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

In the Matter of WEA or	)	
	)	
The Wireless Emergency Alert (CMAS) System	)	EB Docket No. 15-91
	)	
Frank W. Bell	)	

Re: NOTICE OF PROPOSED RULEMAKING

Using the submissions and technologies of others, it may be possible to improve WEA significantly beyond this submission. Also some items here have been previously submitted, so please excuse the repetition if it is perceived.

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WEA Using A 90 Character Limit for Distribution, Possible Improvements

Currently WEA has a 90 character limitation and limited user adaptability. It has a message type grouping based on the three character eventCode similar to the prioritization scheme here. While CAP has and an improved EAS should have the same messageID, this is longer and probably unsuitable for WEA and other alerting distribution. It is proposed to;

1) Add the eventCode 3 characters to the end of the message. This may reduce the message length to 87 characters, or there may be some means to transmit the eventCode separately but linked to the message.
2) If the eventCode of the WEA is the same as one, or in a group like earthquake, that has just been received by a smartphone with EAS+ (or equivalent) via mobile TV or HD Radio within the last 30 minutes, the WEA message SHOULD be ignored for alarm tone and vibration generation.

3) The eventCode uses bits 6 to 0 only. Bit 7 is to be used as follows;
   First Letter bit value:
   0 Normal
   1 First Responder or test message use only, public cellphones SHALL ignore the message
   Second Letter bit value:
   0 Normal, message is not continued beyond 90 or 87 character limit
   1 Message continues in another 90 or 87 character limit segment.
   Third Letter bit value:
   0 Normal
   1 Reserved
4) Note that although it may be possible to exceed 180 or 174 characters using the second letter bit value, there is no provision for the order of the message to be corrected other than to reverse the order if a 1 value message is received before a 0 value message. Longer messages SHOULD NOT be used except for the reasons given below.

WEA Message Content Order

It has been found that the most effective message content order for WEA is Source – Guidance – Hazard – Location – Time. It may be more effective to use this order in EAS messages also. In emergencies, as people are less able to process information, another guideline has also been of assistance. This is called the 3 – 3 – 30 rule. This means that there are 3 points in 3 sentences with 30 words. This is less than may be legally required. The point of simplicity and brevity is valid.

If multiple languages are to be provided for, the order SHOULD be English, Second Major Language (Spanish in most states) and other as determined by the originating Emergency Manager. If it is possible for the user to select the preferred language, a method that can be standardized is preferable.

WEA With Longer Messages Permitted

The suggestion above of including the eventCode of three characters may be modified, except that it would read as;

5) Add the eventCode 3 characters to the end of the message. This may reduce the message length to the new upper limit count characters, or there may be some means to transmit the eventCode separately but linked to the message.
6) If the eventCode of the WEA is the same as one, or in a group like earthquake, that has just been received by a smartphone with EAS+ (or equivalent) via mobile TV or HD Radio within the last 30 minutes, the WEA message SHOULD be ignored for alarm tone and vibration generation.
7) The eventCode uses bits 6 to 0 only. Bit 7 is to be used as follows;
   First Letter bit value:
   2 Normal
   3 First Responder or test message use only, public cellphones SHALL ignore the message

Second Letter bit value:

2 Normal, message is not continued beyond the new upper limit count character limit

3 Message continues in another the new upper limit count character limit segment.

Third Letter bit value:

2 Normal

3 Different language follows

8) Note that although it may be possible to exceed the new upper limit count characters using the second letter bit value, there is no provision or the order of the message to be corrected other than to reverse the order if a 1 value message is received before a 0 value message.

If multiple languages are to be provided for, the order should be English, Second Major Language (Spanish in most states) and other as determined by the originating Emergency Manager. If it is possible for the user to select the preferred language, a method that can be standardized is preferable. A method to delimit the change of language is desirable with longer messages. It would be possible for multiple languages to be transmitted simultaneously with an improved EAS on digital TV. It may be possible to transmit multiple languages sequentially on HD Radio. It should be the decision of the analog radio broadcaster to transmit multiple languages on analog radio, or only the language of the radio station, with English as the default substitute if the station language is unavailable.

An eventCode decision can be made by the following test of the lower 7 ASCII bits. ??x codes are not accepted; It SHALL be preceded by a space, comma, period, hyphen, forward or backslash, question mark, exclamation mark, quote mark, or tilde. Perhaps some other characters also.

10) Is the third to last character a capital letter? If yes go to 11). If not, it is not an eventCode.
11) Is the second to last character a capital letter? If yes, go to 12). If not go to 14).
12) Is the last character a capital letter? If yes, check against the list of eventCodes, but it is most likely one. If not, go to 13)
13) Is it a digit? If not, it is not an eventCode. If it is, it is most likely an eventCode.
14) Is the second to last character a digit? If yes go to 15), if not, it is not an eventCode.
15) Is the last character a digit? If yes, it is most likely an eventCode. If not, go to 16)
16) Is the code “I1E”? if yes, it is an eventCode. If not, it is not an eventCode.

EventCodes thus detected should not be displayed to the public, but should be displayed in test messages and for First Responders. The eventCode list is extended for all known CAP profiles, with some additions, as detailed in a proposed draft for an international improved EAS.

Longer messages may contain URLs in instances where the server capacity of the website is assessed as being equal to or larger than the anticipated amount of traffic to be generated by the emergency. Phone numbers should not be provided unless a numbering scheme can be assigned where the traffic generated can be terminated in the local switch, and sufficient audio message playing termination devices are installed and paid for. If the public is billed for each message delivered, then that is a way to pay for that. Alternatively, IF a message is expected to result in a small enough amount of traffic to be handled by a local number with one or a few lines, then such local numbers MAY be used. Traffic volumes SHOULD be measures and compared with

those of a satisfactory grade of service for the number of lines. Traffic may be measured in Erlangs or EBHC. A small table follows. Larger tables and theory can be found with a search engine “erlang”. 1 Erlang =30 EBHC. P is the grade of service, or probability of a call lost due to all trunks being busy.

P=	0.001	0.005	0.01	0.02	0.03	0.05	0.1
TRUNKS		ERLANGS.		FOR CCS, MULTIPLY BY 36			
1	0.001	0.005	0.01	0.02	0.03	0.05	0.1
2	0.05	0.11	0.15	0.22	0.28	0.38	0.6
3	0.19	0.35	0.46	0.6	0.72	0.9	1.27
4	0.44	0.7	0.87	1.09	1.26	1.52	2.05
5	0.76	1.13	1.36	1.68	1.88	2.22	2.88
6	1.15	1.62	1.91	2.28	2.54	2.96	3.76
7	1.58	2.16	2.50	2.94	3.25	3.74	4.67
8	2.05	2.73	3.13	3.63	3.99	4.54	5.60
9	2.56	3.33	3.78	4.35	4.75	5.37	6.55
10	3.09	3.96	4.46	5.08	5.53	6.22	7.51

Addressing the multilingual versions is also a consideration.

Over-Alerting Problem

Currently cellphones can receive alerts via WEA. However the situation is changing. It is also becoming possible to receive alerts via;

21) Broadband EAS. This is a technology that delivers alerts via LAN or possibly internet. However an internet implementation is liable to have security problems. It was developed by Hisham Kassab of mobilaps (dot) com (website may be under construction). These alerts may be received by smartphones via WiFi. I am not aware of any implementations currently. It may be a desirable technology for corporate LAN alerts.
22) MEAS is currently broadcast on some TV stations. With the development of ATSC 3.0, this is proposed to be upgraded to an improved EAS/AWARN system. These would also be received by smartphones.
23) EAS is also broadcast on radio and TV. However the data transmitted is only in the form of modem tones which can carry a quite limited amount of data, as anything beyond the header is making the duration excessive for the public. A smartphone may receive digital TV, and also HD Radio or other digital radio broadcast (though none appear to provide for the latter at present).
24) Alerts from alerting vendors may be received as SMS texts. These may be of a longer duration that WEA. While these may be customized for the particular customer, some discussion as to how to take advantage of capabilities to avoid over-alerting is desirable. Responses from such vendors to this NPRM would, in my opinion, be welcome. Such

vendors receiving feeds from IPAWS may be contractually required to carry the CAP message ID or at least the eventCode.

25) Alerts from social media providers may also be sent. These are not regulated, but may be requested to carry the CAP messageID or at least the eventCode so as to permit devices to minimize over-alerting with suitable software.

So in summary, there are six modes of alert reception, and avoidance of repetitive messages between them is desirable. Using the eventCode to distinguish the same message within a time frame (30 minutes suggested as this is an EAS time limit) is an option that appears desirable. This is not as thorough as using the CAP message identifier, but that may not be practical in a WEA format.

eventCode to WEA Category Mapping

A mapping of the eventCode to the WEA categories of Presidential Alert, AMBER Alert (and any others in the same category), Imminent Threat Alerts, Emergency Government Information, Severe Weather Alerts and Local Threat Alerts needs definition for the U.S. Profile. Other countries have the same problem if WEA is implemented in a different CAP profile.

Merging of MEAS, AWARN and Improved EAS in smartphones with WEA

While MEAS is currently broadcast, the reception problems of ATSC 1.0 on smartphones is resulting in little current implementation. The ATSC has proposed AWARN as a moniker for a solution for improved alerting on ATSC 3.0. It would take advantage of new technology, particularly the Layered Division Multiplexing for improved reception by smartphones. This includes an alerting wake-up notification in the bootstrap “Signal Discovery and Signaling” data.

While this is an improved transport mechanism, it does not address other alerting issues; for example;

30) The problem of over-alerting on the current EAS because of a lack of means to address the selectivity problem.
31) The de-facto impracticability of using public alerting in either test modes or selective alerts to recipients such as first responders. This is because of a lack of a selectivity mechanism in the receiver.
32) The current slow alert propagation time of alerts for use in earthquake alerts for example. A latency time of 18 seconds is typical to smartphones. The current Japanese earthquake warning system reportedly takes over 8 seconds. However an architecture for rapid delivery of earthquake alerts should be possible within about 2.5 seconds for broadcasting. An alerting system for an improved WEA should be comparable. However this is best if it is a push message system which operates on a local or regional basis. This is a matter of implementing the Earthquake Early Warning System for the west coast, which is appropriate for IPAWS.
33) While EAS is implemented in some form in different countries, this may also be an issue for WEA. Different countries have different CAP profiles. At present this is one per

country with the exception of Caribbean Island countries (which are primary for tsunami alerting). This is worse than PAL/NTSC/SECAM. I have presented a logical proof that it is possible to define an EAS, and hence also a smartphone solution with ATSC 3.0, that has a single definition so consumer electronics manufacturers would have only one software definition to implement for world-wide compatibility. This is by merging the different CAP profiles and other matters described elsewhere in 04-296. This makes for a more cost-effective consumer electronics implementation, which is more likely to be implemented. Also the public would then be able to take their smartphones or TVs (perhaps digital radio receivers also) to other countries and receive alerts there also.

34) Public alerting and Emergency Management continue to make improvements. For example maps of hurricane inundation areas are expected to be delivered by NOAA Hurricane Center. Deliveries of secure files or messages to first responders by digital TV is an alternative to the FirstNet system that is in process of being implemented. These are capabilities of interest to Federal, State, Tribal/Regional and Local governments. An implementation of a CAP message pass-through as has been implemented for HD Radio to some HD Radio/navigation receivers, and proposed for AWARN, is not a sufficient improvement to address the issues. Improved EAS should provide the capability of polygon selectivity for smartphone use for example.

The Cell Sector and Polygon/Jurisdiction Overlap Problem

It appears that currently some cellphone service providers determine if their tower is in the alert area selection and transmit an alert based on that, which is as expected. However if the tower is outside the alert area selection (whether polygon or jurisdiction) they may either transmit or not transmit an alert. My suggestion is that the alert transmission in such situations be further decided by the location of the center of the cell sectors, if applicable. If the cell sector center is inside the alert area, the alert should be transmitted. If the cell sector center (or cell tower for omnidirectional coverage) is outside the alert area, but some is inside the alert area, then the alert be not transmitted if it is a Government Emergency Message, otherwise that it be transmitted. This suggestion is intended to provide more consistent coverage between cell service providers, not to overburden carriers with regulatory obligations or legal liabilities. This item may warrant further discussion as it adds to the software complexity and location data files.

Consumer Electronics Considerations

As may be appreciated, there is an importance given to the consumer electronics implementation. This is a key part of successful implementation as added capabilities are defined for the consumer devices. However while EAS has been completely defined by FCC mandate in the U.S., and to a significant degree in other nations, none of these nations are major consumer electronics manufacturers. So there is a degree of apprehension and concern as to what steps may be taken in the future. On the other hand, as illustrated by previous submissions I have made, a consumer electronics implementation may be a desirable and inexpensive added optional feature for devices that have an architecture that lend themselves to this. So I would expect that an approach that builds on the development of CAP and the EDXL definitions, based on the U.S. Profile that the FCC Part 11 Rules embody, managed by FEMA, and working with a standards

organization such as OASIS, could incorporate the foundation work of ECIG, which I have incorporated, and also welcome CEA, ATSC and other relevant organizations to craft a suitable world-wide definition, Such a definition could then become an ITU standard for EAS that is also in harmony with an improved WEA. Then this would be something welcomed by consumer electronics manufacturers. The resulting economies of production then would drive down costs to consumers in the U.S, as well as elsewhere. Then EAS and WEA technology can be sold by the U.S. and partners worldwide.

FCC Questions and Reply Comments

FCC proposes expanding the WEA message length from 90 to 360 characters

1. How would this provide more detailed alert information to the public sufficient to motivate appropriate and swift action to save lives and protect property (Section III, A, 1, Paragraph 9)? Where practical, it could reproduce the message sent on EAS

2. How would this affect accessibility of messaging to people with disabilities, senior citizens, and persons with limited English proficiency (Section III, A, 1, Paragraph 10)?
   This is also a problem for EAS. Disabled and senior citizens are best served by devices for example that can display sufficiently large text, e.g. TVs. ESL people are best served by support of other languages. See suggestion 7) above. However this is also a budget limit problem for First Responders that to some degree improved translation and prebuilt message formats can address. In an emergency, people are not as able to process messages, and lack of English fluency is further degraded. Note "The Unthinkable" by Amanda Ripley and other publications.

3. How can we quantify the potential life-saving benefits of increasing the character length (Section III, A, 1, Paragraph 10)? No comment as I have no data.

4. Is 360 characters the optimal maximum? What number of characters is necessary to provide detailed information about the emergency (Section III, A, 1, Paragraph 11)?
   It may be a practical maximum. However see the section on over-alerting above.

5. Is it feasible for alert originators to provide both 90 character and 360 character messages to accommodate new and legacy implementations (Section III, A, 1, Paragraph 13)? Some software vendors are assisting in this process for 90 characters at present.

FCC proposes adding a new WEA category titled "Emergency Government Information" for non-emergency type messages (i.e. boil water, shelter locations) School Weather Closings, which some broadcasters currently provide at the detriment of regular program content. However this can be too lengthy for even extended WEA as it even can take 20 minutes to announce all the schools. Perhaps a tune to radio or website for further information would be appropriate.

1. How should the FCC define the "Emergency Government Information" category (Section III, A, 2, Paragraph 18)? There should be a table to map eventCodes to the categories.

2. Would adding this category of alerts expand the alerting toolkit in a meaningful way (Section III, A, 2, Paragraph 18)?
Yes. In addition in EAS I proposed mapping eventCodes to priorities, with 1 highest to 9 low and 0 for local broadcaster only. Also, with the exception of most weather alerts which are apparent, other alerts also need a corresponding "end of alert" which has a lower priority.

3. Should this category be restricted to be used in conjunction with an Imminent Threat alert, or allowed to be issued as stand-alone (Section III, A, 2, Paragraph 19)? This should be a separate category to reduce confusion and allow clear mapping to eventCode

4. What kind of guidelines can be applied to this alert category (Section III, A, 2, Paragraph 19)?
No Comment

5. Should this category of alerts be restricted to certain "appropriate agencies" (Section III, A, 2, Paragraph 19)? While this may appear desirable, on some occasion exemptions may be a better service to the public e.g. the radio DJ that activated EAS in American Samoa and saved many lives in comparison with Western Samoa tsunami.

6. Would adding this category desensitize the public to other alert categories (Section III, A, 2, Paragraph 19)? The public should have a means to adjust sensitivity such as a priority scheme as above, but also the problem of addressing the over-alerting discussed above should be addressed. If eventCodes are included, this can user selectable as proposed for EAS.

7. Should this category be an "opt-in" or "opt-out" category (Section III, A, 2, Paragraph 21)? This should be default opt-out, but with educational material provided with phone user manuals.

8. Should WEA be broken out into other additional categories (i.e. Severe Weather Alerts, Local Alerts), and if so, how would they be different from Presidential, AMBER, Imminent Threat, or Emergency Government Information categories (Section III, A, 2, Paragraph 22)? No Comment

FCC proposes allowing URLs and telephone numbers in WEA messages which were previously prohibited

1. Would including URLs and phone numbers in WEA messages advance public safety (Section III, A, 3, Paragraph 25)? See the details above in terms of URLs and phone numbers.

2. Does the public currently turn to the internet for additional information when they receive a WEA message (Section III, A, 3, Paragraph 25)? I have no data on this.

3. Would including URLs and phone numbers improve alert quality and accessibility (Section III, A, 3, Paragraph 26)? This is possible as some people would want maps of affected areas. However an improved EAS/AWARN solution to smartphones should be providing such details.

4. Would including URLs and phone numbers reduce "milling" behavior by directing the public to specific information (Section III, A, 3, Paragraph 26)? This may assist a minority. However an improved EAS/AWARN should also address this. The Earthquake Early Warning System would need public education and drills as there is not any time for milling "Mill or Drill".

5. Would including URLs and phone numbers enhance AMBER alerts (Section III, A, 3, Paragraph 27)? This may be of some assistance. However CAP currently does not provide for identified fields of vehicleState and vehicleID. An improved EAS could tag these fields for display on vehicle HD Radio/navigation screens.

6. Would including URLs and phone numbers enhance accessibility to those with disabilities, senior citizens, and persons with limited English proficiency (Section III, A, 3, Paragraph 29)? Messages in uncommon languages, TTY, etc. could be accessed when not on WEA or EAS.

7. Currently WEA supports text only. Would the addition of images, maps, or other multimedia content in the WEA message significantly enhance the usefulness of the system (Section III, A, 3, Paragraph 30)? This is basically the same problem as improving EAS, but such details may be more practical to deliver using ATSC 3.0. However LTE can complement this. NOAA Hurricane Center has promised hurricane inundation maps, and in due course these may be delivered to the public by either means.

FCC proposes including multilingual WEA messages

1. Would the addition of multilingual WEA provide any benefits (Section III, A, 4, Paragraph 32)? Yes, if they were adequately brief so secondary languages are heard without much waiting, and if the user had a preset means to exit the alert after the primary language was delivered.

FCC proposes improvements to WEA geo-targeting of alerts

1. FCC proposes requiring cell carriers to transmit alerts to the polygon level (or closest approximation) as opposed to the county level, and therefore seeks comments on this proposal and rationale (Section III, B, Paragraph 37). Polygon selection is a better match to most emergency situations. EAS also needs to be able to have polygon selection, which is possible with digital TV and somewhat with HD Radio.

2. FCC is considering other approaches would improve geo-targeting (i.e. device-based geo-targeting, cell sectorization), and seeks comments on potential benefits to emergency managers. How would more accurate geo-targeting minimize over-alerting, reduce alert fatigue, and minimize problems of bleed-over (Section III, B, Paragraph 41)? Alert fatigue is noted in the over-alerting section above, but in part it is a matter to coordinate all alerting technologies.

FCC proposes inclusion of local WEA test codes

1. FCC proposes allowing state and local testing. The approach defines immediate delivery of the test message (vs allowing cell carriers to delay it up to 24 hours). The approach also provides for a public opt-in (the public would have to enable the test code on their phone) to receive the test message vs opt-out. Please comment on this approach (Section III, C, 1, Paragraph 47). A

suggestion to provide for test messages and exercise alerts for use by First Responders in their exercises is noted above. Perhaps delivery times comparable to the prioritization scheme for EAS noted in 04-296 submission by myself is a goal.

2. There are two alternative approaches being considered, a) delaying test messages up to 24 hours, and b) making public receipt of test messages an opt-out option. Please comment on these alternatives (Section III, C, 1, Paragraph 51). Except for monthly tests like EAS, test messages should be opt-in default.

3. How often should state and local agencies be allowed to test (Section III, C, 1, Paragraph 49)? Only one test per two months in each state with alternate months being for local agencies with geo-targeting to the jurisdiction. Further tests may be as required but opt-in for the public.

4. What public safety benefits would come from state and local testing (Section III, C, 1, Paragraph 50)? If it is an Earthquake Early Warning System drill, that is educational. This needs to be in coordination with EAS drill in coordination with the DOT as cars may be expected to slow down to reduce traffic accidents in a real earthquake.

FCC proposes requiring cell carriers to log alerts and provide reports

1. FCC proposes requiring cell carriers to generate monthly system and performance statistics reports based on category of alert, alert originator, alert area, and other alerting attributes (Section III, C, 2, Paragraph 56). FCC seeks comment on whether cell carriers should report on alert delivery latency, accuracy of geo-targeting, and quality of public response (Section III, C, 2, Paragraph 57). Please comment on the extent to which this reporting would benefit alert originators. Such data should be capable of being collected and presented automatically. Manual labor is a problem with the present EAS method that should not be replicated with WEA.

2. How should this reporting information be shared? Should it be restricted (Section III, C, 2, Paragraph 58)? This should be only reported to the FCC or FEMA and summary information provided to each state separately. If carriers chose to make their data public e.g. for advertising purposes, this would be at their discretion.