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ATTORNEYS AT LAW

September 24, 2019

Ex Parte

Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

> Re: *Location-Based Routing For Wireless 911 Calls, PS Docket No. 18-64;*
> *Facilitating the Deployment of Text-to-911 and Other Next Generation 911*
> *Applications, PS Docket Nos. 18-261, 11-153, 10-255*

Dear Ms. Dortch:

On September 20, 2019, Kumar Chhokra and Trey Forgety of Apple Inc. and Paul Margie on behalf of Apple met with FCC Chief Technology Officer Eric Burger and Erika Olsen, Michael Wilhelm, John Evanoff, Dr. Rasoul Safavian, Alex Espinoza, and Nellie Foosaner of the Public Safety and Homeland Security Bureau. During this meeting, Apple reviewed the attached documents describing location-based routing and text-to-911 location features introduced in iOS 13.

Pursuant to the Commission's rules, a copy of this notice is being filed electronically in the above-referenced dockets. If you require any additional information, please contact the undersigned.

Sincerely,

/s/ Paul Margie

Paul Margie
Counsel for Apple Inc.

Enc.

cc: meeting participants

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.

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.

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.

Text-to-9-1-1

Precise location for text-enabled jurisdictions

Apple's Hybridized Emergency Location (HELO) helps Public Safety Answering Points (PSAPs) locate users who text 9-1-1 in an emergency.

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. In independent testing, iPhone 7 and iPhone 8 were shown to exceed the Federal Communications Commission's 2021 requirements for horizontal location accuracy, yielding location fixes 89.1% of the time, and providing sub-50m accuracy 85.2% of the time, even when deep indoors in the most challenging "Dense Urban" environment.

In 2018, Apple launched Enhanced Emergency Data, bringing HELO location fixes to local 9-1-1 centers using a modern, all-IP path. Enhanced Emergency Data is available during voice emergency calls on devices running iOS 12 or later, or watchOS 5 or later.

Background

Originally launched in 2015, Text-to-9-1-1 is now supported by an increasing number of PSAPs in the United States. This capability improves access to critical emergency services for people with disabilities, and offers a life-saving alternative for users who are otherwise unable to converse. Since Text-to-9-1-1 became available, PSAPs have received only limited location information with a text session: typically the location of the tower, or the "centroid" of the cell sector serving the user's device. Over the same time period, however, there have been tremendous advances in emergency location technologies for voice calls. Now, Apple is making those same technologies available when users text 9-1-1 in a supported jurisdiction.

What's New

iOS 13 makes available precise, device-based location information through both the traditional carrier-network path, and through Apple's own Enhanced Emergency Data service, when a user texts 9-1-1 in a jurisdiction that accepts text messages. As iOS 13 rolls-out via software update this Fall, PSAPs should begin to see dramatically-lower uncertainties for users who text 9-1-1 from an iPhone or Apple Watch, reducing response times and improving outcomes for users.

Text-enabled PSAPs should contact their carrier, Text Control Center, and text-handling software representatives to ensure that both the location estimate and search area guidance ("uncertainty") provided by HELO will be delivered automatically to telecommunicators and dispatchers during a Text-to-9-1-1 session.

Location data will also be available to jurisdictions using Apple's Enhanced Emergency Data feature via Apple's partnership with RapidSOS. In some cases, call-taking, computer-aided dispatching, or text-handling software may require an update to automatically fetch EED locations for text sessions.

Location-enabled Text-to-9-1-1 is available on iPhone 6s and later running iOS 13, and on Apple Watch GPS+Cellular running watchOS 6.