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Before the

Federal Communications Commission

Washington, D.C. 20554

In the Matter of	)	
	)	
Public Safety and Homeland Security Bureau	)	
Seeks Comment on Ways to Facilitate	)	
Earthquake-Related Emergency Alerts	)	PS Docket No. 16-32
	)	
Frank W. Bell	)	

Re: NOTICE OF PROPOSED RULEMAKING

1) Thanks to Art Botterell for the detailed comment. Is it correct to assume that the “A” interface is the input to the IPAWS Alert Server and that the “C” Interface is the alerting output of the IPAWS Alert Server? I was not suggesting that EEWS would not be sending alerts to IPAWS server, only that a regional bypass with push messages be added to reduce latency.
2) The proposed protocol for messages from seismometer processors to an Emergency Management processor needs consideration beyond my comments. Such a processor should be redundant and may be dedicated to EEWS messages. Some added comments follow;
3) <u>Earthquake Polygon definition tactics</u>

4) There are two basic tactics for defining polygons for EEWS alerts. a) Define the polygon for each seismometer for a single detection alert prior to sending an alert and b) Define the polygon after an earthquake is detected. The a) method is faster to implement, but needs memory to recall it, the b) method is slower, but it is applicable after more than one seismometer has detected the earthquake. The initial polygon would be smaller than the distance to any other seismometer, and be closest to the nearest one with some center towards the next fewest seismometers. If a detection is made for a seismometer that is not in the database, the latitude, longitude and altitude data in the message can be used to make a calculation, but that also an alert be made to operations staff to check the situation. If another detection is not made confirming an event, then a FAW should be sent to the same polygon area.
5) When two seismometers have detected an earthquake, the TD (Time Difference) can be used to calculate an hyperbola of location of the epicenter, and the direction line of propagation of the shock gives an approximate location on the hyperbola. Subsequent detections would provide more accuracy, and enable calculations of the magnitude and velocity of propagation to be made with some accuracy. So subsequent polygons can be calculated based on these results.
6) Thanks to Nicholaus E. Leggett for the Human Factors focused comment. These points should be considered in addition to the advice of psychologists, Transport Department Safety experts and the Japanese experience with ETWS.
7) The AT&T and CTIA filings, and ATIS-0700020 Feasibility Study for Earthquake Early Warning System stated that a 3 second message delivery metric has no role in a WEA system. Given the network internal performance description, this seems a reasonable explanation. However in my filing, one possibility I raise is that of cell towers having TV tuner cards to receive alerts via improved EAS/AWARN (or whatever the system gets called) from an ATSC 3.0 broadcast. Then the alert can be sent to cellphones receiving that tower. This bypasses the network infrastructure until such time as an implementation engineered with satisfactory performance and a reasonable price is achievable. This might be included in an equipment upgrade cycle. Delivery of alerts to the epicenter and nearby is the most difficult problem, even with P-wave detection. So this is an understood limitation. As ATSC 3.0 is being developed to be received directly by suitable smartphones, which are not currently available, then EEWS delivery bypassing the CMAS infrastructure completely is an alternative that could be used to assist the sale of new smartphones with that feature. The broadcaster based improved EAS/AWARN I have proposed is not intended to be in competition with WEA, rather that developments in one area may complement limitations in another area and so cooperation and standards development are considered to be within the scope of this important technology development.
8) The SAGE filing brings up further points, most of which are addressed by the proposal comment already filed by myself. The cryptographic processing time is an issue not addressed, and needs consideration. Perhaps establishing tunnels in the regions of alerting is a possibility that is faster, it uses cryptography differently. The Daisy Chain should be replaced by data transmission in the broadcast, which I have called a Digital Daisy Mesh. This, with the optional feature in the receiver, e.g. for HD Radio, can trigger memory playout of the alert and bypass the 7 or so seconds latency, if the first instance of the message header is received.
9) RDS (or RDBS) is a method of distributing alerts and broadcasters receiving IPAWS alerts may send such alerts. This is a method suitable for analog radio stations. Improved incorporation of this into IPAWS was in my filing previously.

10) The Seismic Warning Systems comment regarding the value of including private earthquake warning networks is relevant, and was included in my previous comment to this proceeding on 05/06/2016. This adds to the seismometer population and hence to the probability of earlier detection.
11) The following diagram illustrated the value of alerts with a 10 second latency. Having an alert delivery time of 3 seconds (including 1 second of time and the word "EARTHQUAKE") would reduce the time of the alert by 7 seconds and the radius of the blind zone to approximately 10 miles. In reality this may be larger as the hypercenter depth affect this somewhat.

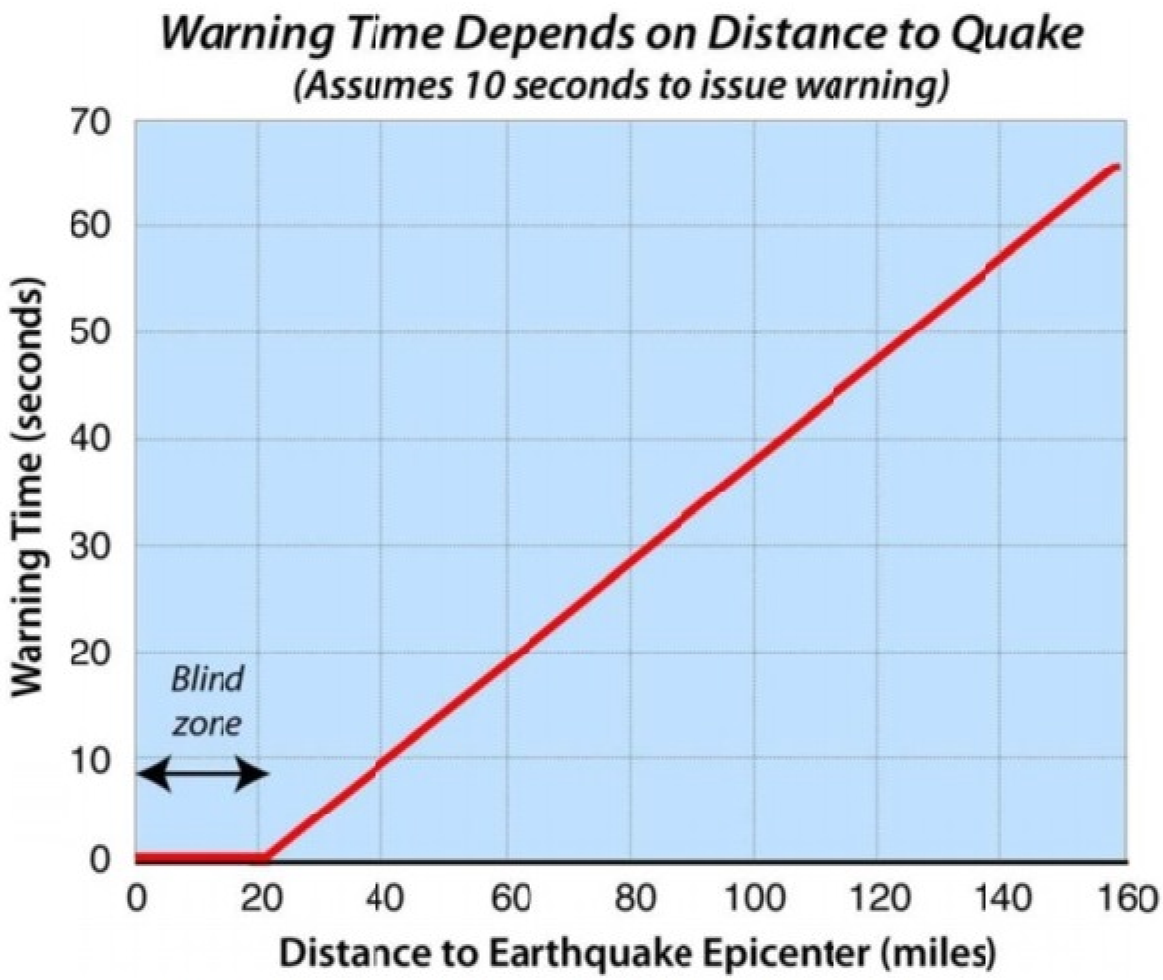

Figure 4.2 – Warning Time versus Distance to Earthquake Epicenter

In conclusion, in my filing for 04-296 in 2010, I outlined a system with a latency of 2.5 seconds including 1 second of tones and "EARTHQUAKE". This still appears achievable for broadcasting even if not for the current WEA.

Sincerely,

Frank W. BELL

President