Meeting the Challenge of Wireless Emergency Alerts

A New Yorker passing through Kansas receives a text message on her cell phone alerting her to tornadoes closing in on the stretch of Interstate 70 down which she and her husband are driving. At the same time, other cell phone customers in the threatened area also receive the National Weather Service alert. So informed, they all can seek shelter and protect themselves. This is one of many visions for Wireless Emergency Alerts (WEA, formerly known as the Commercial Mobile Alert Service).

WEA grew out of the Warning, Alert, and Response Network (WARN) Act. It transmits three types of alerts: presidential alerts, imminent threat alerts, and America's Missing: Broadcast Emergency Response (AMBER) alerts. The system provides alerting authorities the ability to broadcast emergency alerts to customers located in the vicinity of cellular towers serving an affected area. To date, four of the largest cellular networks have agreed to participate. The system also incorporates thousands of alert originators.

Though the four large cellular networks provide WEA 90 percent geographic coverage, numerous smaller providers and thousands of alert originators still need to be integrated to maximize its reach. This is where the SEI comes in. Its role is to support the Department of Homeland Security Science and Technology Directorate by creating a strategy for integrating these alert originators into WEA.

Larry Jones, team lead for the SEI's WEA effort, noted that the SEI brings to the project its leadership in software engineering research and serves as a single source of experts from the multiple disciplines WEA development requires. "The SEI's Research, Technology, and System Solutions [RTSS] Program leads a cross-SEI team," said Jones. "That team includes experts in architecture, integration, network security, domain knowledge and project management."

To be effective, the strategy must provide paths of integration into the systems for the thousands of alert originators. These include all state, county, and city governments, as well as local districts for fire protection, transit, and public utility services. Complicating matters, the overall effort involves aspects of international cooperation.

The challenges are many:

- Alert originators use many different types of software.
- The documentation available for the existing systems varies widely.
- The security of systems varies.
- The originators' readiness to integrate with WEA varies.

What's more, Jones observed that the alert originators' current use of the required protocol varies. "WEA will use the Common Alerting Protocol (CAP)," said Jones. "CAP has a 90-character limit, which originators feel limits their ability to describe a situation to users. So, WEA will have varying needs to be supplemented by other existing emergency alert systems, such as TV, radio, and social media."

Jones added that a one-size-fits-all strategy definitely will not work. "Alert originators work in vastly different contexts and necessarily have vastly different origination systems," said Jones. "For example, San Diego County is the size of Connecticut. Residents speak English, Spanish, Tagalog, Vietnamese, and many other languages. Its territory includes coastline, mountains, and desert, which are prone to different types of emergencies, from tsunami to landslides to wildfires." Consequently, said Jones, "the alert system that San Diego uses will differ from that used by, say, a county in Montana with a population of less than 5,000."

The overall WEA effort is extensive and involves several other organizations working on other aspects of the project. Collaborators on WEA include the Applied Physics Laboratory at Johns Hopkins University and the RAND Corporation.

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