Comments of ART BOTTERELL in PS Docket 16-32 regarding Ways to Facilitate Earthquake-Related Emergency Alerts

These comments are respectfully offered in my private capacity as an individual who initially designed the Common Alerting Protocol (CAP) and is experienced in its applications, and who also has some direct knowledge of the background of the Integrated Public Alert and Warning System (IPAWS) and Wireless Emergency Alerts (WEA) as a member of the Commission's "Commercial Mobile Service Alerting Advisory Committee" (CMSAAC)

This inquiry is an important one, as to date there have been no independently-obtained data available on the performance of IPAWS and WEA. That lack has made it difficult for both alert originators and the public to calibrate their expectations of WEA. Parenthetically, the same is true of the geotargeting performance of WEA; however that is beyond the scope of these comments.

With reference to Figure 1 of the Commission's Public Notice DA 16-380 of April 8, 2016, I would suggest that the practical question of IPAWS support for Early Earthquake Warning (EEW) and other highly time-sensitive alerting activities inherently spans both the "A" and "C" interfaces and the functions of the IPAWS-OPEN Aggregator. Also, I would suggest that the "A" interfaces be viewed as comprising any necessary preparation, digital signing or other pre-processing required to submit a "raw" CAP message over the interface. (Note that there may be some dependency here on the size of the CAP message to be submitted.) This will not be an easy thing to evaluate as it depends on the hardware and software used by the alert originator; however, the IPAWS Lab maintained by the Joint Interoperability Test Command may be able to assist in determining some typical configurations.

By the same token, the evaluation of the "C" interface should also consider any "initialization" or "post processing" latency contributed by typical consumers.

It should be noted that a "push"-type interface will generally be much faster than a "pull" mechanism based on polling by the receiving clients. The current IPAWS interfaces for EAS and other Internet-based associated systems are based on a technique known as an "ATOM feed" used for the syndication of eXtensible Markup Languages (XML) documents (such as CAP alerts) within the World Wide Web ("Web"). This technique was adopted by many early CAP implementers as it was familiar to Web engineers and had been proven to scale relatively well. It was relatively easy to deploy and secure. However, it contributes significant latency due to the interval between "polls" by each client, and each transaction requires a complete cycle of low-level connection set-up activities.

There exists a family of network protocols described as "publish/subscribe" in which each client sets up a connection at start-up and thereafter receives messages as they become available from the Publisher (IPAWS, in this instance.) One example widely used on the Internet is the eXtensible Messaging and

Presence Protocol (XMPP), also known by its original project name of "Jabber." The sponsoring organization for XMPP published a specification for transmitting CAP messages over XMPP in 2004.[1]

A number of other "pub/sub" protocols are supported by an open-source software package known as "ActiveMQ."[2] Supported protocols include: Advanced Message Queuing Protocol (AQMP)[3], which like CAP is a standard of the Organization for the Advancement of Structured Information Standards (OASIS); "OpenWire,"[4] a cross-language network protocol for easy implementation on various types of computers; and "MQ Telemetry Transport" (MQTT)[5], another OASIS standard designed for use in hardware-constrained applications in the "Internet of Things" (IoT).

Latencies for the IPAWS EAS and Internet "C" interfaces could be significantly reduced by utilizing one of these or some other "push" interface. Obviously that would entail a significant reengineering project.

The IPAWS WEA interface poses an additional problem, as it does not conform to the CAP message standard. At the wireless industry's insistence the Commission and FEMA adopted an industry-specific message format developed by the wireless carriers[6] for the WEA "C" interface. This alternate message specification, now commonly referred to as the Commercial Mobile Alert Message (CMAM) format, omits a number of the elements of the CAP message, making it impossible to reconstruct the original CAP alert message from the data supplied. Thus, even if the IPAWS/WEA channel met latency standards it would still fall short of a functional requirement to deliver CAP data.

The Commission is to be commended on the initiative of its staff in preparing and undertaking this important inquiry. As the nation moves toward an Internet of Things, with automated devices and process controls "learning" to act on warnings to mitigate the impacts of unusual events, and as science advances in its ability to detect and characterize threats rapidly, end-to-end warning system latency will become an ever more crucial consideration. It is well that this issue is receiving thoughtful attention now.

Respectfully submitted,

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[1] "XEP-0127: Common Alerting Protocol (CAP) Over XMPP," Dec. 2004, http://xmpp.org/extensions/xep-0127.html
[2] http://activemq.apache.org/
[3] https://www.oasis-open.org/committees/tc_home.php?wg_abbrev=amqp
[4] http://activemq.apache.org/openwire-version-2-specification.html
[5] http://docs.oasis-open.org/mqtt/mqtt/v3.1.1/os/mqtt-v3.1.1-os.html
[6] "Joint ATIS/TIA CMAS Federal Alert Gateway to CMSP Gateway Interface Specification", ATIS J-STD-101, Alliance for Telecommunication Industry Solutions, October 2009.