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## Extension of Public Warning System

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## **Extension of Public Warning System**

### **ABSTRACT**

This disclosure describes techniques to relay public warning system (PWS) messages from a host device to user devices that cannot receive broadcast messages from a cellular network. A PWS message broadcast by a cellular network is received by the host device and relayed to user devices within a personal area network (PAN). Fields from the incoming PWS message are compared to previously received PWS messages to avoid duplication of messages. Relay of the PWS message by the router enables reception of the PWS message by user devices in the PAN that are not connected to the cellular network. User configurable settings enable users to select or disable the feature of reception of PWS via the PAN.

### **KEYWORDS**

- Public warning system (PWS)
- Disaster management
- Emergency alarm
- Emergency alert
- Cell broadcast service (CBS)

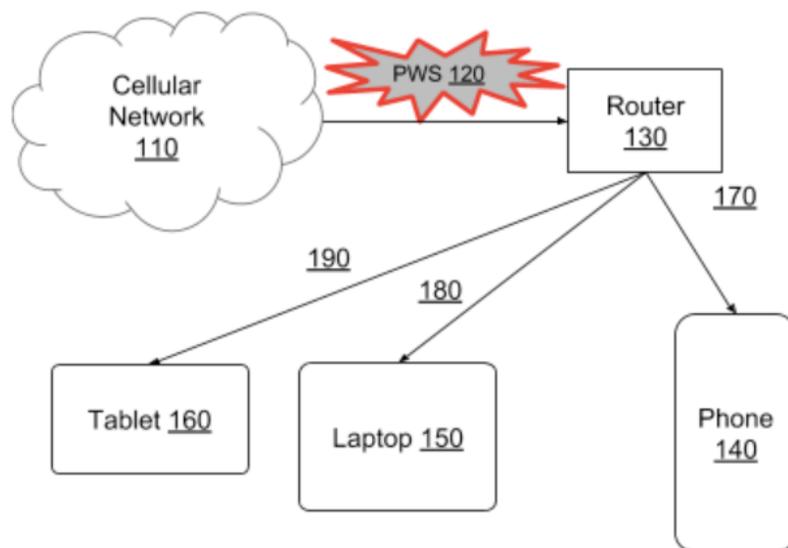
### **BACKGROUND**

Public Warning Systems (PWS) utilize cellular networks to notify people of emergency situations. PWSs commonly use a Cell Broadcast Service (CBS) via a cellular network to transmit messages to user devices, e.g., mobile phones. Examples of PWSs in operation include the Earthquake & Tsunami Warning System (ETWS) in Japan, Wireless Emergency Alerts (WEA) in the United States, Korean Public Alert Service in South Korea, etc.

However, some types of user devices are not configured to receive PWS messages. These include devices that are not PWS capable such as tablet computers and other devices that lack cellular capability, but are connected via WiFi, smart speakers/ appliances, laptop/desktop computers, etc. In some scenarios where a user device is PWS capable, the CBS channels may be misconfigured. In some scenarios, a cellular radio in a user device may be inactivated by the user, e.g., by a user that is away from a home location, such as when roaming internationally. PWS messages cannot be transmitted to user devices that are not configured to receive PWS messages from the cellular network.

### DESCRIPTION

This disclosure describes techniques for transmission of public warning system (PWS) messages to user devices that cannot receive broadcast messages from a cellular network. Per techniques of this disclosure, PWS notifications are relayed from a host device to client devices that constitute a personal area network (PAN).



**Fig. 1: Relaying public warning system messages to non-cellular devices**

Fig. 1 illustrates relay of PWS messages from a host device to user devices within a PAN. In this illustrative example, the PAN includes a router (130) that is configured as a host device and acts as a gateway for the PAN that includes a mobile phone (140), a laptop computer (150), and a tablet computer (160). A PWS message (120) is broadcast by a cellular network (110). The message is received by the router and relayed (170, 180, 190) to user devices within the PAN.

In this illustrative example, the laptop and tablet computers are not PWS capable and therefore, are unable to receive messages directly from the cellular network. In this illustrative example, the cellular radio of the mobile phone is in an inactive state, while the phone is connected to the router via WiFi. Relay of the PWS message by the router enables the reception of the PWS message by user devices within the PAN.

For a user device that is inherently PWS capable but not currently connected to a cellular network, reception of a PWS message is implemented in a manner similar to when it is connected to a cellular network. A look up is performed of previously received PWS messages. Fields (for example, serial number, message identifier, etc.) from an incoming PWS message are compared to fields from previously received PWS messages to avoid duplication of messages.

User configurable settings are provided on user devices via a user interface (UI) to enable users to select or disable the feature of reception of PWS via the PAN.

Techniques disclosed herein can be utilized in multiple contexts. Some example use cases are described below.

- *International roaming:* A user is traveling in a foreign country and uses a travel SIM for internet connectivity on their computer. The user is notified of a PWS message on the computer that is connected to the travel SIM.
- *Cellular based WiFi router:* A 4G (cellular-based) WiFi router is a primary internet source device at a user's home. Other user devices connected to the router (laptop computers, desktop computers, tablet computers, etc.) receive PWS messages relayed by the WiFi router.
- *Specialty devices:* Devices that are not connected to a cellular network are enabled to receive relayed PWS messages, For example, a smart speaker or other smart appliance can receive PWS messages and provide those to proximate users.

The techniques described herein extend the reach of PWS messages by enabling messages to reach more devices, including devices that do not have cellular capability, or have the cellular capability turned off. Extending the reach in this manner allows more people to receive warnings and can help reduce the impact of the situation, e.g., a natural event such as a storm or flood. The features can be incorporated as part of the operating system of a supporting device, e.g. a smartphone operating system.

## CONCLUSION

This disclosure describes techniques to relay public warning system (PWS) messages from a host device to user devices that cannot receive broadcast messages from a cellular network. A PWS message broadcast by a cellular network is received by the host device and relayed to user devices within a personal area network (PAN). Fields from the incoming PWS message are compared to previously received PWS messages to avoid duplication of messages. Relay of the PWS message by the router enables reception of the PWS message by user devices

in the PAN that are not connected to the cellular network. User configurable settings enable users to select or disable the feature of reception of PWS via the PAN.

#### REFERENCES

[1] Wayne W. Ballantyne, Dwight R. Smith, Jerome Vogedes, and Jian Jun Wu. “Method and apparatus for alert message reception.” U.S. Patent 9,226,125, issued December 29, 2015.