



Location-Based Routing

Improving delivery of 9-1-1 calls

Apple devices can often provide a fast, device-based location estimate when a user dials a 9-1-1 call. This allows networks to route more calls to the local 9-1-1 center responsible for the user's location on the first try.

Background

Historically, wireless 9-1-1 calls have been routed based on a fixed correspondence between the cell-sector serving the user's device and a pre-designated 9-1-1 center. Because cell-sectors often span more than one 9-1-1 center's jurisdiction, however, this arrangement can require a transfer when the center that first receives a user's call is not the center that serves the user's location. Transfers increase overall response time, increase opportunities for technology and operational errors, and may limit the ability of the 9-1-1 center that ultimately serves the user to receive critical location and call-back-number data.

What's New

iOS 13 offers wireless carriers the option to enable location-based routing (LBR) for modern radio access technologies. By providing a fast HELO estimate during 9-1-1 call set-up, Apple devices can reduce the number of calls for which transfers may be required. If a location estimate cannot be provided quickly, carriers may fall-back to the existing fixed-sector routing mechanism.

To achieve routing improvements, carriers should work with individual 9-1-1 authorities or local Public Safety Answering Points (PSAPs) to acquire and de-conflict Geospatial Information System ("GIS") "shape files" that represent their service-area boundaries.

Local 9-1-1 authorities should contact the wireless carriers serving their jurisdiction to discuss enabling location-based routing. Whenever possible, authorities and PSAPs should ensure that a consistent set of routing maps is provided to each carrier, and updated regularly. Additionally, authorities and PSAPs should coordinate maps with neighboring jurisdictions to protect against overlaps and underlaps.

Location-based routing is available on iPhone 6s and later running iOS 13, and on Apple Watch running watchOS 6 when operating on a carrier network that has enabled the feature.

Hybridized Emergency Location

Apple devices contain a variety of location sensors. When a user initiates an emergency call, supported Apple devices can "fuse" information from various sensors, such as Global Navigation Satellite Systems (GNSSs) and Wi-Fi. This process takes advantage of proprietary methods and network-provided assistance data (if available), to quickly calculate a low-uncertainty, high-integrity estimate of the device's location. Apple calls this capability "Hybridized Emergency Location" or "HELO." Technologies such as HELO are often referred to as "Device-Based Hybrid" or "DBH."

Since 2015, Apple has offered wireless carriers free access to HELO for voice calls to 9-1-1. HELO for voice calls is available via participating carriers on iPhone 5s or later running iOS 9.0 or later and on Apple Watch. HELO for Text-to-9-1-1 is available for iPhone running iOS 13, and Apple Watch GPS+Cellular running watchOS 6.

In order to produce HELO estimates with the higher speed required to enable location-based routing, the estimates used for routing may have higher uncertainties than those reported to PSAPs for user-location purposes. User location estimates, sent later in the call flow, will continue to provide the same low-uncertainty, high-integrity service available prior to the deployment of Location-Based Routing.