

# Technical Disclosure Commons

---

Defensive Publications Series

---

April 2022

## Trust-Based Emergency Message Relay

Poying Chuang

Tim Chen

Follow this and additional works at: [https://www.tdcommons.org/dpubs\\_series](https://www.tdcommons.org/dpubs_series)

---

### Recommended Citation

Chuang, Poying and Chen, Tim, "Trust-Based Emergency Message Relay", Technical Disclosure Commons, (April 11, 2022)

[https://www.tdcommons.org/dpubs\\_series/5059](https://www.tdcommons.org/dpubs_series/5059)



This work is licensed under a [Creative Commons Attribution 4.0 License](https://creativecommons.org/licenses/by/4.0/).

This Article is brought to you for free and open access by Technical Disclosure Commons. It has been accepted for inclusion in Defensive Publications Series by an authorized administrator of Technical Disclosure Commons.

## TRUST-BASED EMERGENCY MESSAGE RELAY

### Abstract

Under some circumstances, a user equipment (UE) can fail to receive a warning notification from a warning system, such as the Public Warning System (PWS), while other UE associated with the same user receive the warning notification. To ensure that a user does not miss the warning notification in these circumstances, one or more of the UEs can support emergency message relay, wherein the one or more UEs cast, or relay, any received warning notifications to other trusted UEs, such as to other UEs on the same Wi-Fi network.

### Background

The PWS is a general warning notification system provided by mobile network operators (MNOs) to deliver warning notifications for designated emergencies, such as weather emergencies. The MNOs receive the warning information from designated providers and, in response, send corresponding warning notifications to UEs via corresponding networks. However, in some cases, one or more UEs can fail to receive the warning notification, potentially resulting in a user not being aware of the underlying emergency. For example, in some cases, a particular portion of the network (e.g., a given cell tower or a given UE) may not support transmission or reception of the warning notification. In other cases, the UE may fail to receive the warning notification as a cell broadcast when the UE is transmitting user data, either in the foreground or in the background.

### Description

To enhance the likelihood that a user receives a warning notification, a UE can support trust-based emergency relay, wherein the UE casts, or relays, any received emergency notifications to other trusted UEs. This increases the likelihood that a given user will receive the

emergency notification via at least one UE associated with the user, thereby increasing the overall effectiveness and reliability of the warning system.

To illustrate, in many cases a user can be associated with multiple devices that are capable of receiving warning notifications. For example, a user may be associated with multiple UEs (e.g., a smartphone, tablet, and computer) that are all connected to the same Wi-Fi network. As noted above, under some circumstances one of these multiple UEs may fail to receive a particular warning notification from the MNO. However, using the technique described herein, the UEs that do receive the warning notification can transfer that notification to the other UEs, increasing the likelihood that the user becomes aware of the corresponding emergency conditions.

A flowchart of the technique is illustrated at FIG. 1, below:

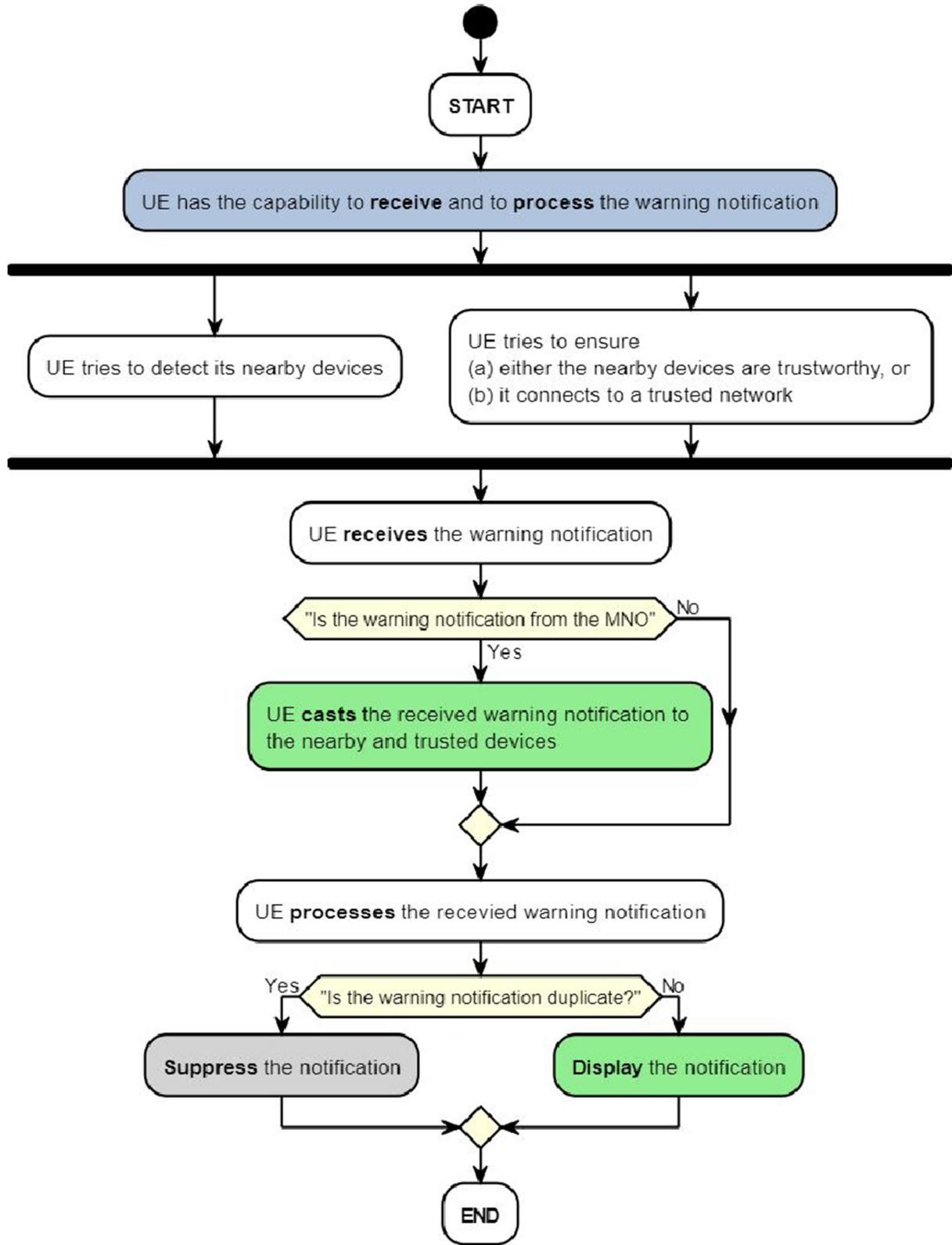


FIG. 1

As shown, to implement the technique a UE first determines if the UE has the capability to receive and process warning notifications from the MNO. The capability to process a warning notification can include the ability to display the corresponding emergency message correctly, and the ability to suppress any duplicate warning notifications (thereby preventing multiple emergency messages for the same underlying emergency). It will be appreciated that in some cases the ability to display an emergency message includes the ability to visually display the message (e.g., via a screen), while in other cases the message may be displayed in other ways, such as via audio or by vibrating the corresponding UE. It will also be appreciated that the UE can be any of a number of different types of UE, such as a smartphone, a mobile device such as a Wi-Fi router, a wearable device such as a watch or bracelet, a tablet, or a device or module in the manufacturing or mobile industry.

If the UE has the ability to receive and process warning notifications, the UE then attempts to detect nearby devices (UEs), and determines which devices are trustworthy. These operations can take place in either order. To determine if a given device is nearby, the UE can use any method to detect or scan for surrounding devices, such as whether the devices are on the same Wi-Fi network, whether the devices are discoverable via Bluetooth scan, or whether the devices are in a specified physical range (e.g., 1-3 meters) using location technologies such as radio-frequency identification (RFID), near-field communication (NFC), Bluetooth, and Ultra-Wide Band (UWB).

To determine if a device is trustworthy, the UE can use a variety of different criteria, or a combination thereof. For example, the UE can identify trustworthy devices based on a stored list of devices, such as a list of devices assigned to or owned by a particular user, assigned to or owned by a particular group of users (e.g., a particular family), or a list of particular network

addresses (e.g., media access control (MAC) addresses). The UE can also identify trustworthy devices based on whether the devices are connected to the same Wi-Fi network or are otherwise connected to the UE, such as via a Bluetooth connection. In some cases, devices can establish their trustworthiness to the UE by requesting the UE to forward emergency notifications.

As shown in FIG. 1, in response to receiving a warning notification, the UE determines whether the warning notification is received from an MNO. If so, the UE casts, or relays, the warning notification to any nearby and trusted devices, such as by sending the warning notification over a Wi-Fi network that connects the devices. If the warning notification was not received from an MNO (i.e., the notification was received from another UE), the UE does not relay the warning notification to other devices. This ensures that the set of devices each receives only one or two warning notifications for processing.

The UE processes any received warning notification by determining if the warning notification is a duplicate of an already received notification. If not, the UE displays the warning notification. If the warning notification has already been received, the UE suppresses the notification, ensuring that a device does not display multiple notifications for a given emergency.

## References

1. 3<sup>rd</sup> Generation Partnership Project (3GPP) TS 23.041 version 16.4.0 Release 16
2. 3GPP TS 22.268 version 16.4.0 Release 16
3. 3GPP TR 22.968 version 16.0.0 Release 16