ENHANCED WIRELESS EMERGENCY MOBILE ALERT SYSTEM

INVENTOR:

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Title: Enhanced Wireless Emergency Mobile Alert system.

Background:

Public warning systems should alert and inform all citizens that are threatened by a hazard to enable them to prepare and to act in a timely manner to reduce the impact of the hazard. This implies that the systems applied for public warning must alert the targeted population, but also provide them sufficient information in an understandable manner. The effectiveness of public warning systems to achieve this goal is highly dependent on the communication channels that are applied, as different communication systems have uneven capabilities to fulfill all public warning requirements and diversity is required to reach the maximum of people at risk

The Wireless Emergency Alert (WEA) system, formerly known as CMAS (Commercial Mobile Alert System), delivers critical warnings and public safety information to the public on mobile devices. Participation by wireless service providers is voluntary, but most providers support WEAs. Those providers that participate adhere to technical and operational requirements established by the FCC.

Commercial Mobile Service Providers (CMSP) allow authorized message originators to send public safety alerts and warnings to mobile phones through IPAWS). A participating wireless provider may apply to FEMA to connect to IPAWS to send [Wireless Emergency Alerts (WEA)] to their subscribers.

Authorized alerting authorities send WEAs through IPAWS to participating wireless providers, which then broadcast the alerts from cellular towers to mobile devices in affected areas.

Specific features applicable to WEAs include:

- Supports up to 360 characters
- Supports English and Spanish languages
- Supports URLs and phone numbers
- Rebroadcast of WEA for alert duration
- Ability to update and/or cancel active WEA
- Unique tone and vibration
- Geo-targeted fences alert capabilities with less than one-tenth of a mile of overshoot

WEAs use SMS-Cell Broadcast (SMS-CB), a one-to-many service that simultaneously delivers messages to multiple recipients in a specified area. By using SMS-CB, WEAs avoid the congestion issues experienced by traditional voice and text messaging (SMS Point -to-Point) alerting services, which translates into faster and more comprehensive delivery of messages during times of emergency.

Wireless providers must comply with the technical and operational requirements established in the Code of Federal Regulations Title 47, Part 10. The rules for Wireless Emergency Alerts, including participation procedures, infrastructure requirements, and message elements are all found in Part 10.

Sending a single message to each citizen affected by a crisis (the SMS solution) will automatically collapse the networks, which is an undesired effect. On the other side, broadcasting an alert message also reaching people that are not affected by the crisis/hazard can result in undesired panic and confusion.

For wireless systems (Land mobile wireless systems in above table), alerts are performed using Cell Broadcast in a targeted region. More information on Cell Broadcasting can be found in 3GPP TS 23.041.

When eNB begins transmission of the emergency information, a paging message in which ETWS indication is set is sent to the UE. The UE whether in Idle or Connected mode, try to receive paging message at least once per default paging cycle, whose value is defined in the SIB message. If the paging message contains an indication that ETWS indication is received, the UE begins the receiving the SIB message that contains the emergency information. Primary Notification is sent in SIB10 and Secondary Notification is sent in SIB11 messages. By checking the disaster type information (Message Identifier and Serial Number) contained in the SIB10 and SIB 11 message, the UE can prevent receiving multiple messages that contain the same emergency information.

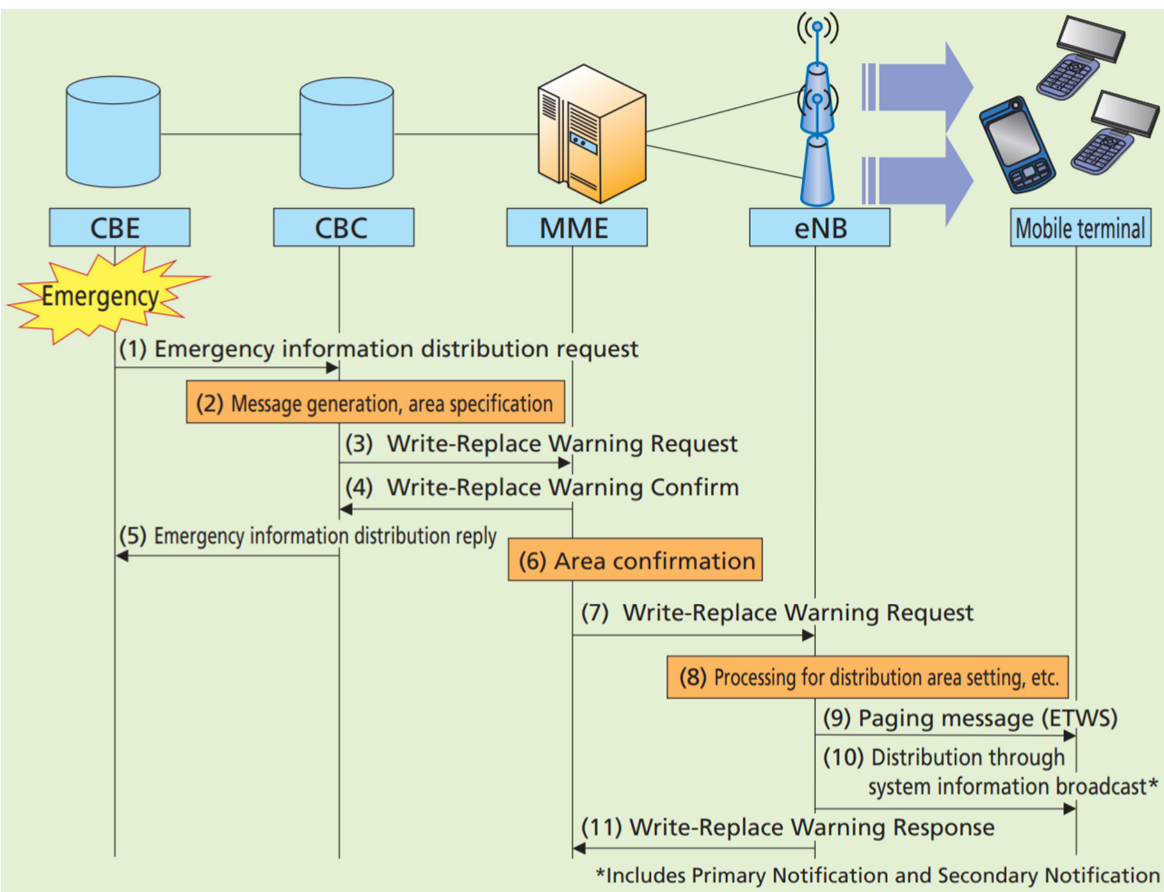

FIGURE 1. Emergency information distribution method.

Problem to solve:

The WEA is a good mechanism to broadcast emergency alerts. Enhancements to make this system more effective, reliable, integrated and flexible will significantly speed up the delivery of potentially critical and life-saving information and response.

Since the alerts are broadcast messages, the UE may receive the paging information with the ETWS indication but the user may be away from the phone or the Mobile phones can be switched off (at night), or not be heard in a noisy environment or be in silent mode or do not disturb mode or have notifications turned off. Even if the User receives the alert, there is NO indication/acknowledgement to the first responders/disaster relief agency that the user received the alert message. An acknowledgement can significantly help improve the search and rescue operations and the response of the first responder's team.

Solution:

A mechanism/solution to send an Emergency Alert acknowledgment message with timestamp, geo-location information, user device battery level and emergency contact information.

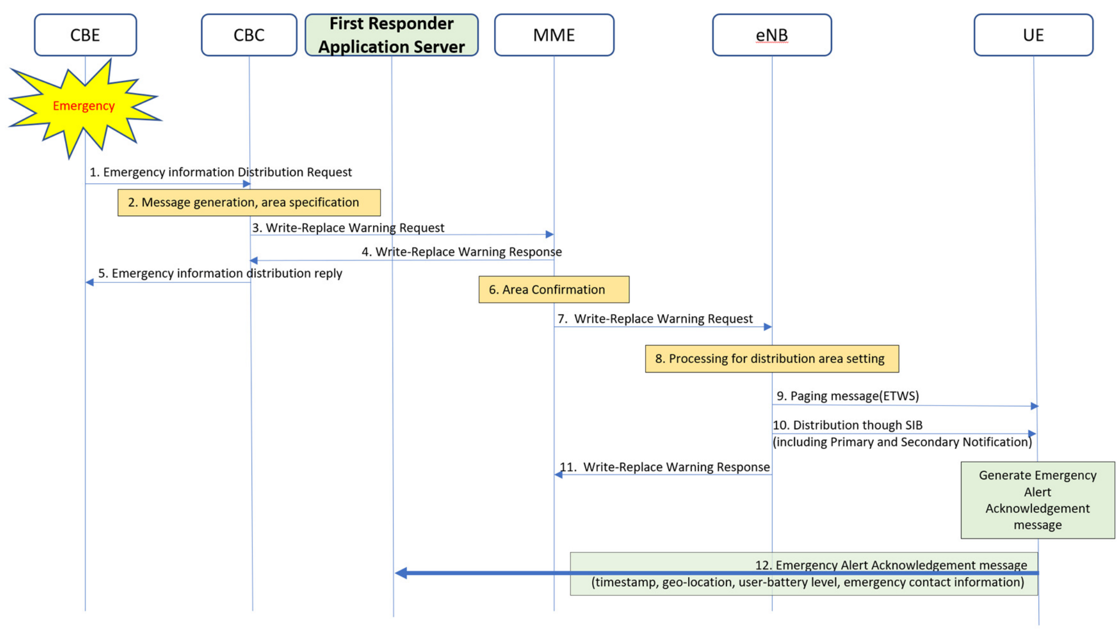

FIGURE 2. Updated Emergency information distribution method with Emergency Alert Acknowledgement packet.

The "First Responder Application Server" is a common database that would store the data reported back from the User as part of the Emergency Alert Acknowledgement message. All Mobile Network Operators would update the information to this server. First Responders and Disaster relief agencies would be able to access this information to better coordinate response.

In order to efficiently send the acknowledgement message without overloading the network, we propose a solution a different solution for UE in connected mode and UE in Idle mode.

For UE that are in connected mode when the Emergency Alert is received, they will send the acknowledgement message as user plane traffic to the First Responder Application Server.

For UE connected to WiFi or able to connect to WiFi, the acknowledgement message as user plane traffic to the First Responder Application Server.

For Users that are in Idle mode and can NOT connect to WiFi network, the acknowledgement message is sent to the First Responder Application Server as a supplementary service using the Man-Machine Interface (MMI) of the UE (3GPP TS 23.030, TS 22.004). Advantage of using USSD (Unstructured Supplementary Service Data) packet is that it allows two-way exchange of data, more responsive than SMS. USSD messages can be 182 alphanumeric characters long.

Advantage of proposed solution:

1. It is an enhancement to existing mechanism.
2. Allows better search and rescue operations.

Existing Solutions:

None