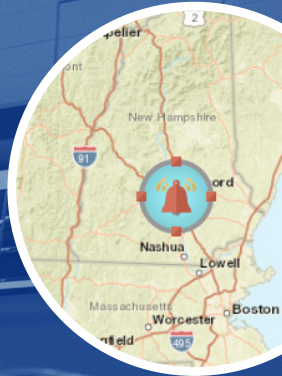




IMPROVING WIRELESS CALL HANDLING IN 9-1-1 CENTERS

THE DATA AND TECHNOLOGIES NEEDED TO
MAKE IT HAPPEN TODAY

A Solacom White Paper





NG9-1-1 Systems Are Key to Improving Wireless Call Handling

There has been no shortage of stories in the media about the challenges public safety answering points (PSAPs) experience when trying to determine the location of 9-1-1 calls from mobile phones. Imprecise and inaccurate location information can have tragic results for those calling 9-1-1. The irony is that the technologies and capabilities required to resolve the issue and pinpoint the location of wireless callers exist today in Next Generation 9-1-1 (NG9-1-1) emergency call handling and management systems.

At some point, every PSAP will have to evolve to NG9-1-1 emergency call handling and management capabilities. With the explosion of mobile devices and peoples' increasing reliance on wireless communications, PSAPs that make the move to NG9-1-1 systems sooner rather than later will be in the best position to provide better service to more callers.

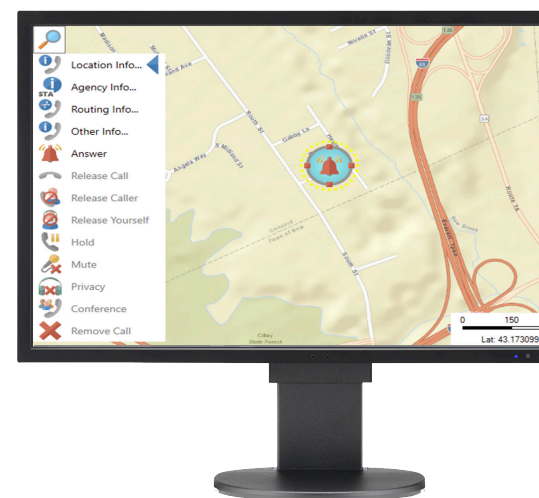
NG9-1-1 call handling and management systems leverage location information from multiple sources, including a geographic information system (GIS) database and third-party databases that offer device-based location data. They also give PSAPs the opportunity to go beyond the NENA standard for GIS data and incorporate building floor plans and venue layouts to further improve the precision of location information.

Together, these capabilities enable NG9-1-1 systems to provide call takers with far more precise location information than is available in today's Master Street Address Guide (MSAG), Emergency Service Number (ESN), and Automatic Location Information (ALI) databases. Perhaps most importantly, NG9-1-1 systems also give PSAPs new ways to access and visualize detailed location data.

It's the combination of PSAPs' own GIS data, location data from other sources, and the flexibility to manipulate that data in different ways that ultimately gives PSAPs the ability to improve the way 9-1-1 calls from mobile phones are handled.

The FCC Recognizes the Value of Wireless Caller Location Data

The Federal Communications Commission (FCC) consumer guide for wireless services says 70 percent of all U.S. calls to 9-1-1 originate from mobile phones.¹ The federal regulator also estimates that accelerating response times to mobile phone callers by one minute could save more than 10,000 lives per year.² As a result, the FCC has mandated that mobile network operators must provide wireless caller location information that is accurate to within 50 meters at least 80 percent of the time by 2021.³





Wireless Call Location Data Comes From Three Main Sources

Precise location data for wireless calls is crucial from the moment 9-1-1 is called. Today, PSAPs can access three main sources of wireless call location data:

- Phase I and Phase II location data from mobile network operators
- Mobile device location data from a third party
- GIS location data through an NG9-1-1 emergency call handling and management system

Phase I and Phase II Location Data

To improve PSAPs' ability to locate wireless calls, the FCC requires mobile network operators to provide location data to PSAPs in two phases of precision within six months of request.

Phase I location information is a coarse estimate of the mobile device location based on the location of the cell tower that delivered the call. Phase I location data adds the following information to the ALI:

- Name of the mobile operator
- Mobile operator's customer service phone number
- Callback number for the caller
- Cell tower location

In some cases, the latitude and longitude for the cell tower are also included in the ALI.

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Two major issues arise with Phase I location information:

- The caller may not be near the cell tower that delivered the call. While the caller may be only yards from the tower in urban environments, they could be miles from the tower in rural locations, significantly increasing the amount of time it takes first responders to find them.
- Location information is used to determine which PSAP gets the call. If the cell tower is near a PSAP boundary, the call may be routed to the wrong PSAP, further slowing response times.

Phase II location data increases the precision of wireless caller location information. All of the Phase I information is included but, the latitude and longitude for the mobile device location, not the cell tower, is provided with the ALI.

While Phase II location information is more accurate, it takes more time to gather the signal data and perform the necessary triangulation calculations, so it is not immediately provided to PSAPs. The emergency call handling system must be configured to automatically request the Phase II information after the Phase I information is received, or call takers must manually refresh the ALI information to get the updated location details.

Mobile Device Location Data

The wide recognition of PSAPs' challenges in quickly accessing the precise location of wireless callers has led to two dramatic improvements in the accuracy and precision of the location information that's made available to them.

As a first step, a third-party organization called the RapidSOS NG911 Clearinghouse gave PSAPs access to the Advanced Mobile Location (AML) data a smartphone transmits when a 9-1-1 call is made. To help PSAPs take advantage of this data, advanced NG9-1-1 emergency call handling and management systems added the ability to query third-party databases directly into their systems.⁴

In mid-2018 the situation became even brighter as leading mobile phone manufacturers and industry organizations began announcing their own plans to help ensure PSAPs have access to precise wireless call location data.

- Apple will share its Hybridized Emergency Location (HELO) data from iOS 12 devices.⁵ The HELO technology combines cell tower location information with GPS and Wi-Fi access point information on the device to increase the accuracy of location data.



- Google will use its Android Emergency Location Service (ELS) to transmit faster and more-accurate emergency location information for wireless calls made indoors and outdoors.⁶
- Wireless industry association, CTIA, announced that national wireless providers AT&T, Sprint, T-Mobile, and Verizon will integrate device-based hybrid (DBH) location technology solutions to help resolve the issue. DBH solutions combine data from technologies and sensors, including satellite GPS and crowd-sourced Wi-Fi measurements, to more accurately determine wireless caller location, particularly inside buildings.

Together, these initiatives will give PSAPs crucial new insights into a mobile caller's location, such as the caller's location on a specific floor in a tall building or the caller's precise location within a large indoor-outdoor venue.

GIS Data

While legacy Enhanced 9-1-1 (E9-1-1) call handling systems can typically use the location data described above, only NG9-1-1 emergency call handling and management systems can leverage the data in a GIS database. A PSAP's ability to access this GIS data is a major advantage in terms of its ability to quickly pinpoint wireless caller location.

The draft NENA standard for the NG9-1-1 GIS data model provides extremely precise requirements for numerous mandatory and recommended GIS data elements, including:

- Road centerlines
- PSAP boundaries
- Emergency service boundaries
- Street name aliases
- Landmark names and aliases
- States and counties
- Municipal and community boundaries

The information PSAPs need to build a GIS database already exists in various databases and formats. The challenge for PSAPs is to find it, analyze it, and rework it to meet the NENA standard. For more information about acquiring, auditing, and adapting GIS data for use in NG9-1-1 systems, read our white paper [Locating Callers Faster: Optimizing GIS Data and Mapping to Pinpoint Caller Location](#).

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Putting Wireless Call Location Data Into Action

While the advances in providing PSAPs with improved location information are extremely important, the way PSAPs integrate location information into their systems and processes is equally vital to improving wireless call handling.

There are different ways to provide wireless caller location information to call takers, ranging from basic text to interactive, graphical maps. The option PSAPs choose today depends on their overall NG9-1-1 evolution plan and budget.

The good news is PSAPs can start with a basic approach to viewing wireless call data and evolve to more-sophisticated capabilities over time. The most advanced NG9-1-1 systems offer a mapping application as an option, so PSAPs have the flexibility to integrate interactive mapping capabilities into their emergency call handling and management solution when their budget permits it.

Publicly Available Mapping Applications

PSAPs that are not ready to invest in an integrated mapping application and do not have a computer-aided dispatch (CAD) system can manually plot a caller's X and Y location coordinates in a publicly available mapping application.

While using a generic mapping application to view caller location can help PSAPs meet budget requirements in the short term, it is a disjointed approach that completely separates caller location data from the call handling process. It requires use of multiple disparate and disconnected systems and manual entry of location data. These requirements complicate processes, increase the risk of human error, and delay response times.

The CAD System

Caller location data can also be sent directly to the PSAP's CAD system. If the CAD system includes mapping capabilities, the location data can be graphically displayed. If the CAD system does not include mapping capabilities, the location data can still be viewed in plain text format.



This is also a disjointed approach that separates caller location data from the call handling process. However, because location information is automatically sent to the CAD and displayed in the supported formats, it eliminates the need to manually enter location data.

A Fully Integrated and Interactive Visual Map

A sophisticated mapping application that's integrated into the NG9-1-1 emergency call handling and management system allows call takers to quickly and easily make the best possible use of location data from all sources.

With an integrated mapping application, call takers can see the location and status of all calls on the map at a glance. They can even answer and manage calls through the map, automatically zooming to the active call location when the call is answered.

The ability to instantly see the call location on the map can help PSAPs prioritize incoming calls. For example, a major incident at an event venue can result in dozens of calls from the same location. It may not make sense for call takers to answer every one of those calls when they can see additional calls coming in from other locations. Call takers can use the map view to quickly see where calls are coming from, identify the call status, and make more informed decisions.

The map can also be used to isolate and view the relevant information from the GIS database in layers. For example, call takers can show only certain types of buildings such as schools or banks. And they can easily zoom in and out and pan around the map view and visually track caller movements to help guide first responders along the fastest path to the caller.



Giving Each PSAP Exactly What They Need

As PSAPs plan their evolution to NG9-1-1 emergency call handling and management systems, they must carefully evaluate how each system improves wireless call handling. Calls from mobile phones already make up a large majority of 9-1-1 calls. And that number will only increase as the landline generation of callers fades away and more people take advantage of the convenience and flexibility that mobile phones offer.

Solacom understands that each PSAP must evolve to full NG9-1-1 operations at the pace that's right for their budget and operational priorities. That's why the Solacom Guardian 9-1-1 Call Handling solution is the most flexible, user-centric NG9-1-1 solution available today.

The Guardian 9-1-1 Call Handling solution supports Phase I and Phase II location data, device data from third-party sources, and GIS data. To help PSAPs make the best possible use of geospatial data, Solacom offers complete GIS database development, standardization, and maintenance services. With our assistance and expertise, PSAPs can simplify the transition to new data standards and ensure that location-based information meets industry benchmarks for uniformity, accuracy, and timeliness.

To give PSAPs the flexibility to evolve to integrated mapping capabilities over time, the Guardian 9-1-1 Call Handling solution can be used with text-based location information, publicly available mapping applications, and CAD systems. When PSAPs are ready, they can take advantage of the Solacom Guardian Map application, an advanced mapping application that integrates seamlessly with the Guardian 9-1-1 Call Handling solution.

Guardian Map provides full, visual call handling capabilities from within the mapping application, allowing call takers to easily consider the caller's location as part of their decision-making process before and during the call. There's no need for call takers to switch computers, convert text coordinates to a visual display, or liaise with coworkers to take precise caller location into account.

Together, these capabilities allow PSAPs to dramatically improve wireless call handling today and evolve to even more advanced wireless call handling features in the future.

Leading PSAPs Rely on Solacom

A growing number of PSAPs around the U.S. are recognizing the value of partnering with Solacom to improve wireless call handling:

- The Emergency Services Communications Bureau (ESCB) in the **State of Maine** is one of the first organizations to use geospatial routing statewide to identify wireless call locations based on caller location instead of tower location. The ESCB enhanced its Solacom Guardian 9-1-1 Call Handling solution with Guardian Map so call takers can quickly and easily select the most appropriate agency for call transfers. [Download the case study.](#)
- The **Owensboro-Daviess County Central Dispatch** in Kentucky receives about 50,000 wireless calls every year. Because the Guardian 9-1-1 Call Handling solution seamlessly integrates location data from third parties, the Central Dispatch has been able to improve its responses to 9-1-1 calls from smartphone users. [Download the case study.](#)

Acronyms

ALI	Automatic Location Information	ESN	Emergency Service Number
AML	Advanced Mobile Location	FCC	Federal Communications Commission
CAD	Computer-aided dispatch	GIS	Geographic information system
DBH	Device-based hybrid	HELO	Hybridized Emergency Location
E9-1-1	Enhanced 9-1-1	MSAG	Master Street Address Guide
ELS	Emergency Location Service	NG9-1-1	Next Generation 9-1-1
ESCB	Emergency Services Communications Bureau	PSAP	Public safety answering point

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Additional Information

[Click here](#) for more information about how Solacom can help you improve wireless call handling as part of a complete NG9-1-1 call handling and management solution for your PSAP.

Contact Us

Solacom 9-1-1 call handling and management solutions are built on more than 30 years of research and innovation in the application of advanced hardware and software technologies for public safety. Today, Solacom Guardian 9-1-1 solutions support thousands of agencies affecting millions of lives annually — from dense urban environments to statewide deployments.

Contact us today to discover how our Guardian solutions can help your PSAP streamline 9-1-1 call handling and management processes and enable more efficient collection of critical information in emergency situations.

Visit our website: www.solacom.com

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Improving Wireless Call Handling in 9-1-1 Centers

