS Science and Technology (S&T) Directorate would develop a mobile penetration strategy for CMAS, which would eventually be renamed the Wireless Emergency Alerts (WEA) service.

In February 25, 2013 the Chief, Public Safety and Homeland Security Bureau of the FCC released an Order [PS Docket No. 07-287] that officially changed the name of the system used to transmit mobile emergency alerts to the public from "Commercial Mobile Alert System" (CMAS) to "Wireless Emergency Alerts" (WEA). The Order referenced the fact that the system was originally referred to as CMAS in the previous rulemaking proceedings. However, they went on to state, WEA was the more common terminology utilized by the commercial mobile service providers. Therefore, to eliminate confusion and provide consistency across organizations, the FCC revised the name to "reflect what is commonly used by the participating mobile service providers".

Introduction

Since the creation of the Emergency Alert System (EAS) in 1994, people with sensory disabilities, organizations that advocate on their behalf and academics conducting research on disability access to technology have submitted recommendations to the Federal Communications Commission (FCC) intended to enhance the accessibility of EAS. The Rehabilitation Engineering Research Center for Wireless Technologies (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 individuals with disabilities. For over a decade the Wireless RERC conducted research and development projects dealing with the accessibility of emergency communications, and have been active in filing comments in federal rulemakings to promote the inclusiveness and accessibility to emergency communications for people with disabilities and other vulnerable populations.

Between 2008-2009, findings from the Wireless RERC research and analysis of the regulatory framework for EAS revealed there were still barriers for people with disabilities. Further, within the CMAS First Report and Order there was a prohibition which on the surface did not appear to affect accessibility but in actuality hindered equal access to emergency information, namely, the exclusion of URLs and 800 numbers in the alert message. Preliminary research results from field testing conducted by the Wireless RERC 2008-2009, further showed that users with sensory disabilities preferred to have access to a second tier of more detailed emergency information that was accessed by way of the same device that provided the alert message, which in a field tested prototype system was furnished through a URL.

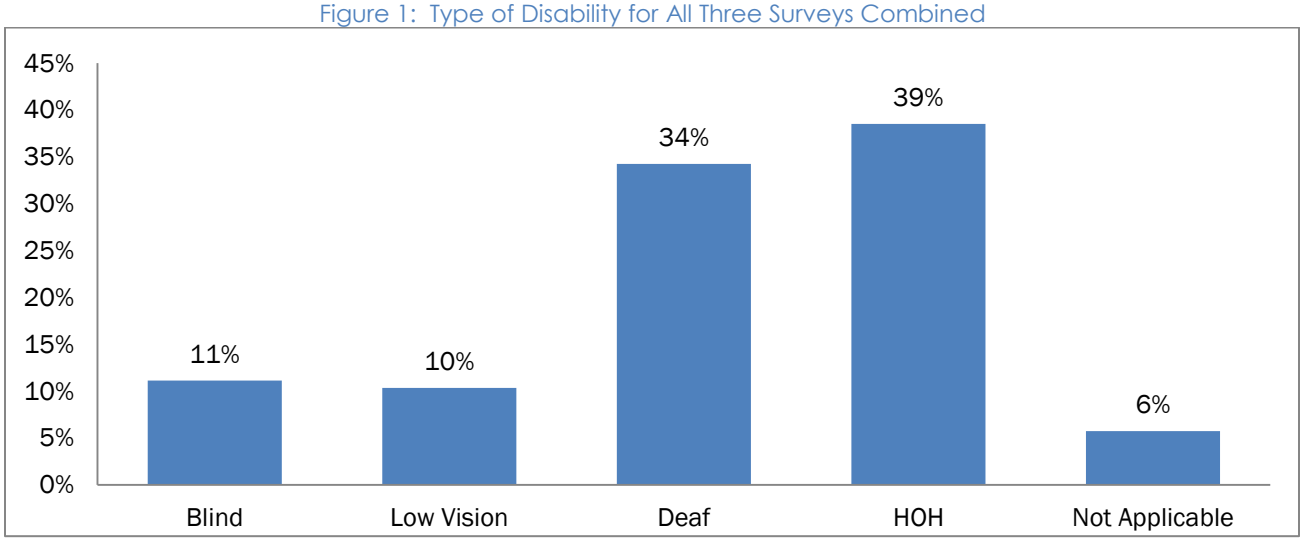
In light of the first-ever, nationwide EAS test scheduled for November 9, 2011, we determined it was an opportune time to gather survey data on how people with sensory disabilities experienced EAS in order to set a baseline to compare with survey data to be gathered on the accessibility of CMAS. The research conducted from 2011

– 2014 indicated that the newer CMAS (hereafter referred to as WEA) system also shared similar accessibility barriers. This research brief[ii] was designed to verify the hypothesis that accessibility barriers continued to exist. Answers would be captured by comparing both systems and conducting a comparison between the Pre and Post EAS Test surveys (conducted November 2-18, 2011) and the WEA survey (conducted November 2013 – March 2014). The survey tools were heavily modified between the EAS and WEA surveys which limited the statistical analysis to a subset of questions that remained backward compatible, and thereby statistically comparable.

Demographic Profiling

This brief is a comparison between the three surveys. It includes an analysis of the 2014 WEA survey and the 2011 Pre EAS Test and Post EAS Test surveys. The three surveys collected demographic details which were categorized into profiles: blind, low vision, deaf, and hard-of-hearing. Of the 628 respondents, the most represented disability among survey respondents was hard-of-hearing at 39%, followed by 34% deaf, 11% blind, 10% low vision. 6% of the respondents that took the EAS survey classified themselves as not applicable.

Figure 1: Type of Disability for All Three Surveys Combined



The average age of survey respondents from the three surveys was 54 years old; the oldest was 89 and the youngest 18. Less than one percent (0.6%) fell in the 18-24 age

group; 19% in the 25-43 age group; 54% in the 44-62 age group; and 25% in the 63+ age group (2% of respondents did not answer the question).

Figure 2: Age Range of All Respondents of the Three Surveys

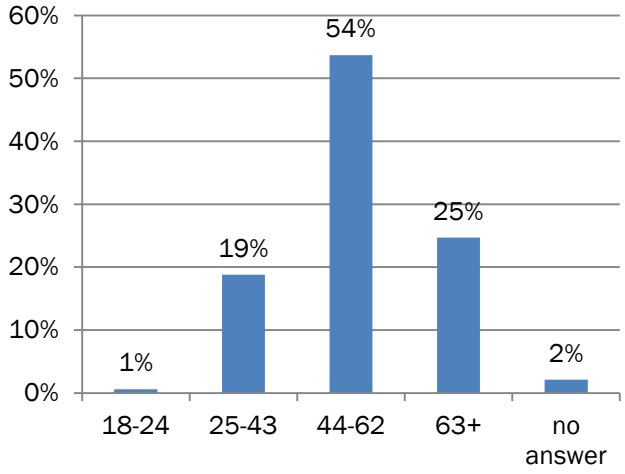
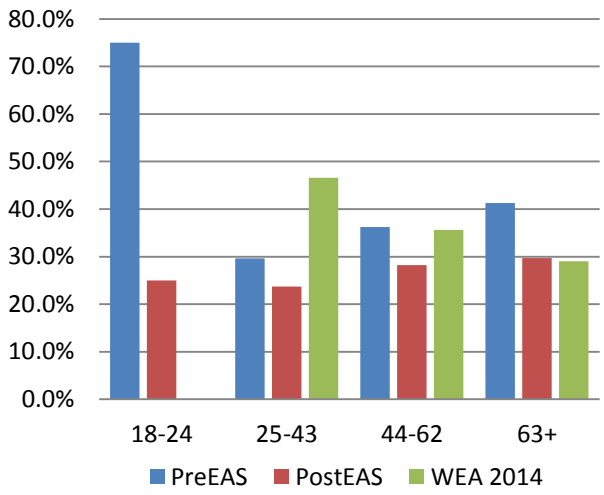


Figure 3: Crosstab of Age Ranges within the Three Surveys



From a crosstab analysis of the age ranges within each of the 3 surveys, the Pre EAS respondents dominated both the 18-24 age range at 75% and the 63+ age range at 41%. The age ranges among the respondents of the Post EAS survey remained in the mid to high 20th percentiles among all age ranges.

EAS / WEA Knowledge

Prior to the EAS / WEA alerts, participants were asked whether or not they had pervious knowledge of receiving emergency alerts. Of the EAS respondents, 19% *did not* have previous knowledge, 80% *did* have previous knowledge and 2% did not answer the question. It might be expected that at the time of data collection for the EAS survey, EAS was approximately 17 years old. Of the WEA respondents, 41% *did not* have previous WEA knowledge and 59% *did* have previous WEA knowledge. Understandably, since WEA had only been commercially available for 17 months at the time data collection began, survey respondents had more awareness regarding EAS messages than WEA messages. However, given that fact, the 21 percentage

awareness gap between EAS to WEA, should close as WEA message diffusion increases.

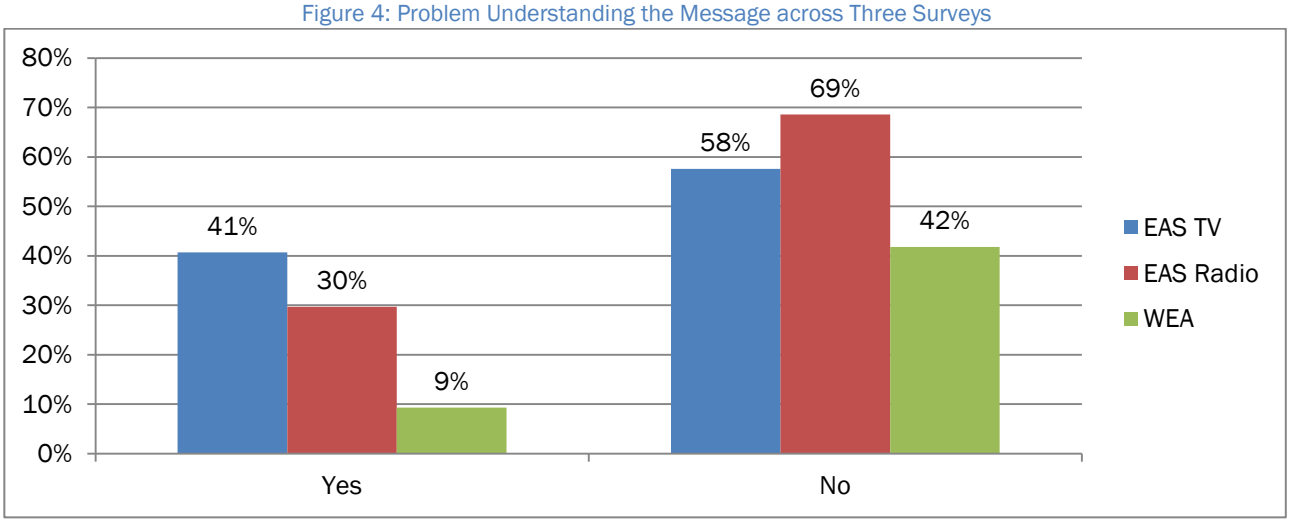
Problem Understanding the Message

With regard to hearing and vision disabilities, separate questions were asked to determine whether or not respondents had any problems understanding the message. In the pre-EAS Test survey, respondents were asked questions about both the TV and radio messages. Forty-one percent (41%) of the respondents had a problem understanding the TV message while 58% had no problem. Of the respondents that had a problem with the TV message, some of the access barriers included: the television broadcasts were inconsistent in their use of audio; there was no audio accompanying the TV crawl; the text crawl was too small and too fast to decipher; (when provided) audio of the alerts were of poor quality; the attention signal was not in a frequency the hard-of-hearing could hear; there was no visual alert mechanism such as a flashing screen. Regarding radio, 30% of respondents had a problem understanding the radio message while 69% did not have a problem understanding the message. The respondents that had a problem with the radio message indicated that the audio of the radio alerts was of poor quality; the attention signal was not in a frequency the hard-of-hearing could hear.

From the 2014 WEA survey, participants were asked if they would have a specific problem with a sample weather related WEA message provided in the survey "Flash Flood Warning for this area until 8:00pm CDT. Avoid flood areas. Check local media, NWS". 9% reported they would have a problem with the message while 42% claimed they would not have a problem with the message. The respondents that described the problems they would have with the message indicated they would need an American Sign Language (ASL) translation. Respondents mentioned features they would like to see available on their WEA capable devices. For example, one respondent stated:

"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. I don't remember hearing a special sound for the audible alert." Another respondent mentioned a unique issue with the text-to-speech software on their phone: "The originating TTS software added superfluous zeroes and "dots." It also spelled some words, instead of sounding the words themselves." This indicates that the assistive technologies used by people with disabilities to access their mobile devices, may not work correctly with WEA messages. Additionally, suggestions based on improving WEA message content 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. Despite these issues, fewer WEA survey respondents had problems understanding WEA messages, while approximately 1/3 of EAS survey respondents had problems understanding the TV and radio EAS messages (Figure 4).

Figure 4: Problem Understanding the Message across Three Surveys



Alert Notification Signal

Of the three types of alerts asked about in the EAS survey and the WEA survey, only one alert was asked about across all three spectrums – EAS TV, EAS radio, and WEA. The sound attention alert / attention tone across all three platforms was analyzed from

the post-test EAS survey and WEA survey. The majority of respondents (>50%) did not answer the question, as a result only participants who answered the question are analyzed in Table 1. (67%) the majority of the EAS TV respondents claimed the sound did not get their attention and (61%) the majority of the EAS radio respondents claimed the sound did not get their attention. However, this is significant because 70% of the EAS respondents were deaf or hard of hearing. On the other hand, the majority of participants (67%) that answered the question about the WEA survey indicated that they *did* hear the attention signal.

Table 1: Effectiveness of Attention Signals (a Comparison of the Three Surveys)

ALERTS		EAS TV		EAS Radio		WEA	
		N	%	N	%	N	%
Vibrate	Yes	*n/a*		*n/a*		86	77%
	No					25	23%
Sound Attention	Yes	28	33%	27	39%	60	67%
	No	57	67%	43	61%	7	8%
	Not Applicable					22	25%
Audio Message	Yes	20	24%	12	*18%*	*n/a*	
	No	63	76%	56	*82%*		

Action Taken

The pre-test EAS survey respondents were asked what method of action they took, including (1) Followed instruction given the alert (stayed indoors, evacuated) (2) Ignored instructions given in the alert (3) Called family, friends, and/or neighbors (4) Forwarded the alerts to family, friends, and/or neighbors (5) Shared the alert message on a social networking site – Twitter/Facebook (6) turned on the TV for additional information (7) Turned on the radio for additional information (8) Searched the internet to receive more information.

The WEA survey respondents were asked if they took action immediately based on the information in the alert; took action after verifying their alert from another source; took

action after informing loved ones; took no action because they were unsure of the alert; took no action because the alert could not be verified; took no action because they didn't know what action to take; took no action because they didn't receive enough information; took no action because they were not near the location of the event.

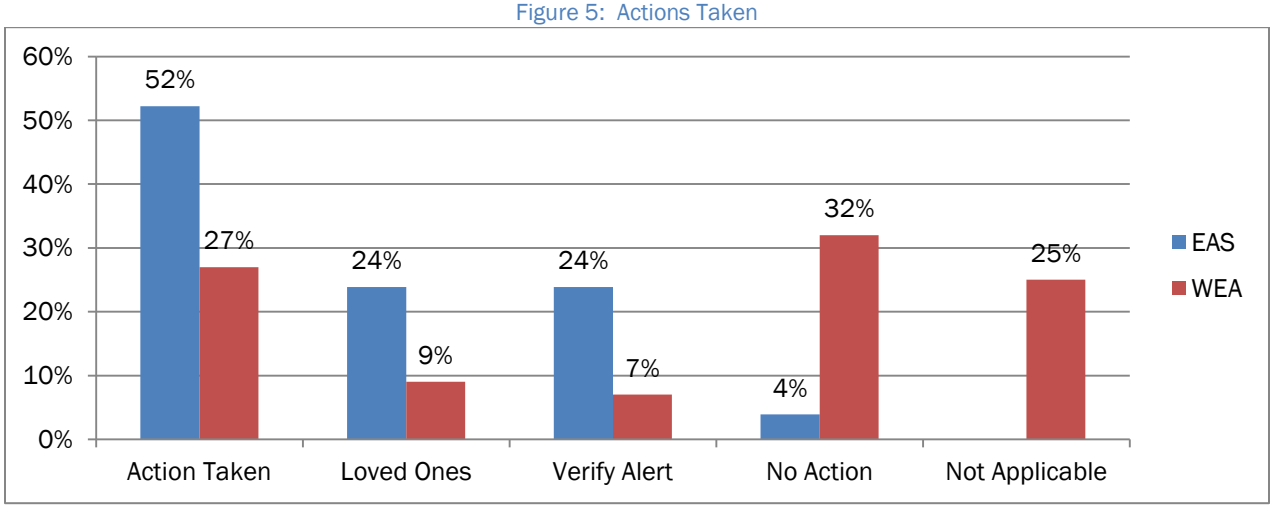
The different potential actions from both the surveys, a simplified action variable was created that combined similar actions for further statistical analysis. In the WEA survey – Action Taken was created from all of the choices where an individual "took action". There was a variable from each survey that mentioned contacting loved ones before taking action; therefore it became its own variable. Whenever "took no action" was an option it was simplified to No Action, and so forth.

Table 2: Behavioral Response to EAS vs. WEA

ACTION	EAS		WEA	
	N	%	N	%
Action Taken	94	50%	27	27%
Loved Ones	43	23%	9	9%
No Action	7	4%	32	32%
Verify Alert	43	23%	7	7%
Not Applicable			25	25%
TOTAL	**187**		**100**	

52% of respondents took action based on the information in the EAS alert, while only 27% of the respondents took action after the WEA alert, suggesting that EAS messages provoke protective actions. This may be a result of greater familiarity, comfort and trust of EAS messages as a result of its legacy, compared with the relatively new WEA. Or potentially, the incidence of taking protective actions may be greater for EAS because the message content is longer.

Figure 5: Actions Taken



Findings

From a comparative analysis of the WEA and EAS surveys the findings support the hypothesis that the systems have similar accessibility barriers. However, the rate at which those barriers impact the respondents with disabilities seems to be less with WEA messages, than with EAS messages on both television and radio. Of note, both systems sound attentions signals are not always accessible to people who are hard of hearing due to the variability in high and low frequency hearing loss amongst the population. Additionally, both systems shared a need to improve the quality of the audio portion of the message.

The nationwide test of EAS revealed the EAS alerts via television broadcasts were inconsistent in their use of audio and therefore not reliably accessible to people with vision loss. Respondents and participants with hearing loss also found that the national EAS test message was not fully accessible, reporting problems with the attention signal and audio quality. While we realize the nationwide EAS test was created to evaluate the effectiveness of the system, it served to highlight that there were inconsistencies in delivering the message.

Regarding WEA, the length of message, use of jargon and acronyms; and inadequate knowledge of WEA are limiting factors to the accessibility of WEA messages and their ability to elicit protective action behaviors. As the adoption rate of WEA increases among the state and local emergency management officials WEA message awareness amongst the public should also increase.

Many of the concerns presented by respondents with disabilities are related directly to current restraints of EAS and WEA based on the policy guiding these alerts. The FCC is currently in the process of updating the regulations of both systems and subsequent to the revised rules and regulations, research should reveal improved accessibility. The Wireless RERC will continue to monitor progress in this area and provide empirical evidence to support technology and policy solutions that realize parity of access to lifesaving emergency information.

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[i] Federal Communications Commission (2004). *In the Matter of the Review of the Emergency Alert System, Notice of Proposed Rulemaking*, (EB Docket No. 04-294), 12 August. Available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-04-189A1.pdf; accessed January 7, 2009.

[ii] This research was conducted under a grant from 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 paper do not necessarily represent the policy of NIDILRR, ACL, HHS, and you should not assume endorsement by the Federal Government.