What is the location of your emergency? It’s the first piece of information a public safety telecommunicator (PST) at an emergency communications center (ECC) needs to know. In some cases, the caller isn’t the subject of the emergency. This is especially true with medical calls. In most instances, the caller is close to the person in need of help or is the person who needs help themselves. At other times, the caller is contacting the ECC on behalf of someone else who needs help but that person is nowhere near the caller. As a result, just locating callers can be confusing, and PSTs routinely handle such complicated scenarios. No matter the circumstance, the PST must determine where the caller is so the right help can be sent to the right place at the right time.

As smart phones come to dominate emergency call traffic, the National Emergency Address Database is central to acquiring dispatchable locations.

By Steve Leese

To add to this complexity, the device that people use to call 9-1-1 can further complicate the determination of location. Some callers use Voice over Internet Protocol (VoIP) devices which allow session initiation protocol (SIP) signaling to place calls via the internet using a handset regardless of the billing address associated with the device. Other calls come from complex private business exchanges, routing office extensions from satellite branches through a headquarters that can be miles away. Recent statistics suggest that 80 percent or more of the incoming 9-1-1 calls received by ECCs are placed from cellular phones, many of which are smartphones. Various mechanisms and solutions exist to determine where a smartphone is located in an emergency situation and many more are in development. Let’s focus on one such solution available now — utilizing associated reference points to locate the caller’s device — which is known as the National Emergency Address Database (NEAD). Reference points, as they relate to the NEAD, are Wi-Fi access points, Bluetooth beacons and reference points mapped to street addresses with additional location information.

By leveraging commercially deployed reference points, the NEAD will help 9-1-1 professionals locate wireless 9-1-1 callers more quickly and accurately. Wi-Fi access points are networking hardware devices that allow a Wi-Fi device to connect to a wired IP network. Bluetooth beacons are small hardware devices transmitting Bluetooth low energy (BLE) signals. Bluetooth-enabled smartphones are capable of scanning and displaying these signals. Today, beacons are deployed in retail stores, real estate properties, amusement parks, hotels and other public venues to broadcast advertisements and notifications. In the NEAD solution, nearby Wi-Fi access points and Bluetooth beacons are connected to a smart phone when a 9-1-1 call is made. If the Wi-Fi access point and Bluetooth beacon’s location are provisioned into the NEAD, that information can help determine where the caller’s device is located relative to the reference points. An important part of this solution is the word “relative.” It is essential the location determination be that of the caller, and not the reference point to which it is attached. The logic behind the equation is complicated, utilizing algorithms and formulas to correctly correlate this information and determine the location of the caller’s device. Then the estimated location is passed to the PST at the ECC, who ultimately sends it to the first responders. This estimated location is commonly referred to as dispatchable location. From the Federal Communications Commission’s (FCC’s) Fourth Report and Order for Wireless 911 Location Accuracy.
Requirements, dispatchable location is defined as:

A location delivered to the PSAP by the (commercial mobile radio service) provider with a 911 call consisting of the street address of the calling party, plus additional information such as suite, apartment or similar information necessary to adequately identify the location of the calling party. The street address of the calling party must be validated and, to the extent possible, corroborated against other location information prior to delivery of dispatchable location information by the CMRS provider to the PSAP.¹

It is important to note that the addresses provisioned into the NEAD are validated against the Master Street Address Guide (MSAG). The privacy and security of the NEAD database was also a built-in consideration. Wireless carriers must certify to the FCC that any address information contained in the NEAD can only be utilized for the purpose of 9-1-1.

As we know, a typical class of service description for a wireless phase 2 (WPH2) call is displayed on the automatic number identification/automatic location identification (ANI/ALI) screen in the class of service field. In the future, there will be three new classes of service: wireless dispatchable location 2 (WDL2); wireless dispatchable location 1 (WDL1); and wireless civic address (WCVC). These three new classes of service will be displayed in the class of service field to describe a more enhanced level of location accuracy.

WDL2 represents the highest quality of dispatchable location. It will include elements such as the civic address, floor and additional room information for multi-unit buildings (i.e., room, suite or unit). WDL1 represents a medium quality of dispatchable location. Some of the elements of WDL1 are similar to WDL2. The elements of information that WDL1 provides are: civic address, floor (plus or minus one floor), and the building zone or quadrant (e.g., NW, SW, NE, or SE) of the caller. A WCVC class of service will be the designator for a civic address of the caller. Additional sub-address elements, such as room or suite number, will also be displayed to the PST and will appear in what
most ECCs call a “location” field. There has been some customization of these ALI configurations throughout ECCs, and attention must be paid to ensure that these changes will not interfere with the delivery of these new elements. For instance, some ECCs have utilized the location field for miscellaneous information about the location. In many cases this field is limited to 20 characters, so it is important to reserve the capacity to enable the receipt of any enhanced location information.

According to the 2015 FCC report, “Within 6 years: Nationwide CMRS providers must deploy either (1) dispatchable location, or (2) z-axis technology that achieves the Commission-approved z-axis metric, in each of the top 25 Cellular Market Areas (CMAs).” The NEAD solution will not be the sole means of defining WDL2, WDL1 and WCVC. Inevitably, other technologies either evolving or in development will contribute to more accurately and efficiently locating the caller.

In accordance with the 2015 FCC report, a test bed was established so that emerging location technologies could be demonstrated. This test bed tested in 20 representative buildings in two test regions (San Francisco and Atlanta), across four morphologies (dense urban, urban, suburban and rural), and in urban and dense urban buildings (approximately 10 buildings) in Chicago in winter. ECCs in the Atlanta and San Francisco regions recently participated in an end-to-end test of NEAD-derived 9-1-1 calls. This test examined the flow of caller location information from the caller’s device, to obtaining NEAD data, and to the customer premise equipment and CAD display.

Examining the results of these end-to-end tests will support not only an increased understanding of the impacts of the dispatchable location solution on ECC operations, but will also be used to provide recommendations related to the development and delivery of education and training. Analyzing the tests is essential to fully understanding the impacts to 9-1-1 operations.

Determining the caller’s location takes up a considerable amount of time. Imagine the benefits of knowing what room a child is calling from in a multi-story building when their parent is having a heart attack. Or, knowing during a domestic violence incident where the caller is located at a large venue. The impacts on 9-1-1 operations are huge. However, in order to ensure that this new location information is fully optimized, public safety must be educated about the impacts to ECCs. In order to complete this vision, ECCs must prepare themselves for the onset of new information from wireless calls. WDL2, WDL1, and WCVC information...
can assist in determining the caller’s location, but that assistance will only become useful if it is put into practical operational use. As stated above, the NEAD is one method that will utilize these new classes of service. As future location technologies come to fruition, other methods to derive the caller’s location will become a reality. Learning what the new classes of service descriptions are, how they are derived and how this new information is displayed in the ECC is essential to the future of emergency response.

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References
1 www.911nead.org/
3 Ibid
4 www.911locationtestbed.org/Stage_z.html

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