Breakthrough 9-1-1 Technology for Saving Lives

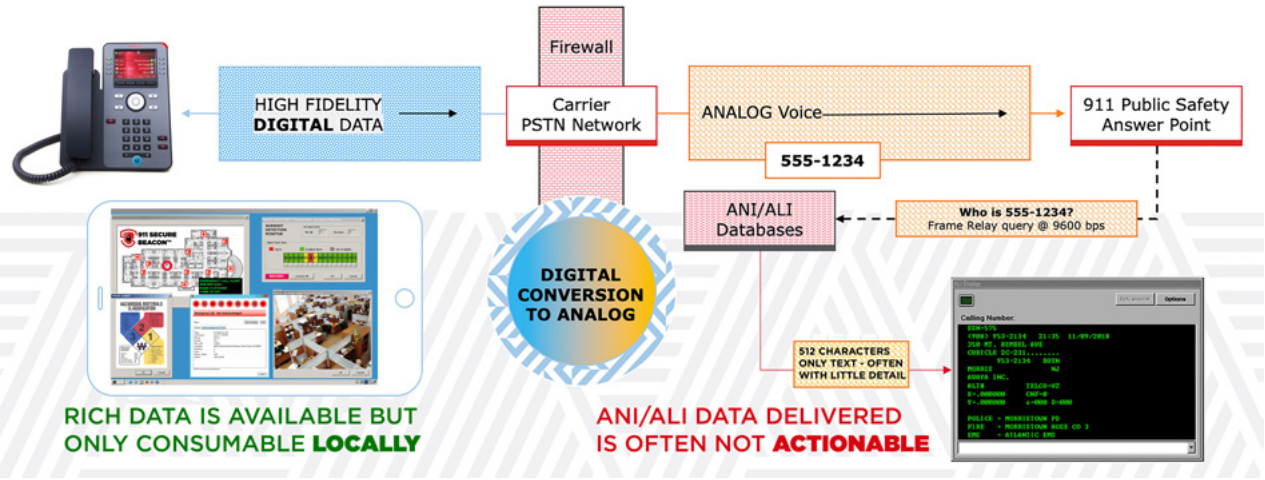
9-1-1 is changing: the network, the information being transmitted, and the ability for 9-1-1 call takers to receive and consume that data.

Back in 1968, making an emergency call was as simple as calling your local police or fire department. Citizens from coast to coast reached out to thousands of agencies, all using unique local numbers. With most using fixed landlines from familiar locations, calling for help wasn't seen as much of a problem. On the other hand, AT&T did see the bigger picture and problem, and worked to develop a nationwide deployment of what is known today as, the National 9-1-1 Telephone Network.

While this was taking place, in the quiet Alabama town of Haleyville, a couple of dedicated phone company engineers got together and beat "Ma Bell" to the punch. With incredible resolve, the Haleyville Telephone Company, a small independent local exchange carrier, put plans in place to secure their position in the history books with the very first 9-1-1 call. Shortly thereafter, on February 16, 1968, they succeeded with a call from the mayor's office to the Haleyville police station at 2 o'clock in the afternoon, and history was made.

At that time, the call routing logic was simple. Anyone on the Haleyville central office exchange dialing 9-1-1 would be routed to the local police department where the call would ring on a bright red telephone. The technology was easily implemented but provided little functionality beyond basic call connection and a 3-digit shorty code to reach local police. Today, that red phone is proudly on display in the Law Enforcement Museum in Washington DC.

Over a decade later, the 9-1-1 network was entering its formidable teenage years, and telephony was advancing with the adoption of new Digital Central Offices. In an effort to improve the nation's 9-1-1 service, Caller ID was delivered on 9-1-1 calls. While call takers now had the number that was calling, they still had no information on the originating address.



The new NENA i3 compliant information was now accessible to authorized PSAPs through integrations into all major call-taking equipment, mapping software, and CAD products.

Enter ANI and ALI. The Automatic Number Identification and Automatic Location Information databases provided a referenceable knowledge repository allowing a 9-1-1 call taker to query with a telephone number, and then retrieve the location information associated with that record. This gave the 9-1-1 call taker valuable location information on the originating caller. While this solved the problem of location for fixed land line telephones, the technology was based on street addresses and not really applicable to a new breed of telephone that was quickly emerging.

On the mobile front, cellular phones were coming into existence, offering a new freedom of mobility to the consumer. With this latest wireless innovation, the actual device (as well as the telephone number assigned to it) no longer existed at a fixed place, meaning the telephone number assigned to it, was of no use in determining its actual location. With these devices becoming more popular, cellular carriers added Wireless Phase 1 (WP1) location reporting. This information provided the 9-1-1 call taker with the address of the cellular tower that the mobile caller was connecting through. While this was nowhere near accurate enough to route the call to the appropriate agency servicing that geographic area, it initially worked well, as the density of cellular towers was nowhere near what it is today.

On the business front, Multi-Line Telephone Systems (MLTS) with Direct Inward Dial numbers were also becoming common deployments in hotels, schools, and commercial businesses, and any other venue that had multiple telephones throughout the building. This created additional problems for the aging ANI/ALI database construct for calling 9-1-1. Many phones were internal and didn't have an assigned telephone number, so no database entry could exist for the device. Also, these MLTS systems used a pool of trunks common to all telephones, each with a telephone number that reported only the main business address. This left public safety responders in a bit if a lurch when responding to a high-rise building of thousands of phones, with no indication of the caller location. Additionally, the security staff at the building were often unaware an event had occurred.

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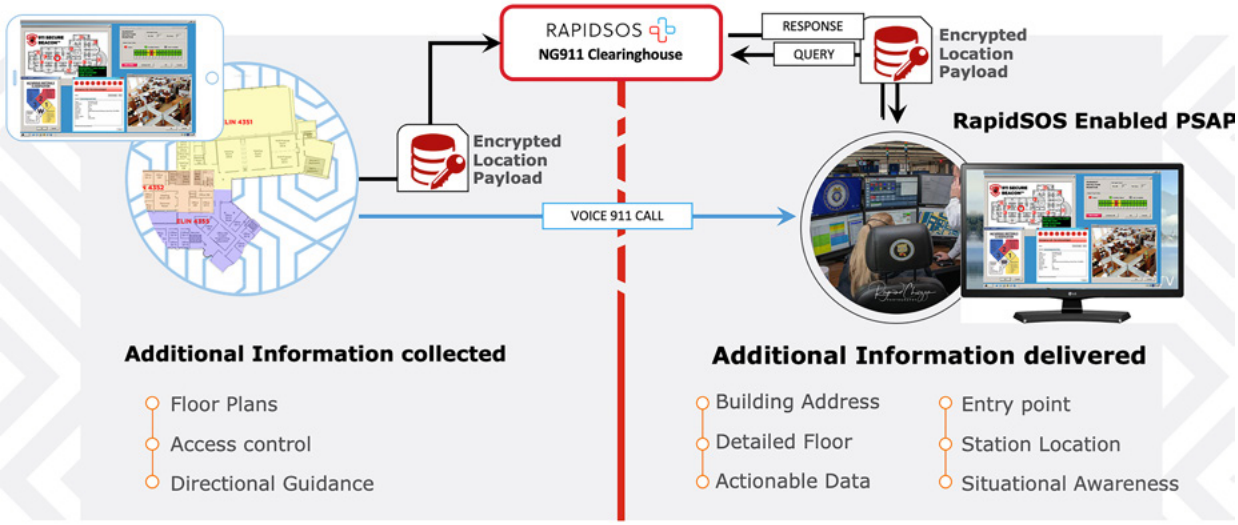
The knee-jerk reaction was to require better location reporting, but while that seemingly corrected the problem, the operational side of the problem was ignored, leaving businesses with a lose-lose proposition. Reporting to the station level would require a telephone number at each station, and an associated ANI/ALI record, both of which incur a monthly cost. On top of that, often a platform that managed the data was required to maintain the accuracy of that database and make the daily submissions of changes as individuals move within the facility. Anyone working in a large company knows that people move within an office space on a daily basis as new teams are formed, or the business changes internal staffing. It is not uncommon for a large corporation to move several hundred people a week, both within and between facilities.

This led to a dichotomy of the needs of the business and the available capabilities to manage the appropriate level of emergency services. In many cases, it created a financial burden. While no dollar amount can be placed on the life of a person, or their safety and well-being, it should not be interpreted as a free and open license to charge fees that are not commensurate, in the name of public safety, with the services being provided.

Looking back, it is clear that the cellular industry, and their challenges created a very similar problem for location and dispatchable address. In fact, according to CTIA's 2019 Annual Report, there are nearly 1.3 devices for every person in the US. Clearly, with 80% of the 240,000,000 calls a year originating from cellular devices, a solution had to be on the horizon, which with any luck could be reused for the MLTS industry to provide reliable location and dispatchable addresses for businesses. Fortunately, there was, thanks to some determination and innovation by a group of Ivy League business students, and their newly formed company RapidSOS.

NENA, the National Emergency Number Association, has worked to develop a standard for Next Generation 9-1-1 called the NENA i3 Solution - Stage 3 Standard: Detailed Functional and Interface Standards for the NENA i3 Solution. The standard, recognized worldwide, "... builds upon prior NENA publications including i3 requirements and architecture documents" and provides an operational framework of functional elements to deliver end to end NG9-1-1 services. RapidSOS took this framework and delivered a NENA i3 compliant Location Information Server (LIS) and Additional Data Repository (ADR). This functionality replaced the need for antiquated ANI/ALI databases that were limited in what they could store, and provided the ability to update in near real-time. The new NENA i3 compliant information was now accessible to authorized Public Safety Answering Points (PSAPs) through integrations into all major call-taking equipment, mapping software, and CAD products. This, however, only solved half of the problem. The problem of getting the data to the 9-1-1 PSAP was solved, but the data still needed to exist and be put in the database.

Fortunately, cellular device manufacturers saw the value of the NG9-1-1 architecture, and the innovation that RapidSOS brought to the table, and in the fall of 2018, both Apple and Google made changes to their operating systems that would utilize the RapidSOS Additional Data Repository (ADR) as a mechanism to place the location information from the device into a place where the 9-1-1 PSAP could retrieve the information when they received a call.



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For Avaya, RapidSOS brought to the table a revolutionary capability for Enterprise MLTS systems. For the first time ever, real-time information, unconstrained by the limitations of a 512-character text only database providing a single field of 20 characters to deliver what was deemed as the most critical information, was available to provide full multi-media information in near real-time directly to public safety and first responders.

For the first time ever, paramedics could enter a building through the most appropriate entrance, with a floorplan on their tablet telling them exactly where to go, and which elevator could accommodate a stretcher, and get to where they were needed quickly and efficiently.

For the first time ever, a police SWAT team could have access to video cameras in the lobby of a bank, and see a masked gunman holding customers hostage when they received a hold-up alarm, instead of wondering if someone triggered it by accident, again.

For the first time ever, audio sensors could detect gunshots in a school or public facility and provide real-time actionable information that would help coordinate the appropriate response, and assist in providing immediate updates of any new incidents that could be analyzed and evaluated before blindly sending in resources into be harm's way.

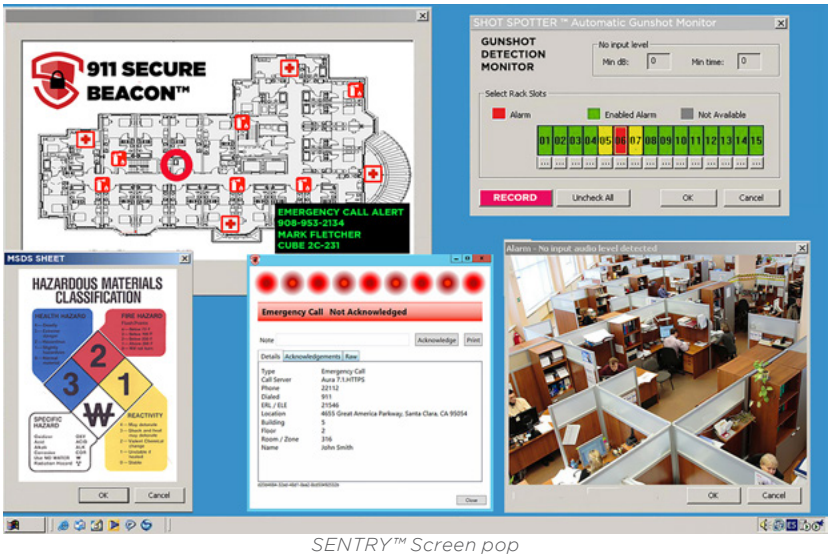
About Avaya

Businesses are built on the experiences they provide and every day millions of those experiences are built by Avaya (NYSE:AVYA). For over one hundred years, we've enabled organizations around the globe to win—by creating intelligent communications experiences for customers and employees. Avaya builds open, converged and innovative solutions to enhance and simplify communications and collaboration—in the cloud, on premise, or a hybrid of both. To grow your business, we're committed to innovation, partnership, and a relentless focus on what's next. We're the technology company you trust to help you deliver Experiences that Matter. Visit us at www.avaya.com.

Clearly, this was one of those rare instances when technology not only improved a situation but provided a bridge to existing technology while not creating a future burden and dependence on siloed technology approaches that were proprietary in nature.

There is no doubt that a dispatchable location is clearly the most valuable piece of information needed by public safety. However, this is being hyped as requiring the exact room or cube number of the caller, with no regard for the understandability or actionable nature of the information. The fact that I sit in cube 2C-231 has no meaning to anyone outside of my company. Without a floor plan to reference, first responders have no idea where 2C-231 is within the building, or even the floor it is located on. While it may be, albeit detailed and accurate, it has no relevance and is not actionable. For internal responders, familiar with the building, it is extremely relevant, and should be provided to those within the facility.

9-1-1 is changing: the network, the information being transmitted, and the ability for both 9-1-1 call takers and first responders in the field to receive and consume that data. With new modalities of information comes new technology to manage and handle that data, getting the information that is needed to the people who needed it in an expeditious and effective manner. At Avaya, we examine any problem with an end-to-end approach, and 9-1-1 Emergency calling is no different. The SENTRY™ solution collects information about devices, their location, and other data points and then correlates that information and presents it internally to those who need to know. With integration into the RapidSOS NENA i3 compliant Additional Data Repository (ADR), that information is also made available, in near real-time, to nearly any 9-1-1 PSAP in the US.



SENTRY™ Screen pop

This provides full compliance with Kari's Law, the Ray Baum Act – Section 506, and the on-site notification requirements that provide the required situational awareness to building staff in the event of an emergency call.

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