

Location, Location

How technology helps solve E9-1-1 location challenges created by wireless & VoIP emergency calls

By Drew Morin • Senior Vice President & Chief Technology Officer, TeleCommunication Systems (TCS)

The summer months have traditionally been times of greater challenge for emergency telecommunicators and first responders. As travelers vacation in spots far from home and often in unfamiliar surroundings, they are even more vulnerable when an emergency occurs. Knowing the location of the caller is critical, yet more and more of these people are relying on new wireless and Voice over Internet Protocol (VoIP) communications systems, and the devices that use these systems generally are not tied to street addresses.

With more than 82 million wireless 9-1-1 calls placed in 2005, and an estimated 1 million additional VoIP 9-1-1 calls made, public safety responders need to locate such callers in order to effectively dispatch emergency services—no matter where wireless and VoIP users travel.

Consider the many travelers to Orlando's tourist sites, such as Walt Disney theme parks and Universal Studios, who bring their wireless and VoIP devices with them to Florida. If these users dial 9-1-1 with an out-of-town wireless number, how is the wireless handset or VoIP device routed to the PSAP in Orlando instead of the subscriber's home market?

"The concept of 9-1-1 itself has brought certain expectations to the public that the caller's location will always be known," explains Wanda McCarley, president of APCO International. "When people call 9-1-1, they expect the dispatcher to be able to see their locations and know where they are. Many people rely on such location information being available when they are unable to talk. When they can't speak, it's that location information that allows the emergency response to be initiated regardless, and that's very important to the public."

The telecommunicators who answer wireless and VoIP E9-1-1 phone calls day in and day out as the first line of response for 9-1-1 systems need to send first responders to the correct locations. This scenario is where technology is coming to the assistance of telecommunicators.

Location Technology Helps to Save Lives

Technology has brought many valuable assets to public safety communications. A primary example of these assets is E9-1-1 itself, which has changed the way public safety operates.

Telecommunicators understand the need for new technology and are painfully aware of the challenges that wireless and VoIP services have created as they receive more and more calls from people whose devices are not tethered to a specific location. They also understand that technology must provide the solution.

McCarley, a telecommunicator at heart, promotes the need for upgrading technology at the nation's PSAPs, from the largest to the smallest. "In some areas of the United States, we don't have E9-1-1," she says. "So the public, being a transient public, sometimes doesn't realize that they're in an area where E9-1-1 is not present, which creates a huge perception gap for them. And perception gaps are always dangerous."



TCS' Seattle Service Bureau is the only TL-9000-certified facility providing wireless or VoIP 9-1-1 location services in the U.S.

Lat-Long Is Key

"Today, we've seen great improvements in our ability to locate wireless calls and the technology is still evolving," McCarley states. "The location information from today's wireless technology is latitude-longitude (Lat-Long) based, and it varies in accuracy."

Technology is coming to the aid of PSAPs in their efforts to rescue people in emergencies. As a provider of location technology, TeleCommunication

Systems Inc. (TCS), Annapolis, Md., works with PSAPs, wireless carriers and VoIP service providers to provide location information associated with wireless and VoIP E9-1-1 calls.

The sophisticated TCS TL-9000 certified Network Operation Center (NOC) in Seattle facilitates the routing of wireless and VoIP 9-1-1 calls to PSAPs throughout the United States. This specialized center hosts a large U.S. map that displays in real time the emergency wireless and VoIP 9-1-1 calls as they occur nationwide. The driving force behind the center and its operation resides in the patented technology that supports its activities.

TCS envisioned and implemented the technology that enables the routing and delivery of the emergency caller's location information for both wireless and VoIP 9-1-1 calls. This technology is at the core of TCS' NOC. "Fundamentally, the TCS NOC processes wireless and VoIP-originated E9-1-1 calls from across the U.S. and passes both the location information and the callback number to the local PSAP to provide E9-1-1," explains Tim Lorello, TCS senior vice president and chief marketing officer.

“To accomplish this, the TCS platform has to know the location of the caller first. The second requirement needed—and sometimes this is underestimated—is to route the E9-1-1 call to the proper PSAP, and there are over 6,000 PSAPs. The third step is to automatically deliver location and callback number information to the correct PSAP so responders can be dispatched promptly.”

With five “9s” reliability, the Seattle center handles nearly 100,000 calls every day by extracting the data out of the network and then delivering it to the PSAP. “The location information is gathered by our system and presented to public safety,” says Lorello. “We provide these services on behalf of 37 wireless carriers in 46 states, and we work with thousands of PSAPs. In addition, we are working with Voice over IP operators in support of over 1.5 million subscribers, and these numbers are growing rapidly.”

TCS’ solution automatically provides location and telephone number information to local PSAPs—even when the caller’s handheld number is an out-of-area number.

To solve this area code problem, TCS created technology in 1997 that replaces the actual phone number with a temporary number that is recognized by the system as a local phone number. At the TCS NOC, the out-of-area number is automatically replaced with one that looks like a local number.

The PSAP system uses this temporary number to query the local exchange carrier (LEC) for the caller’s current location. TCS’ technology then replaces the temporary phone number with the actual phone number and the current physical location of the caller. The data is automatically and reliably gathered in the background while the call is being set up. This is how TCS passes precise location information, up to 50-meter accuracy in many cases, for E9-1-1 calls around the country.

The TCS technology that works well for wireless E9-1-1 calls also serves VoIP E9-1-1 callers as they move about. VoIP service providers offer terminal adapters (TAs) that enable users to unplug their phones from their homes or offices. From there, the user can take the TA to a hotel room, a house, the beach, or any place with Internet access.

The technology is not available everywhere yet. In some areas, the wireless coverage is not there to support E9-1-1; in other areas where wireless coverage exists, wireless carriers have not moved to a Phase II environment, or the PSAP has not moved to a Phase II environment and, therefore, the information cannot be processed and relayed. Much work remains to ensure that the E9-1-1 perception gaps are closed.

About the Author

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