March 2023

COMMUNICATIONS SECURITY, RELIABILITY, AND INTEROPERABILITY COUNCIL VIII

REPORT ON WEA APPLICATION PROGRAMMING INTERFACE

DRAFTED BY
WORKING GROUP 6: WEA APPLICATION PROGRAMMING INTERFACE

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1 Executive Summary

The Wireless Emergency Alert (WEA) system serves a critical function, disseminating important and often life-saving information. While information is included in the alert text to assist the user, there may be opportunities to enhance the effectiveness of the alert via new or existing capabilities on mobile devices.

This report explores the following proposals which provide the opportunity to enhance the WEA user experience:

1) Alert Area Graphic
2) Dedicated Audio Attention Signal(s) for Critical Response Time Alerts
3) WEA Event-Based Notifications
4) Expanded Language Set for WEA
5) WEA Handling of Threats in Motion

This report documents the analysis produced by Communications Security, Reliability, and Interoperability Council VIII (CSRIC VIII) with respect to these proposals, including recommendations for an Application Programming Interface (API) to leverage mobile device applications, native Operating System (OS) functionality, and firmware that could enhance WEA's presentation of emergency information to the public. This includes aspects related to security of WEA message content and protection of consumer privacy. The report also identifies potential impacts to the timely deployment of this API.

2 Introduction

The Federal Communications Commission (FCC) directs CSRIC VIII to provide recommendations for the software or functional requirements necessary to allow WEA software to pull capabilities from other mobile device applications, native OS functionality, and firmware to improve the effectiveness of WEA alert messages, including an API for this purpose.

2.1 CSRIC Structure

CSRIC VIII was established at the direction of the Chairwoman of the FCC in accordance with the provisions of the Federal Advisory Committee Act, 5 U.S.C. App. 2. The purpose of CSRIC VIII is to provide recommendations to the FCC regarding ways the FCC can strive for security, reliability, and interoperability of communications systems. CSRIC VIII's recommendations will focus on a range of public safety and homeland security-related communications matters. The FCC created informal subcommittees under CSRIC VIII, known as working groups, to address specific tasks. These working groups must report their activities and recommendations to the Council as a whole, and the Council may only report these recommendations, as modified or ratified, as a whole, to the Chairwoman of the FCC.

Working Group 1: 5G Signaling Protocols Security	Working Group 2: Promoting Security, Reliability, and Interoperability of Open Radio Access Network Equipment	Working Group 3: Leveraging Virtualization Technology to Promote Secure, Reliable 5G Networks	Working Group 4: 911 Service Over Wi-Fi	Working Group 5: Managing Software & Cloud Services Supply Chain Security for Communications Infrastructure	Working Group 6: Leveraging Mobile Device Applications and Firmware to Enhance Wireless Emergency Alerts
Co-chairs: Brian Daly, AT&T & Travis Russell, Oracle	Co-chairs: Mike Barnes, Mavenir & George Woodward, RWA	Co-chairs: Micaela Giuhat, Microsoft & John Roese, Dell	Co-chairs: Mary Boyd, Intrado & Mark Reddish, APCO	Co-chairs: Todd Gibson, T- Mobile and Padma Sudarsan, VMware	Co-chairs: Farrokh Khatibi, Qualcomm & Francisco Sanchez, Harris County Office of HSEM
FCC Liaison: Ahmed Lahjouji	FCC Liaison: Zenji Nakazawa	FCC Liaison: Jeff Goldthorp	FCC Liaison: Rasoul Safavian	FCC Liaison: Saswat Misra	FCC Liaison: James Wiley Tara Shostek

Table 1 - Working Group Structure

2.2 Working Group 6 Team Members

Working Group 6 consists of the members listed below.

Name	Company
Farrokh Khatibi (Co-Chair)	Qualcomm
Francisco Sanchez (Co-Chair)	U.S. Small Business Administration (SBA)
Mark Annas	City of Riverside Fire Department, OEM
Rebecca Baudendistel	NYC Emergency Management
Terri Brooks (Report Editor)	T-Mobile USA
Wade Buckner	International Association of Fire Chiefs
Kirk Burroughs	Apple
Brian K. Daly	AT&T, Inc.
Harold Feld	Public Knowledge
Craig Fugate	America's Public Television Stations
Michael Gerber	NOAA/National Weather Service
Dana Golub	Public Broadcasting Service
Stephen Guiwits	US Geological Survey
Mark Hess	Comcast Corporation
Antwane Johnson	FEMA
Robert Kubik	Samsung Electronics America
Jennifer Lazo	City of Los Angeles Emergency Management
John Marinho	CTIA
Susan Miller	ATIS
Nathanael Scherer	American Consumer Institute
Matthew Straeb	Global Security Systems, LLC
Peter Tomczak	FirstNet Authority
Dara Ung	Comtech Telecommunications Corp.
Larry Walke	National Association of Broadcasters
Steve Watkins	Cox Communications
Chia-Kaung (Jack) Yu	Google LLC

Table 2 - List of Working Group Members

Alternates for members are listed below.

Name	Company
Tim Dunn	T-Mobile USA
Nicholas Garcia	Public Knowledge
Kevin Green	FirstNet Authority
Al Kenyon	FEMA
Charles (Peter) Musgrove	ATIS
Peter Scott	PBS

Table 3 - List of Working Group Alternates

2.3 Subject Matter Expert Contributors

Name	Company
Donna B Platt	North Carolina Department of Health and Human Services

Table 4 - List of Subject Matter Experts

3 Objective, Scope, and Methodology

3.1 Objective

CSRIC VIII has been charged with forming recommendations for the software or functional requirements necessary to allow WEA software to pull capabilities from other mobile device applications, native OS functionality, and firmware to improve the effectiveness of WEA messages, including an API for this purpose.

3.2 Scope

CSRIC VIII has explored, through an in-depth look at several proposals to enhance the effectiveness of WEA, requirements necessary to allow WEA software to pull capabilities from other mobile device applications, native OS functionality, and firmware to improve the effectiveness of WEA messages, including an API for this purpose and requirements should such an API be necessary.

3.3 Methodology

This report analyzes five proposals to enhance the effectiveness of WEA and describes, at a high level, the involvement of and impacts on the WEA Stakeholders as depicted in Figure 1 below.

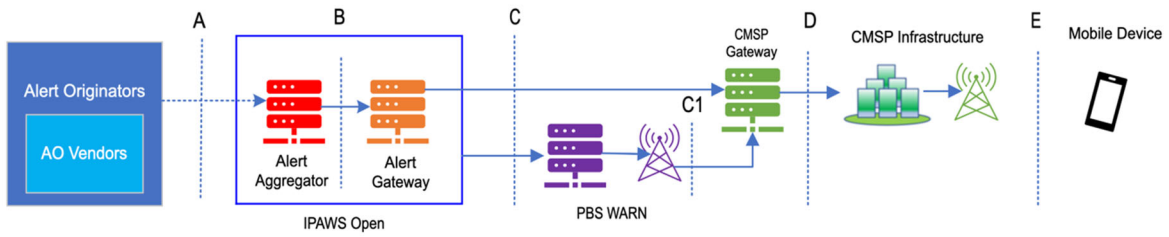

Figure 1 – Wireless Emergency Alert System

The WEA system, launched in 2012, allows compatible mobile devices to receive geographically targeted alert information that warns about imminent threats to safety in the area such as dangerous weather or other hazards, missing children, and other Public Safety information.

Authorized federal, state, and local government authorities may send alerts via the Federal Emergency Management Agency (FEMA) Integrated Public Alert and Warning System (IPAWS) to the Participating Commercial Mobile Service Providers (CMSPs). The Participating CMSPs then broadcast the alerts to mobile devices in the affected area. Mobile devices in the broadcast area will receive the alert; however, mobile device users may opt out of having any type of alert presented, with the exception of a National Alert. When an Alert Originator (AO) defines the Alert Area by polygon(s) and/or circle(s), mobile devices capable of Device-Based Geo-Fencing (DBGF) compare the device location with that of the Alert Area to determine whether the alert should be presented.

In Figure 1, the vertical dotted lines between pairs of major responsible entities, referred to as "stakeholders" throughout this document, are labeled with the quick-reference names representing the specification requirements between any two stakeholders—A, B, C, C1, D, and E.

4 Definitions and Acronyms

4.1 Definitions

Alert Area	Geographic area associated with the geometric shape defined by coordinates provided by the Alert Originator, or by a geocode representing a geographic area (e.g., county, state).
Broadcast Area	Geographic area selected for the broadcast.
Overshoot	WEA broadcast propagating beyond the boundaries of the Alert Area potentially resulting in presentation of the WEA beyond the Alert Area boundaries
Undershoot	WEA broadcast propagating short of the boundaries of the Alert Area resulting in the lack of presentation of a WEA within the Alert Area
WEA Stakeholder	Any entity with an ongoing vested interest in WEA, as a provider, vendor or user of some portion or the entirety of the service.

4.2 Acronyms

AO	Alert Originator
API	Application Programming Interface
ATIS	Alliance for Telecommunications Industry Solutions
CMSP	Commercial Mobile Service Provider
DAFN	Disability, Access and Functional Needs
DBGF	Device-Based Geo-Fencing
EAS	Emergency Alert System
EEW	Earthquake Early Warning
ETWS	Earthquake and Tsunami Warning System
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
IPAWS	Integrated Public Alert & Warning System
NWS	National Weather Service
OS	Operating System
PBS	Public Broadcasting Service
USGS	United States Geological Survey
WEA	Wireless Emergency Alert

4.3 Reference Documents

Description	**Link**
FEMA Event Code Glossary	https://www.fema.gov/sites/default/files/documents/fema_event-codes-glossary_02-01-2021.pdf
Alert Symbology Example	https://napsg-web.s3.amazonaws.com/symbology/index.html#/subcat?Public%20Alert
Common Alerting Protocol, v1.2	https://docs.oasis-open.org/emergency/cap/v1.2/CAP-v1.2-os.html
Example Alert Message Templates (State of California)	http://calalerts.org/resources.html
California Law requiring alerts in multiple languages	https://casetext.com/statute/california-codes/california-government-code/title-2-government-of-the-state-of-california/division-1-general/chapter-7-california-emergency-services-act/article-65-accessibility-to-emergency-information-and-services/section-859416-translation-of-emergency-notifications
National Weather Service 360 Character Alert Template	https://www.weather.gov/wrn/wea360
List of EAS Event Codes	https://docs.fcc.gov/public/attachments/FCC-16-80A1.pdf
NOAA Threats in Motion	https://inside.nssl.noaa.gov/facets/2021/03/threats-in-motion/ https://journals.ametsoc.org/downloadpdf/journals/wefo/36/2/WAF-D-20-0159.1.pdf
New York City information on Planning for Disabilities, Access and Functional	https://www.nyc.gov/site/em/ready/community-planning-disabilities-access-functional-needs.page

Needs	
FEMA Drop, Cover and Hold	https://community.fema.gov/ProtectiveActions/s/article/Earthquake-Earthquake-Early-Warning-System-Drop-Cover-and-Hold-On

5 Analysis, Findings, and Recommendations

5.1 Analysis

5.1.1 Introduction and Background

An application (App) is a computer software program most commonly used to perform a specific function for a user or another application. "Apps" in this report refers to those used on mobile devices. There are different types of Apps including:

- System Apps – The Apps that are part of the mobile operating system. System Apps must have the same signature of the mobile operating system and are the most trusted Apps on the mobile devices.
- First party Apps – The Apps that are developed by the first party (e.g., Apple, Google) that also develops the mobile operating system (e.g., Google Maps, Apple Maps).
- Privileged Apps – The Apps that are developed by the third party but designated by the mobile device manufacturers to be pre-installed on the devices out of the box. Privileged Apps are less secured than the System Apps and First party Apps.
- Third party Apps – The Apps that can be downloaded through an App store (e.g., Apple App Store, Google Play App Store). These Apps are developed by third party developers and are normally less secured than System Apps and Privileged Apps.

When WEA standards were developed, mobile device manufacturers, in collaboration with CMSPs that participate in WEA, created specific programming procedures and rules for receiving, processing, and presenting the WEA messages as needed. These WEA messages, including metadata, and the alert text are not available to mobile device/OS third-party application developers and do not currently allow the WEA software to interface with other non-WEA related mobile device functionality. This policy protects consumer privacy and the integrity of WEA messages, but also prevents WEA from leveraging other mobile device capabilities that could enhance WEA's presentation of emergency information to the public.

This report explores the possibility of enabling access between WEA and these mobile device capabilities.

5.1.2 Application Programming Interface (API)

An API is an interface that allows two Apps to communicate with each other, as shown in Figure 1.

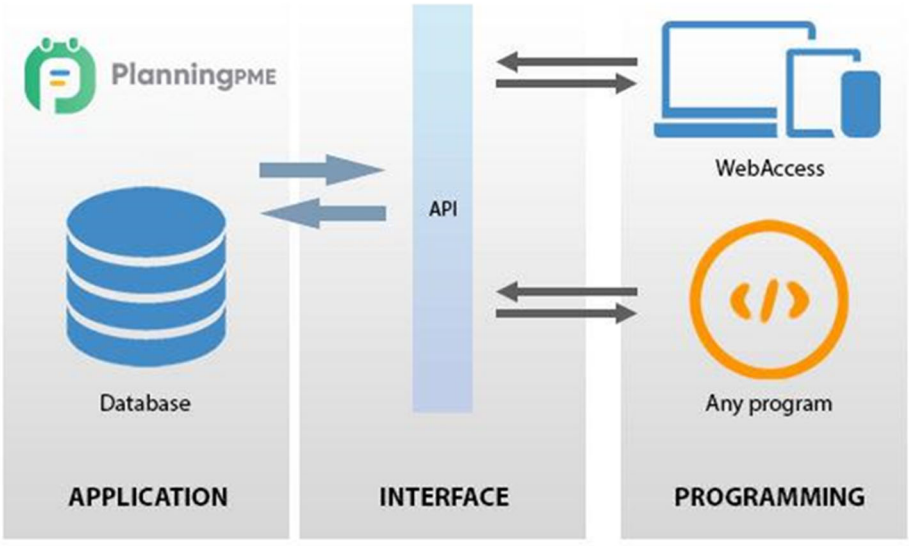

Figure 2 - Application Programming Interface (API)

In the case of WEA, an API could allow Apps to:

- Access the real-time emergency alerts information including message content, device location, time, etc.
- Provide additional capabilities based on the received information, such as real-time translation to different languages.

APIs would not be needed if the additional capabilities for emergency alert handling are part of the mobile device OS. Additional feature enablement can be done through OS upgrades. APIs exposing the real-time emergency alert information to third party Apps would not be needed.

5.1.2.1 Assumptions for Trusted WEA API

Due to the nature of emergency alerts, any new WEA APIs must be secured and, as such, current mobile device implementations are open only to the System Apps or the First party Apps. Android, as an example, has APIs for trusted Apps to receive emergency alert information. These APIs are only for System Apps or the First party Apps (e.g., Google Maps, Google SOS alert, etc.), and not Third-party Apps (i.e., 2.7 million Apps on Google Play Store) or Privileged Apps that are pre-installed by mobile device manufacturers or wireless carriers.

If appropriate security steps are not followed, malware could potentially use the API to pop up a false but realistic notification which could include a malicious link, or if the WEA information is passed to an untrusted App it could be manipulated and provide incorrect or intentional misinformation. If a user clicks on the malicious link provided by the false emergency message notification, it could redirect the device to a website that leverages security holes, and the device's security could be compromised.

Accordingly, to enable access to Apps beyond System Apps and First party Apps, the development of new APIs will need to address operational, security, privacy, and any other related requirements. Substantial additional consideration should be given to allow Third-party Apps access WEA parameters. Future CSRIC activities should investigate the use of Third-party Apps for WEA.

5.1.2.2 Existing APIs Relevant to WEA

Currently there are no APIs relevant to WEA on either Apple iOS or Google Android because emergency alert handling is tightly integrated into the mobile OS and does not allow any Apps other than System Apps or First party Apps to access the emergency alert information.

5.1.2.3 Potential New APIs Relevant to WEA

For a mobile OS that already supports advanced emergency alert handling (e.g., Google SOS alert, shown in Figure 3), APIs are available for government agencies to feed real-time comprehensive disaster information (e.g., earthquake affected area, flood situation, hurricane trajectory prediction, etc.) through the internet (i.e., outside of WEA pipeline). However, currently there is no API to feed WEA information into the mobile OS's advanced emergency alert handling program.

Potential new APIs could be added in the advanced emergency alert handling program to access WEA information.

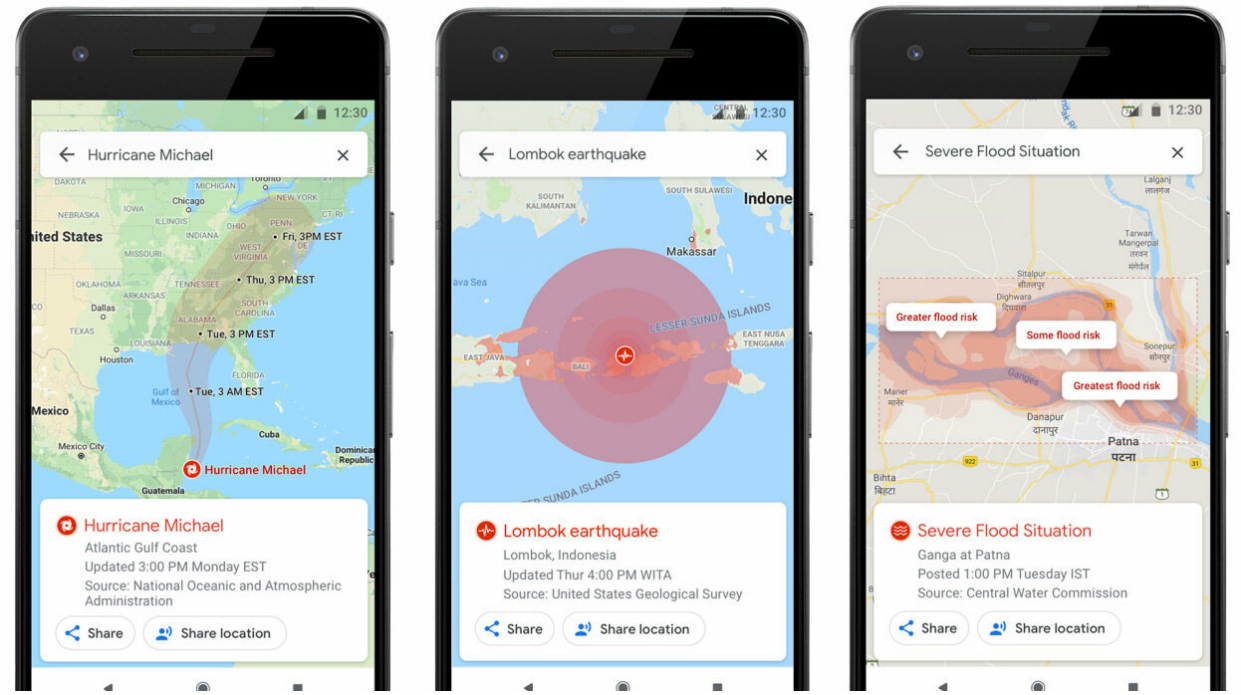

Figure 3 - Google SOS Alert

5.1.3 Proposals for WEA Enhancements

The proposals described in this section are grouped into the following three categories based on the extent of the identified changes to the current WEA design:

1) Leverages Existing WEA Parameters
2) Requires Additional WEA Parameters
3) Requires Modifications to WEA Design or Alternative Alerting Techniques

Each proposal provides a description of the WEA aspect(s) being enhanced and a high-level solution description. Cautions and concerns with field deployment are described, as well as guidance for further study that may be needed to measure the benefits of the proposal or assist in determining the best

implementation. The expected effort involved is conveyed by a detailed list of impacts to the WEA Stakeholders.

Regulatory and liability considerations are included where identified. Further studies may provide more insight into these areas.

In each example scenario used to describe or illustrate the proposals, it is assumed that the user settings are appropriate for presentation (e.g., opted in for the received alert class) and that the device's location is available (i.e., location services turned on and location acquired) unless otherwise stated.

Please note that the terms "WEA" and "alert" are used interchangeably throughout this report.

5.1.3.1 Leverages Existing WEA Parameters

5.1.3.1.1 Alert Area Graphic

Potential Need from User's Perspective: Maps are commonly used to depict alert location across a variety of alert dissemination methods (e.g., TV, social media). Presenting WEAs in a similar fashion via mapping applications on the device could help the recipient better understand the boundaries of the Alert Area and the device's location relative to the Alert Area as shown in Figure 4.

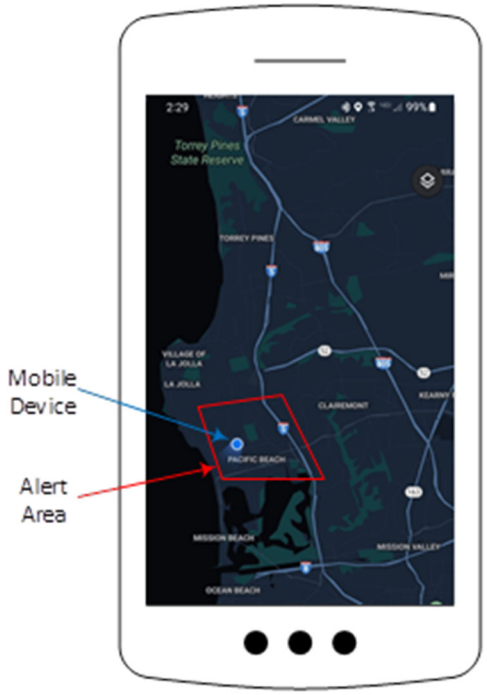

Figure 4 - Alert Area Graphics

If the device receives a WEA that triggers DBGF procedures but is unable to determine its location (e.g., location services are turned off), the WEA will be presented by default with no map display. In this case, the device display would show only the Alert Area with no indication of the location of the mobile device as shown in Figure 5.

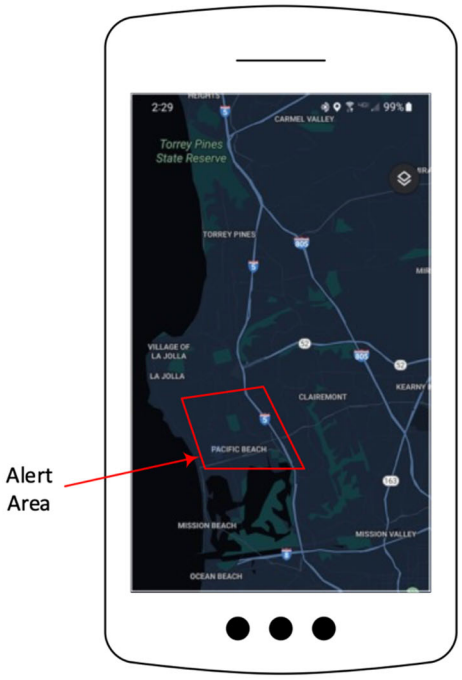

Figure 5 - Example of when Mobile Device's Location is Unknown

Potential High Level Solution Description: WEA can be activated for an Alert Area defined by one or more polygon(s) and/or circle(s). If the Alert Area is defined in this manner, the WEA text could be displayed on the device along with a map of the Alert Area and an indication on the map of the recipient's location. Two possible implementation examples are discussed below, as it is expected that not all users will want to display a map when a WEA is presented. If the recipient has location services turned off, then the WEA text is displayed on the device and follows the same two options outlined below but without the display of the mobile device location on the map.

The maps should be simple and intuitive so that users are motivated to take the action prescribed in the alert text. Thus, usability testing that leverages public warning risk communications expertise should be conducted in parallel with the standards development process. The Alliance for Telecommunications Industry Solutions (ATIS), with input from public warning risk communications experts from the AO community, should develop standards and best practices regarding usability for the various use cases where a map is to be displayed.

The possibility of showing the device's movements in relation to the Alert Area subsequent to the initial display should be considered.

The two options are:

Option 1: Alert text is immediately displayed and an additional option to display a WEA map is provided, as shown in Figure 6.

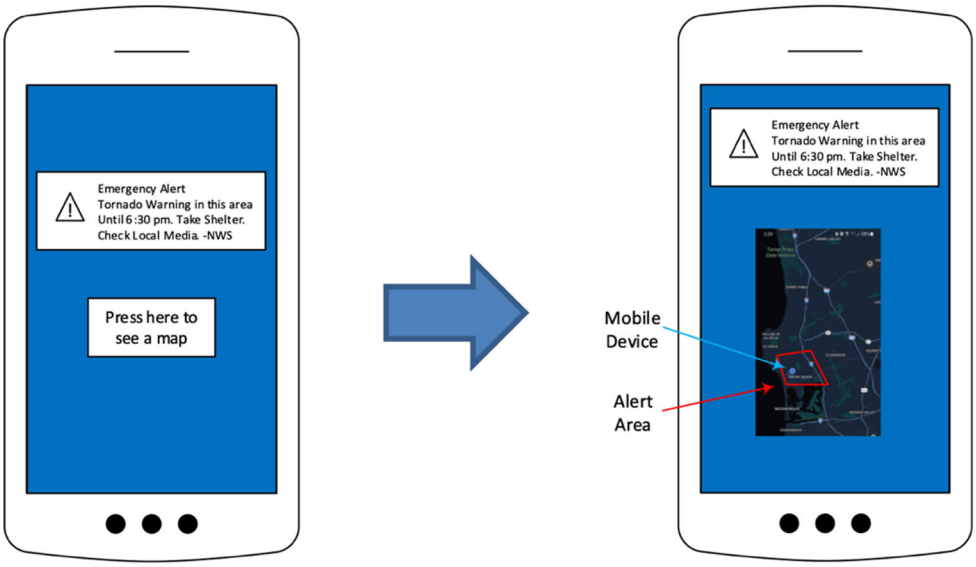

Figure 6 - Alert Area Graphics - Option 1

Option 2: Alert text and a WEA map are both simultaneously displayed, as shown in Figure 7.

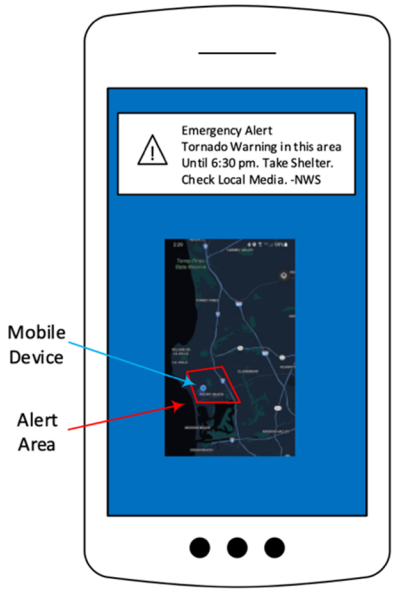

Figure 7 - Alert Area Graphics - Option 2

In Figure 7, the alert text is displayed immediately, and the map may take additional time to be rendered (download and display) on the device (e.g., based on the speed of the cellular or Wi-Fi network connection used to communicate with a map server).

In either option, it should be possible for the user to dismiss the WEA presentation screen and return to the main screen.

Cautions or Concerns if Realized:

1. For Option 2, consideration must be given to having the device immediately display the alert text and allowing the rendering of the map to take additional time. The user impacts of this potentially slow rendering of the map should be considered.
2. Consideration should be given to any technical issues or user comprehension issues in cases of the display of multiple polygons.
3. There must be handling for when location services are turned off, such as only displaying the map depicting the Alert Area without the mobile device location.
4. Option 2, (i.e., always displaying the Map) may generate significant network traffic spikes not only to the map server but also on the carrier's network, because all the devices will fetch map data from Google Maps or Apple Maps servers over a relatively short period of time, distributed only based on the latency variation of reception among the devices. Option 1, requiring user interaction, will result in a more manageable distribution of traffic (similar to including an embedded link within the WEA text) because not all users will request the map display. Impacts could still be significant in the case of urban areas. For both Options 1 and 2, while WEAs are always received via a cellular broadcast, an active Wi-Fi connection on a user device that received the WEA may be used to communicate with a map server, thus mitigating cellular network traffic congestion associated with rendering of the map for that device.
5. When a WEA is issued with a geocode only or issued with DBGF Bypass, no map is presented because no coordinates are conveyed to the mobile device. The absence of a map is likely to confuse users who become accustomed to seeing a map option. A public education campaign may not be adequate to prevent confusion. Further consideration should be given to this case to prevent confusion.
6. Disability, Access and Functional Needs[1] (DAFN) Concern: While the map can supplement the existing alert, the presence of a map does not replace the responsibility for AOs to describe the area at risk in the alert text. This type of map will likely not be accessible via screen readers, so people who are blind or low vision may not find the map useful. Further consultation with experts in mobile accessibility should be included in the design process.

Potential Impacts to the WEA Stakeholders:

Alert Originator: When it is desired for a map to be rendered, the AO must ensure the Alert Area is defined by geographic coordinates (i.e., circles(s) and/or polygon(s)).

AO vendor: None

FEMA: None.

PBS: None.

CMSP Network: No development impacts are expected. Capacity impacts will be expected with either

[1] NYC Emergency Management, *Community Planning for Those with Disabilities, Access & Functional Needs*, https://www.nyc.gov/site/em/ready/community-planning-disabilities-access-functional-needs.page (last visited Feb. 24, 2023).

implementation option, though greater impacts will occur, and over a much shorter period of time, with Option 2 versus Option 1.

Mobile Device: None.

Mobile Device Applications and APIs: It is recommended that the WEA OS application and the mapping application be tightly coupled, therefore no API is needed. It is not recommended that the desired mapping application be configurable by the user, which would require not only a new API exposing the WEA data required for the mapping function, but also modification of third-party mapping applications to support the receipt and display of WEA messaging.

Public Outreach: User education will be needed to ensure that users understand the new functionality, default settings, and their interactions depending on the option implemented. See DAFN concern above.

Social Study: It is recommended that further study be conducted on the two options from the social science perspective and with regard to minimizing the impacts to cellular networks and mobile devices. A study should be performed for the purpose of designing graphics that promote quick comprehension by the greatest breadth of recipients.

Studies should also be conducted to determine whether a display containing multiple graphics (e.g., multiple nearby Alert Areas or multiple events) would be beneficial or detrimental.

Regulatory Considerations: None identified.

5.1.3.2 Requires Additional WEA Parameters

5.1.3.2.1 Dedicated Audio Attention Signal(s) and Vibration Cadence(s) for Critical Response Time Alerts

Potential Need from User's Perspective: The time it takes a person to read the alert may result in losing critical reaction time for some types of alerts (e.g., United States Geological Survey (USGS) Earthquake Early Warning (EEW)). Dedicated audio attention signals and vibration cadences may allow the user to react immediately and read the alert text after taking appropriate action (e.g., DROP, COVER, HOLD ON[2] for USGS EEW).

Potential High Level Solution Description: Establish a dedicated audio attention signal and vibration cadence for specific types of alerts (e.g., USGS EEW). An example of a distinct tone is the one used in the Japanese Earthquake and Tsunami Warning System (ETWS).[3] Update network and mobile device processing as needed to present the new audio attention signal and vibration cadence to the user.

Cautions or Concerns if Realized: A public education campaign must be employed to educate users. Users are unlikely to instantly recognize more than two or three dedicated audio attention signals or vibration cadences. People may need to have advance knowledge of the actions that should be taken in response to additional audio attention signals and vibration cadences. The distinct audio attention signal and vibration cadence should be globally standardized and harmonized with other regions (e.g., Japan's

[2] FEMA, Preparedness Community, *Earthquake/Earthquake Early Warning System: Drop, Cover, and Hold On*, https://community.fema.gov/ProtectiveActions/s/article/Earthquake-Earthquake-Early-Warning-System-Drop-Cover-and-Hold-On (last visited Feb. 24, 2023).

[3] *See* Japan Living Guide, *Japanese warning system - J – Alert*, https://www.japanlivingguide.net/health-and-safety/emergency/j-alert-system (Sept. 2, 2022).

Earthquake and Tsunami Warning Systems, or ETWS).

Potential Impacts to the WEA Stakeholders:

Alert Originator: AOs would need to work with mobile device developers, CMSPs, standards bodies, and social scientists to develop a standard set of additional audio attention signals and vibration cadences.

AO vendor: Depending on the solution, processing may be required to convey an indication that an additional dedicated audio attention signal is needed.

FEMA: Recognize and process new information element or message type. Modification of IPAWS to support a revised C-Interface.

PBS: Recognize and process new information element or message type. Modification to support a revised C1-Interface.

CMSP Network: Design, standardization (ATIS and 3GPP), and implementation of protocol signaling impacts in the network and broadcast signaling (will vary depending on available transport methods) to communicate the indication that a dedicated alert cadence or audio attention signal is required. No significant post-deployment capacity impacts are expected.

Mobile Device: Development for receiving and handling of new event types.

Mobile Device Applications and APIs: As this would be a WEA level change, only the internal WEA code (e.g., Application) would be impacted to allow the presentation of new audio attention signals and vibration cadences per event type (assuming this solution). It is not envisioned this would be available to any application, even First party Apps or other trusted Apps.

Public Outreach: The public will need to be educated on recognizing the different audio signals and vibration cadences, the actions that should be taken in response, and reminded about the importance of reading the alert text details to react appropriately.

Social Study: Social study should be conducted to determine the impact of new audio attention signals and vibration cadences on users, with particular attention to the impacts on populations with disabilities.

Regulatory Considerations: Per Section 10.520 of the Commission's rules, "A Participating CMS Provider and equipment manufacturers may only market devices for public use under Part 10 that include an audio attention signal meeting the requirements of this section."[4] Also, per Section 10.530 of the Commission's rules, "A Participating CMS Provider and equipment manufacturers may only market devices for public use under Part 10 that include a vibration cadence capability that meets the requirements of this section."[5]

5.1.3.2.2 WEA Event-Based Notifications

Potential Need from a User's Perspective: Today, there is a single known and protected audio attention signal and a single vibration cadence associated with all WEA notifications.[6] There have been

[4] 47 CFR § 10.520.

[5] 47 CFR § 10.530.

[6] 47 CFR §§ 10.520 and 10.530

industry discussions about creating additional audio attention signals/vibration cadences for alert notifications in which user response time is at a premium. For example, in the case of an earthquake alert, the user could hear and recognize a tone specific to earthquakes without first touching or viewing their wireless device and respond appropriately (DROP, COVER, HOLD ON).[7]

Public education for one or more new audio attention signals and/or vibration cadences (beyond the existing WEA audio attention signal/vibration cadence) will be difficult, and perhaps impossible for international roamers into the U.S. who have Public Warning System (PWS) and WEA capable devices.[8] Therefore, this use case seeks to create an intuitive, simple, and quickly comprehendible event-based alerting method to convey the subject event of the WEA.

Potential High Level Solution Description: Today, event-specific codes (called "event codes") for emergency alerts are not included in WEA messages broadcast by CMSPs. Event codes are transmitted from AOs to the Federal Alert Gateway (part of the FEMA IPAWS), but are not currently transmitted from the Federal Alert Gateway to the CMSPs. If the interface between FEMA IPAWS and the CMSP was modified such that the CMSP was to receive the event codes, WEA could be modified such that these codes could be broadcast along with the WEA alert to wireless devices. The wireless device could then provide:

1. event-specific spoken language notification (e.g., voice saying "earthquake alert", "tornado alert" or "thunderstorm warning") when the alert is presented; and
2. user-customizable event-specific cadences for at least the most frequent or typical events (especially useful for individuals who are deaf or hard of hearing); and
3. a symbol presentation for quick visual comprehension.

The event-specific spoken language notification would be provided in English (because the FCC requires English language WEA) and in Spanish for those users opted in for receiving Spanish language alerts. While only English and Spanish versions of a WEA are received by the CMSP for the alert broadcast, it is possible that a device could offer settings that would allow the event to be announced in additional languages. Standardized event codes could be associated with spoken standardized preferred language "snippets" (and customizable vibration cadences representing at least the most frequently used event codes) stored in a wireless device receiving WEA alerts. This approach to making additional languages available to the user for event notification would not have significant impacts on broadcast capacity.

To enhance the effectiveness of event-based alerting, a symbol associated with the event (e.g., tornado symbol) could be provided on the wireless device concurrent with the WEA presentation. The use of a symbol on the device screen during presentation is especially useful for enhancing accessibility of the WEA. A quick glance at the device will allow the user to understand the type of event and take immediate action if warranted, followed by reading the specifics of the alert text when it is safe to do so.

The preferred language alert notification is particularly helpful to people who have a visual impairment. Wireless devices could be built with support for spoken event language for a set of standardized event

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[7] See, for example, Japan Living Guide, *Japanese warning system – J – ALERT*, https://community.fema.gov/ProtectiveActions/s/article/Earthquake-Earthquake-Early-Warning-System-Drop-Cover-and-Hold-On (Sept. 2, 2022).

[8] 47 CFR § 10.470 ("Roaming. When, pursuant to a roaming agreement (*see* § 20.12 of this chapter), a subscriber receives services from a roamed-upon network of a Participating CMS Provider, the Participating CMS Provider must support WEA alerts to the roaming subscriber to the extent the subscriber's mobile device is configured for and technically capable of receiving WEA alerts.")

codes in any language choices provided by the device.

Event-specific alert notifications using speech and a limited number of potentially customizable audio attention signals and vibration cadences may improve safety for individuals with disabilities, those with limited English and Spanish proficiency, and their vendor advocates.

Other types of devices (e.g., smoke detectors or other Internet of Things (IoT) devices) could provide emergency alert notifications using the WEA infrastructure and voice announcements associated with the alert event codes.

Cautions or Concerns if Realized: The choice of event code to be used by WEA, and the matching of those with specific event-related conditions, is the responsibility of the AO. Guidelines should be considered. [9]

This proposal assumes that the WEA event-based notification (e.g., spoken preferred language representing event) will need to be juxtaposed onto the existing WEA audio attention signal. A study should be performed to determine the most effective way to do this (e.g., spoken word may come just before the WEA audio attention signal, just after the WEA audio attention signal, or during a "quiet" or "quieter" period during the rendering of the WEA audio attention signal).

Regarding symbology representation of the alert, it is proposed that the mobile device would store an internationally recognized set of symbols[10] to allow for correlation of the incoming event code to a standard symbol that is presented on the screen. A collaborative effort is recommended to identify an appropriate set of easily recognized symbols.

Interaction with existing text-to-speech capability for having the mobile device read the contents of the alert to the user must be considered, although for event-based notifications, the assumption is that everything discussed in support of this use case should happen BEFORE the text-to-speech capability would be used to read the contents of the alert.

Potential Impacts to the WEA Stakeholders:

Alert Originator: None.

AO vendor: None.

FEMA: Modification of IPAWS to support a revised C-Interface which includes Event Codes.

PBS: Modification to support a revised C1-Interface which includes Event Codes.

CMSP Network: Design, standardization (ATIS and 3GPP), and implementation of protocol signaling impacts to handle reception, processing and dissemination of event code information already sent by

[9] OASIS, Common Alerting Protocol Version 1.2, OASIS Standard, https://docs.oasis-open.org/emergency/cap/v1.2/CAP-v1.2-os.html (July 1, 2010). It is assumed the Event Codes used for EAS notifications would be used for this purpose; *See* Amendment of Part 11 of the Commission's Rules Regarding Emergency Alert System, Dkt No. 15-94, Report and Order, 31 FCC Rcd 7915 (July 11, 2016) available at https://docs.fcc.gov/public/attachments/FCC-16-80A1.pdf.

[10] NAPSG Foundation, *Public Alert, Public Alert and Warnings*, https://napsg-web.s3.amazonaws.com/symbology/index.html#/subcat?Public%20Alert (last visited Feb. 24, 2023).

AOs. Modification of C-Interface, Mobile Device Behavior and other relevant ATIS standards to include Event Codes.

Mobile Device: Development to receive and process event code and coordinate presentation, translation, text-to-speech and all related functions. Store information and symbols linked to specific event codes.

Mobile Device Applications and APIs: As this would be a WEA level change, only the internal WEA code (e.g., Application) would be impacted to allow the presentation, translation, text-to-speech and all related functions (assuming this solution). It is not envisioned this would be available to any application, even First party Apps or other trusted Apps.

Public Outreach: Education of users on expectations and symbol recognition.

Social Study: A limited number of symbols should be considered, in conjunction with a collaborative effort, because the public is not likely to remember more than a few easily recognizable symbols. An additional study should be performed to determine whether simultaneous presentation of the WEA and the symbol and/or spoken event is preferred, or some other specific arrangement.

Regulatory Considerations: Modifications to 47 CFR Part 10 to allow for presentation of new audio attention signals, vibration cadences, audio alerts using speech, event codes and symbology.

5.1.3.2.3 Comparison of "Dedicated Audio Attention Signal(s) and Vibration Cadences for Critical Response Time Alerts" and "Event-based Notifications"

Event-based notifications using a spoken version of the event in the preferred language of the user does not require members of the public to learn and remember a particular tone or tones associated with one or more particular critical events. Perhaps members of the public can remember today's existing WEA audio attention signal and only one or two additional tones to be associated with the most critical alerts (e.g., earthquake early warning, tornado warning). As both use cases require network changes, it appears the event-based notifications have a clear advantage in terms of not requiring members of the public to learn/remember anything in advance of receiving the alert. In addition, event-based notifications work for all events, not just one or two of the most critical events as would the dedicated audio attention signal method.

Note that both use cases have the same difficulty with providing special alert vibration cadences associated with events. Alert vibration cadences would have to be learned ahead of time, and it is unlikely the general public could easily be taught special vibration cadences beyond today's WEA vibration cadence. However, special cadences for a small number of events may be of significant benefit to enhance accessibility and requires further study.

5.1.3.3 Requires Modification of WEA Design or Alternative Alerting Techniques

5.1.3.3.1 Expand Language Set for WEA

Potential Need from User's Perspective: Users need to quickly comprehend and act on alerts. Comprehension is aided when the alert is received in their native language. Currently alerts can be originated by an AO and broadcast by the CMSP in English and Spanish. Availability of the WEA in additional languages would allow more users to more quickly comprehend and respond to an alert.

Potential High Level Solution Description: Provide the option of sending WEA alerts in additional languages using the same method currently being used for Spanish. The AO is responsible for message translation, but the alert in an additional language will be presented or not presented by the mobile device based on the user's language setting.

Cautions or Concerns if Realized: If the AOs are required to provide the WEA in multiple languages, the AOs may have challenges translating the alert text into multiple languages and may have to rely on translation software. However, FEMA has been releasing resources to assist with translating template alerts[11] into Spanish, and those resources could be expanded to additional languages.

If multiple additional languages are included in the WEA broadcast, capacity limits may not allow for the expected behavior of the WEA system in the case of a crisis scenario with multiple live alerts in three or more languages. For example, the addition of one new language represents a capacity increase of 50% compared to current usage because the alert would be broadcast three times rather than twice. The addition of two languages would double current capacity usage. A crisis situation employing multiple simultaneous alerts could result in a degradation of the system performance for WEA if not all broadcasts can be supported due to capacity limits.

The number of languages per jurisdiction also needs to be evaluated. For example, the FCC's CMSAAC report stated, "on a local basis, there are potentially more than 37 languages that exceed 1% of households which would require more than 16 different character sets to be supported in the mobile device." [12]

Potential Impacts to the WEA Stakeholders:

Alert Originator: Must accurately translate alerts into multiple languages. Potential delay in sending the alert if alert wording is not pre-translated.

AO vendor: AO software would require a substantial upgrade to support multiple languages. Software will require redesign in order to accommodate control screens for each language, including an English version since the AO may not understand the language to which the alert is being translated. The training process would be prolonged. If the support of additional languages results in the need to modify the current 360-character limit on WEAs, this impact will need to be accommodated by the AO vendors.

FEMA: Accept and process new parameters containing the alert in additional languages. Modification of IPAWS to support a revised C-Interface which includes additional languages.

PBS: Accept and process new parameters containing the alert in additional languages. Modification of C1-Interface which includes additional languages.

CMSP Network: Design, standardization (ATIS and 3GPP), and implementation of protocol signaling impacts in the network and analysis of the broadcast signaling to process additional languages.

CMSP Network Capacity Impact/Analysis: Because each alert now allows up to 360 characters and is

[11] See e.g., Wireless Emergency Alerts| Stay Connected. Be Informed., *Resources*, http://calalerts.org/resources.html and, National Weather Service, Wireless Emergency Alerts (360 characters) https://www.weather.gov/wrn/wea360.

[12] The Commercial Mobile Alert System, PS Dkt. No. 07-287, Notice of Proposed Rulemaking, App B, (*CMSAAC Report*) (Dec. 14, 2007) (available at https://docs.fcc.gov/public/attachments/FCC-07-214A1.pdf).

broadcast once in each language, along with all related alert information (possibly including up to 100 coordinates), an increase in the number of languages supported by the broadcast will significantly increase the capacity used per alert, possibly impacting the number of simultaneous live alerts that can be supported and degrading performance (e.g., delays in alert broadcast). A performance analysis will be needed to determine if 360 characters can still be supported. Depending on languages chosen, support for multiple character sets may be required.

Mobile Device: Support of new protocol signaling impacts (ATIS and 3GPP) in the network and broadcast signaling. Processing the new code for an additional language (assuming a "new code" implementation).

Mobile Device Applications and APIs: As this would be a WEA level change, only the internal WEA code (e.g., Application) would be impacted to allow the presentation of new languages (assuming this solution). It is not envisioned this would be available to any application, even First party Apps or other trusted Apps.

Public Outreach: Educate the public on the expanded options and how to access these options.

Social Study: Assess specific additional language needs per jurisdiction.

Regulatory Considerations: WEA 2.0 meets the current FCC requirements of supporting up to 360 characters (47 CFR §10.430) for both English and Spanish (47 CFR §10.480). If the support of additional languages requires a change from the current use of GSM-7 encoding (7 bits per character) to another encoding for an expanded character set that requires more bits per character, such as UCS-2 (16 bits per character), the CMSP network may be unable to continue support of 360-character alert text. This would precipitate a need to review the 360-character requirement.

5.1.3.3.1.1 Alternative Approaches to Additional Languages for WEA

With improvements in language translation technology, there is an opportunity to provide WEAs in the user-preferred language via language translation of the English alert text at the mobile device. This solution does not involve the alert creation and broadcast capacity difficulties described above and would allow users to have the WEA rendered in their preferred language (not just in one of a handful of languages that would be chosen via the above solution). The assumption is that the WEA would be rendered in English (as the mandatory WEA language) and then could also be rendered in the user-preferred language after a translation from English to the user-preferred language. The translation could be automatic, or it could happen based on a request at the English presentation screen (e.g., "translate to preferred language Y?").

It is anticipated that even though this method would work for English to Spanish translations, the existing broadcast of both English and Spanish languages (when provided by the AOs) would continue to be supported.

Additional study should be done to compare/contrast additional alternative solutions (e.g., the "Notify NYC" app) to determine the preferred method to support additional languages for WEA.

5.1.3.3.2 WEA Handling of the Threats in Motion

WEA alert updates are processed similarly to new alerts. This poses issues for alerts involving hazards that move, such as weather and hydrologic hazards, which will be exacerbated as alert originator

capabilities advance. When an active alert is updated, the broadcast of the original alert is terminated for the entire area defined in the original alert and a new alert (i.e., new unique set of identifiers) is broadcast based on the Alert Area defined for the updated alert, resulting in a presentation similar to the original alert with full audio/visual/sensory cues. This may not always be the most effective approach for users who received the original alert, as these users may perceive the updated alert as a duplicate.

Three categories of use cases, regarding the recipient's perspective during an update to an alert have been identified:

1. No new information relative to the recipient—no presentation needed,
2. Minor new information relative to the recipient—minimized presentation needed, and
3. Significant new information relative to all recipients—full alert presentation needed.

This issue with updates will become more pronounced in the future when weather-related Alert Areas and related alert information are updated with even greater frequency as a hazard moves forward in time. The National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) is proactively studying Threats in Motion where Alert Area polygons continuously move forward with a storm based on continuously updating radar, satellite, lightning, near-storm environment, automated forecast guidance, and other information.[13] For Threats in Motion, WEA may be tasked to continuously update the alert polygon as the storm moves forward. This polygon movement may not necessarily change the WEA text, but any map associated with the WEA will change as the storm moves. The goal is for mobile device users to be aware of the movement of the storm/polygon, but not be over-alerted with duplicative alerts as the storm moves.

While the third use case is accommodated by the current design of WEA, the first two require modifications to WEA and are described in more detail below.

5.1.3.3.2.1 No new information relative to the recipient

Potential Need from User's Perspective: When an active alert is updated, the updated alert information is presented in the same manner as the original. If there is an overlap between the original Alert Area and the updated Alert Area, devices in the overlap area will be presented with both alerts. This behavior may be desired in cases where significant new information must be conveyed to the recipient, but not, for example, when the update is being performed to modify the Alert Area coverage and does not impact those who have already been presented with the alert and happened to remain in the alert area. Having the flexibility to avoid this perception of a duplicate alert would result in less alert fatigue.

Consider an alert update that shrinks the original Alert Area as the hazard moves out of previously threatened areas (Figure 8).

[13] *See* "Forecasting a Continuum of Environmental Threats (FACETS), NOAA, FACETS-SEVERE, Forecasting a Continuum of Environmental Threats, *THREATS-IN_MOTION*, Kodi Berry (March 16, 2021) (available at https://inside.nssl.noaa.gov/facets/2021/03/threats-in-motion/) and Gregory J. Stumpf and Alan E. Gerard, *National Weather Service Severe Weather Warnings as Threats-in-Motion*, 36 Amer.Meteor.Soc. 627 (April 2021) (available at https://journals.ametsoc.org/downloadpdf/journals/wefo/36/2/WAF-D-20-0159.1.pdf).

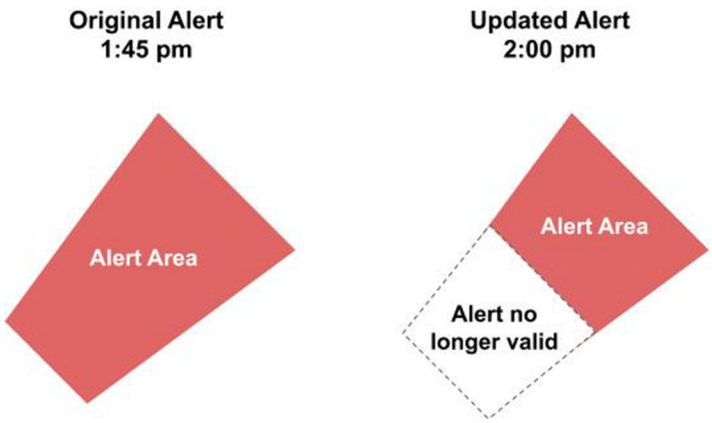

Figure 8 - Alert updated to shrink the Alert Area

As described above, the area of overlap between the original alert and the updated alert (See Alert Area in both diagrams in Figure 8) will receive the same (or very similar) information, resulting in two presentations of the alert to the user who then perceives the second presentation as a duplicate, as indicated in Figure 9 below. To avoid perceived duplication and potential alert fatigue, NOAA's NWS must currently avoid sending WEA updates when an alert area shrinks. The downside is that the WEA broadcast continues for the entire original alert area until the alert expires or is terminated by the NWS. Thus, people who travel into the original alert area may be falsely alerted to a WEA that no longer impacts that area.

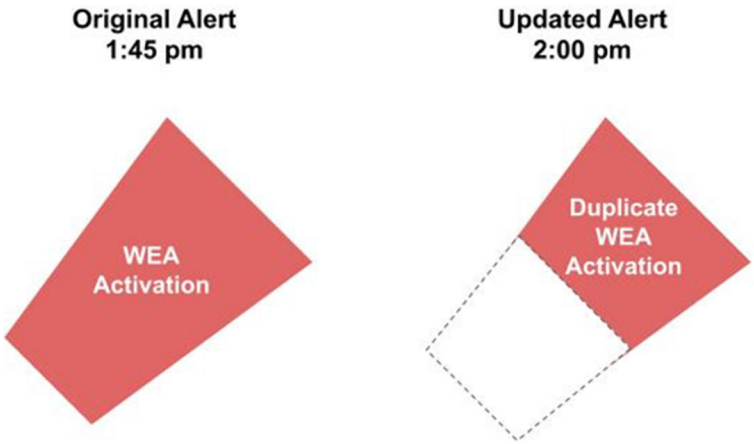

Figure 9 - Duplicate WEA that occurs when an alert update contains no new information

Potential High Level Solution Description: The solution implies that a Threat in Motion WEA should not be presented if the information in the alert text has not changed. However, a Threat in Motion implies the Alert Area changes, therefore there is interaction with the proposed "Alert Area Graphic" proposal in Section 5.1.2.1.1. That is, even if the alert text does not change, the Alert Area (polygon(s) and/or circle(s)) and thus the map changes as shown in figure 8 & 9 above. The solution should determine if any map associated with the WEA should change with the Threat in Motion. To implement this, the AO may need the ability to indicate (e.g., through modification to current signaling with the alert) when a Threat in Motion Update to an active alert should only be presented to users who have not previously received the WEA.

NOTE: The ATIS WEA technical group has looked at one solution implemented in Canada, but this same solution cannot be applied in the U.S. due to the combined interactions of Duplication Detection (detection of alerts already received) and Device-Based Geo-Fencing (DBGF). No alternative was clear at the time of this evaluation of the Canadian solution. Any solution to this will entail significant standards analysis and possible redesign that would impact all WEA Stakeholders.

Cautions or Concerns if Realized: If the proposed solution of broadcasting the original unique identifier combination is implemented, there will be mobile devices in the field acting on out-of-date information.

Potential Impacts to the WEA Stakeholders:

Alert Originator: An option for special treatment must be selected in the AO interface.

AO vendor: Update interface and add Common Alerting Protocol (CAP)[14] parameters to align with specification, possibly including a new indicator or sending a new message type.

FEMA: Recognize and process new information element or message type. Modification of IPAWS to support a revised C-Interface.

PBS: Recognize and process new information element or message type. Modification to support a revised C1-Interface.

CMSP Network: Design, standardization (ATIS and 3GPP), and implementation of protocol signaling impacts in the network and broadcast signaling to recognize and process new information element(s) or message type(s). Modify current Update process to handle Threats in Motion, including retaining the Message ID/Serial Number combination from original alert to correlate to the Update message.

Mobile Device: Support of new protocol signaling impacts (ATIS and 3GPP) in the network and broadcast signaling; processing the new information element(s) or message type(s) as required.

Mobile Device Applications and APIs: As this would be a WEA level change, it is anticipated only the internal WEA OS software would be impacted; this may require the mobile device to manage the update process to retain the state-fullness implied by this life cycle experience. It is not envisioned this would be available to any other applications, even First party Apps or other trusted Apps.

Public Outreach: Public education on how Threats in Motion are handled and presented on mobile devices may be needed.

Social Study: None identified.

Regulatory Considerations: If new or subdued audio attention signals or vibration cadences are needed, then impacts to existing WEA regulations[15] may be required.

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[14] OASIS, Common Alerting Protocol Version 1.2, OASIS Standard (July 1, 2010) available at https://docs.oasis-open.org/emergency/cap/v1.2/CAP-v1.2-os.html.

[15] 47 CFR § 10.520.

5.1.3.3.2.2 Minor New Information Relative to Recipient

Potential Need from User's Perspective: Some alert updates may freshen text or graphic information (e.g., polygon showing of the Alert Area), but not warrant full WEA presentation (audio attention signal and vibration cadences) unless the alert was not previously presented on the device.

Potential High Level Solution Description: WEA Update handling should be evaluated in ATIS. One possible realization may be for the AO to have the ability to indicate (e.g., modification to current signaling with the alert) when a Threat in Motion Update to an active alert should be handled differently than the way WEA Updates are currently handled. For example, an indicator could be included to request any mobile device that has previously presented the alert to use minimized (e.g., subtle) presentation (audio/visual/sensory) cues, conveying to the user that this is a Threat in Motion Update to a previous alert. The device would be required to correlate two separately received alerts and handle appropriately.

Cautions or Concerns if Realized: The public may not understand what the subtle presentation cue means. Outreach should be updated to ensure the public understands what a minimized presentation (i.e., audio/visual/sensory) cue means.

Given that alert fatigue may occur with any level of presentation, a study should be conducted to determine whether minimized presentation will truly address the targeted issue, especially due to the greater frequency of updates described as being pursued.

Potential Impacts to the WEA Stakeholders:

Alert Originator: Select desired Update behavior in AO interface.

AO vendor: Update interface and potentially add CAP parameters to direct WEA on desired Update procedure.

FEMA: Handle any new CAP parameters describing the desired WEA Update procedure and pass along to CMSPs. Outreach is needed to ensure the public understands how a Threat in Motion update works, and what a subtle presentation cue means. Work with CMSP Networks/Carriers on a modified C Interface and new CMAC parameters.

PBS: Handle any new CAP parameters describing the desired WEA Update procedure and pass along to CMSPs. Work with CMSP Networks/Carriers on a modified C1-Interface and new CMAC parameters.

CMSP Network: Design, standardization (ATIS and 3GPP), and implementation of protocol signaling impacts in the network and broadcast signaling to handle the Threat in Motion Update procedure, possible including the ability to receive and process new CMAC parameters from FEMA, via modified C-Interface. Convey new information as needed over the WEA broadcast.

Mobile Device: Recognition and processing of new information elements in the broadcast, including a correlation process and development of new handling to produce modified presentation cues.

Mobile Device Applications and APIs: As this would be a WEA level change, only the internal WEA code (e.g., Application) would be impacted; managing the update process to retain the state-fullness implied by this life cycle experience (assuming this solution). It is not envisioned this would be available to any application, even First party Apps or other trusted Apps.

Public Outreach: Outreach should be updated to ensure the public understands what a subtle presentation cue means.

Social Study: Determine the benefit in a presentation with possible alteration of the vibration cadence and/or audio attention signal.

Regulatory Considerations: Per Section 10.520 of the Commission's Rules, "A Participating CMS Provider and equipment manufacturers may only market devices for public use under Part 10 that include an audio attention signal that meets the requirements of this section."[16] Also, per Section 10.530 of the Commission's Rules, "A Participating CMS Provider and equipment manufacturers may only market devices for public use under Part 10 that include a vibration cadence capability that meets the requirements of this section." [17]

5.1.4 Additional Considerations

5.1.4.1 Official Government URL Shortener

Potential Need from User's Perspective: Trust is important in alerting. The ability to have an official government URL shortener with a top-level domain .gov address builds confidence in the alert. Many local government websites use up precious characters in their domain name. Prior to sunset in September 2022, Go.USA.gov was the official URL shortener for federal and State, Local, Tribal and Territorial users. In the sunset page, The Go.Usa.gov Team stated that many social media sites no longer limit characters.[18] Efficient utilization of limited character count is still highly important when issuing alerts, according to AOs.

5.2 Recommendations

CSRIC VIII recommends any new WEA APIs must be secured and open only to the System Apps or the First party Apps for the proposals in this report.

CSRIC VIII recommends that ATIS collaborate with all WEA Stakeholders to form recommendations for an order of efforts as parallel development will impact the timelines for each overlapping effort. Prioritization is recommended but has not yet been addressed. ATIS should provide these prioritization recommendations within six months of the acceptance of this report. The recommendations below describe specific enhancements studied by CSRIC VIII. The timelines[19] included for each enhancement represents the estimated time to field with the enhancement considered in isolation.

CSRIC VIII recommends that the Alert Area Graphic Option 1 be incorporated in WEA. ATIS, with input from public warning risk communications experts from the AO community, should develop standards and best practices regarding usability for the various use cases where a map is to be displayed. Usability testing that leverages public warning risk communications expertise should be conducted as part of the standards development process. Once the project is initiated in ATIS, it is estimated that an 18–24 month timeline may be needed for completion of WEA Stakeholder collaboration, usability testing, and standards/best practices development, followed by 18-24 months for mobile device/OS time

[16] 47 CFR § 10.520.

[17] 47 CFR § 10.530.

[18] USA.Gov, *Sunsetting Go.USA.gov: Frequently Asked Questions*, (May 24, 2022) (available at https://blog.usa.gov/sunsetting-go.usa.gov-frequently-asked-questions).

[19] Please also note that the timelines are based solely on ATIS standardization activities. The specifics of any required 3GPP specification modifications will be identified during the ATIS solution planning phase and may further impact the timeline.

to field for first device deployments.

CSRIC VIII recommends that WEA be enhanced to speak the name associated with the event in English and/or the user preferred language when the WEA message is presented on the device. Mobile device users should be able to opt-in to this feature if desired. ATIS, with input from public warning risk communications experts from the alert originator community, should develop standards and best practices regarding the use of an event code for this purpose, standardize the spoken name that is associated with each event (or at least for the most popular events) and determine whether unique vibration cadences specific to a very small number of events may be used. In addition, for the USGS EEW, a new audio attention signal specific to this event should be used along with the associated spoken name (e.g., "earthquake alert") and a unique vibration cadence. ATIS should develop standards required for the signaling of the event code from FEMA IPAWS through the CMSP infrastructure to the mobile device, and handling of the capability in the mobile device. Once the project is initiated in ATIS, it is estimated that an 18–24 month timeline may be needed for completion of WEA Stakeholder collaboration (including members of accessibility community) and standards/best practices development, followed by 18-24 months for FEMA IPAWS, CMSP infrastructure, and mobile device/OS field for first device deployments.

CSRIC VIII recommends that WEA message presentation include a standardized symbol representative of the event. ATIS, with input from public warning risk communications experts from the alert originator community and social scientists, should develop standards and best practices regarding usability for a short list of easily recognized symbols from an internationally recognized symbology table agreed by WEA Stakeholders. This collaborative effort should also consider whether mobile device users should be allowed to opt-in/out of having the addition of this symbol to the presentation of the alert. Once the project is initiated in ATIS, it is estimated that an 18–24 month timeline may be needed for completion of WEA Stakeholder collaboration and standards/best practices development, followed by 18-24 months for FEMA IPAWS, CMSP infrastructure, and mobile device/OS field for first device deployments.

CSRIC VIII recommends that WEA should support languages other than English and Spanish. ATIS, in conjunction with public warning risk communication experts, should conduct a study to determine a feasible, accurate, and effective method for enabling this capability. The study should determine the desired set of languages to be considered for inclusion. The study should determine, for each method proposed, the WEA Stakeholder and capacity impacts and the related limitations (e.g., number of languages, alert text length) that may impact the performance of WEA, as well as the responsible party and placement for the translations of the additional languages. Pros and cons of the proposed solutions should be compared to those of the existing solution that provides an embedded link to a web page that provides expanded languages, as well as against the results of a study performed by appropriate experts on the feasibility of translations by the mobile device. The results of this study should be reported to the Commission with recommendations on further standards development and implementation considerations.

CSRIC VIII recommends that WEA handling of Threats in Motion be improved by modifying the current alert Update procedure. ATIS, AOs, and other WEA Stakeholders should collaborate to study the potential network and user impacts of this proposal as described in Section 5.1.3.3.2 WEA Handling of Threats in Motion. The results of this study should be reported to the Commission with recommendations on further standards development and implementation considerations. If proceeding with this proposal, ATIS should then perform necessary standards and best practices development for WEA Handling of Threats in Motion. Once the project is initiated in ATIS, it is estimated that a 12–18 month timeline may be needed for completion of WEA Stakeholder collaboration and standards/best practices development, followed by 18-24 months for FEMA IPAWS, CMSP infrastructure, and mobile device/OS field for deployments.

CSRIC VIII recommends that if the results of any WEA standardization or collaborative efforts impact existing FCC regulations, then the FCC should determine if the proposed changes are acceptable or additional regulations are needed. This includes changes to 47 CFR Part 10 for a spoken language notification, and/or vibration cadences, and/or audio attention signal and the modification of the audio attention signal when an alert is updated or canceled.

CSRIC VIII recommends that the Commission evaluate the impact to the WARN Act liability protections offered to CMSPs and work with Congress if needed to extend the liability protections to cover the proposals in this report. This includes extending liability protections to CMSPs for any mobile OS and especially to applications outside of the CMSP's visibility or control.

CSRIC VIII recommends that an official URL shortener, with a .gov top level domain, is established that can be used by federal departments and agencies as well as State, Local, Tribal and Territorial users for alerting.

CSRIC VIII recommends specific public education activities (See Section 5.1.3) as part of the realization of each of the above enhancements.

6 Conclusions

This report documents potential improvements that may enhance the effectiveness of WEA for users or subsets of users. Each proposal entails modifications to the current presentation of WEAs and some involve new user interaction, meaning that a significant learning curve will be involved for users. In some cases, this learning curve will extend to the AOs.

While all included proposals are intended to improve the user experience, some require studies to determine the degree of need and expected benefits of the solution variations that could be pursued, as well as the likelihood of success in fully addressing those needs. These benefits would then need to be weighed against the educational challenges, the identified WEA Stakeholder impacts, and impacts to current regulatory requirements.

It should be noted that the upstream WEA Stakeholders may have no visibility into the operations of third-party Apps or other entities. For example, if an API is employed to provide assistance to the user in relation to a received WEA. In keeping with the protections set forth by the WARN Act[20], the upstream WEA Stakeholders are therefore not liable for the information or services supplied by the downstream WEA Stakeholder or other entity.

[20] Warning, Alert and Response Network (WARN) Act, Title VI of the Security and Accountability For Every Port Act of 2006, 120 Stat. 1884 (2006) (WARN Act).