January 2022

Selective Delivery of Smart Device Audio Alerts to Reduce Interruptions

Anonymous

Selective Delivery of Smart Device Audio Alerts to Reduce Interruptions

ABSTRACT

Multiple interlinked smart devices belonging to a user can each play an audio alert for the same notification, which is a disturbance for the user. This disclosure describes techniques to arbitrate among multiple devices owned by a user when providing audio alerts. The number of audio alerts played per notification is optimized to reduce interruptions to the user while still keeping the user well informed of notifications and emergencies. Per the techniques, the received signal strength indicator (RSSI) of the BLE (or other wireless personal area network) signal is used to infer the distance between the devices. Distance data is used to select the device(s) that play the audio alert and the device(s) that stay silent.

KEYWORDS

- Audio alert
- Smartphone
- Smartwatch
- Bluetooth low energy (BLE)
- Personal area network (PAN)
- Received signal strength indicator (RSSI)
- Wearable device
- Emergency alert
- Commercial mobile alert system (CMAS)
- Notification

BACKGROUND

Multiple interlinked smart devices belonging to a user can each play an audio alert for the same notification, which is a disturbance for the user. For example, when tethered via Bluetooth low energy (BLE), a smartwatch may have its LTE (cellular) modem turned off. In this mode, the smartwatch receives notifications and emergency alerts from the smartphone via BLE. Even when in close proximity, both devices play audio alerts, which is an annoyance to the user and possibly distracts them from ongoing tasks or causes them to ignore the alert. At the same time, a user with a smartwatch that is tethered to a smartphone that is in a different room (e.g., twenty or more feet away) benefits from the smartwatch providing audio alerts, even if it means both devices sound the same alert.

DESCRIPTION

This disclosure describes techniques to arbitrate among multiple devices owned by a user when providing audio alerts. The number of audio alerts played per notification is optimized to reduce interruptions to the user while still keeping the user well informed of notifications and emergencies. Per the techniques, the received signal strength indicator (RSSI) of the BLE (or other wireless personal area network) signal is used to infer the distance between the devices. Distance data is used to select the device(s) that play the audio alert and the device(s) that stay silent. For example, the audio alert can be played on the wearable device (smartwatch) if its RSSI is weaker than a predetermined threshold. Effectively, the smartwatch audio alert plays if the user is beyond a certain distance (a coarse measurement based on the RSSI) from the smartphone, thereby mitigating the likelihood of audio interruptions. Temporary link fluctuations or signal blockages, e.g., reductions in BLE link quality, can be accounted for using hysteresis.

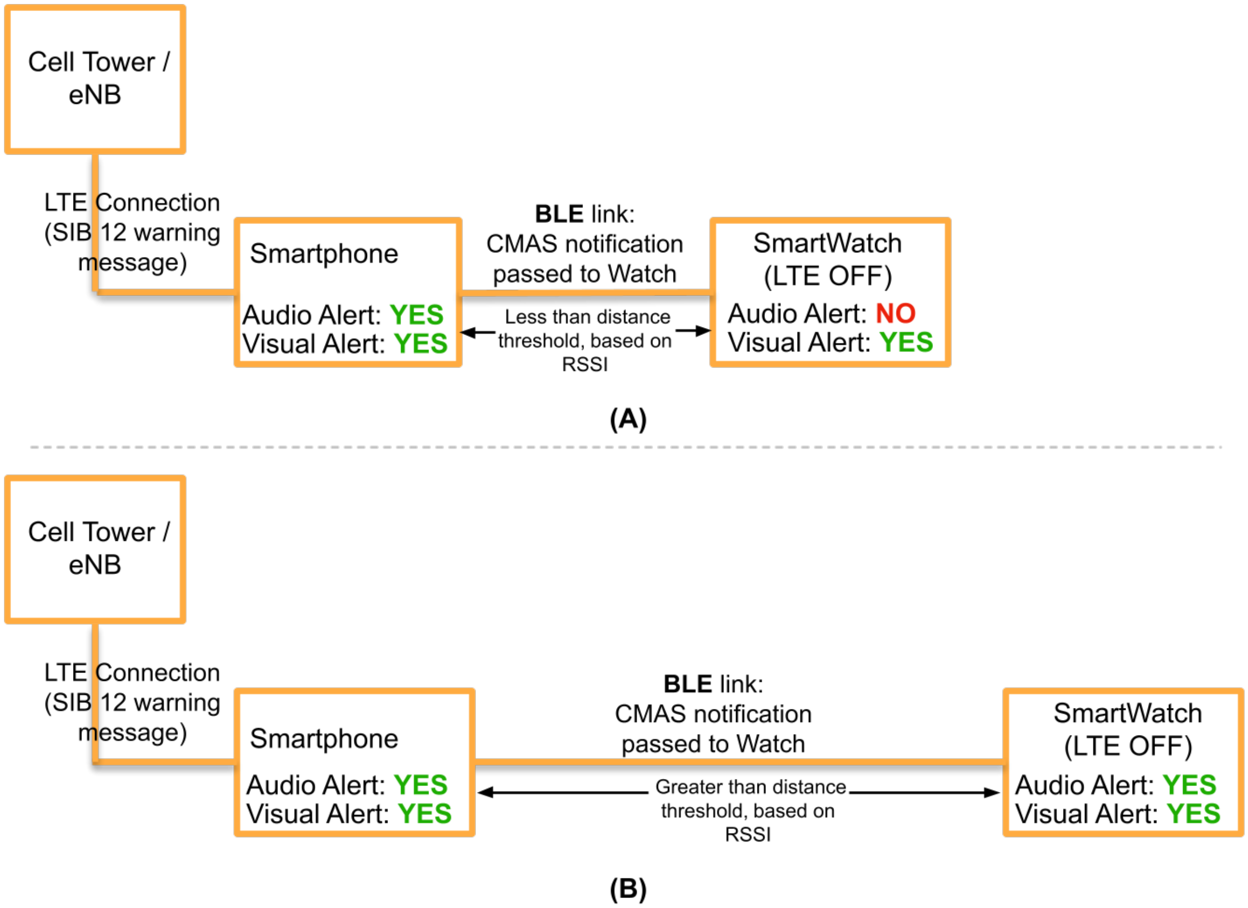

Figure 1: (A) The smartphone and smartwatch are in close proximity, as detected by RSSI, such that only one device (the smartphone) sounds an alert; (B) The smartphone and smartwatch are relatively far apart, as detected by RSSI, such that only both devices sound the alert.

The use of RSSI to detect inter-device distance and to decide the device(s) that sound alerts is illustrated in Fig. 1. In both scenarios A and B illustrated in Fig. 1, the smartphone communicates with a cell tower or base station (eNB) via a cellular standard, e.g., LTE, and the smartphone and smartwatch communicate with each other using a wireless PAN standard, e.g., BLE. In both scenarios, the smartphone receives an alert (in this example, a SIB-12 warning) from the base station, which it passes on to the smartwatch over the BLE link. In the example of Fig. 1, this is in the form of a CMAS (public safety) notification).

In scenario A, the smartphone and smartwatch are in close proximity, as detected by an above-threshold RSSI. Since the two devices are determined to be in relatively close proximity, only the smartphone issues the audio alert while the smartwatch stays silent, such that the user receives only one audio alert. Effectively, both devices are inferred to be close to the user, such that an audio alert from just one device suffices. Visual alerts can be issued on both devices.

In scenario B, the smartphone and smartwatch are relatively far apart, as detected by a below-threshold RSSI. The relatively large distance between the two devices is an indication that the smartwatch is close to the user while the smartphone is far away, or vice-versa. To ensure that the user is able to hear the alert, both the smartphone and the smartwatch issue audio alerts. Visual alerts can be issued on both devices. When selecting the device to issue alerts, the output sound level on the device can be taken into account to ensure that the delivered alert is audible to the user.

CONCLUSION

This disclosure describes techniques to arbitrate among multiple devices owned by the user such that the number of audio alerts played per notification is optimized, thereby interrupting the user less frequently while still keeping the user well informed of notifications. Per the techniques, the received signal strength indicator (RSSI) of the Bluetooth (or other wireless personal area network) signal is used to infer the distance between the devices. Distance data is used to decide the device(s) that play the audio alert and the device(s) that stay silent.