



AVAYA SOLUTIONS FOR PUBLIC SAFETY

Bridging the Information Gap Across the ‘Continuum of Care’ to Link Citizens, Emergency Call Centers, Hospitals & First Responders

The Great Divide in Emergency Communications

In situations where every second counts, seamless communication can make all the difference. That’s especially true in emergency response. Everyone across the continuum of care needs real-time access to information and to each other to make certain each individual in distress receives optimal care.

Unfortunately, though, significant communication gaps persist across the entire emergency response process. This not only includes citizens and public safety call takers, but also first responders, trauma centers and hospitals.

For example, first responders delivering on-scene care typically lack access to electronic medical records (EMRs) that could help them understand underlying medical conditions or life-threatening allergies. Once they’ve readied a patient for transport, they lack visibility into the current capacity status of nearby treatment facilities, including which are best equipped to handle the patient’s condition. And they don’t have data to indicate how long it will take to get to a given hospital or trauma center based on current traffic conditions, despite the existence of networks and systems containing this information.

Meanwhile, care teams at hospitals lack a complete picture of inbound patients. The only information they have is what has been verbally conveyed to them about a patient’s status or the services first responders have administered on site or during transport. Precious time can be lost since they don’t know precisely what to expect when the patient arrives for further care.

The Culprit: Technology Silos

The linchpin linking citizens and first responders during an emergency is the public safety answering point (PSAP) – the call center that answers emergency calls and dispatches appropriate resources. Unfortunately, the legacy E911 PSAPs today only have analog voice capabilities available to them – technology that may be a half-

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century old and unable to meet modern-day demands from increasingly tech-savvy citizens.

For example, PSAPs are unable to receive and share video or photos that can provide a much richer view of an emergency and what first responders will be facing. Current data from the FCC shows most are even unable to receive text messages.¹ (Imagine trying to hide from someone intent on doing you harm and having to risk giving away your location in order to call instead of text for help.)

In addition, despite the fact that today's communication devices can understand exactly where a mobile caller is located, public safety organizations are still unable to access device location data to determine a caller's location. Instead, PSAPs are forced to rely on carrier-based tower triangulations and GPS data for a rough idea of where a caller is located. Historically, this location information is only accurate enough for call routing; the precise physical address of the caller needed by dispatchers remains unknown.

Commercial ride-share services, retailers and pizza delivery teams routinely leverage device location information by simply installing an app on the device. Want a pizza? Simply order through the app and your pie will be delivered directly to your door. So the obvious question becomes, "Why not a 911 App?" They are out there. In fact, a quick Google search of "911 App" will return millions of hits. But experience shows that when apps are available, they've been used to report fewer than 2% of all emergency requests. That's because each of us is trained to dial 911 or some other local emergency number. At the end of the day, it is clear that any solution for emergency calls must be inherent in the mobile device itself.

Another important issue is that PSAPs are often unable to provide robust data connectivity between first responders and other medical professionals to ensure everyone is on the same page and poised to deliver the best possible care. In addition, service boundaries can change. That means collaboration needs to be both dynamic and ad hoc.

The slowness of PSAPs to adopt modern-day technology is largely a result of functional limitations in the core network. Because of this, most PSAPs are locked into outdated solutions with no opportunity to upgrade.

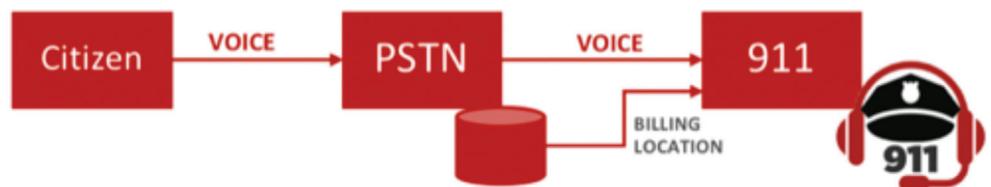
The Solution: A Game-Changing New Ecosystem

There is, though, a path forward. As you will see in this paper, Avaya and its technology partners are changing the game and leading the industry with a new open, affordable emergency response ecosystem. We offer both the core

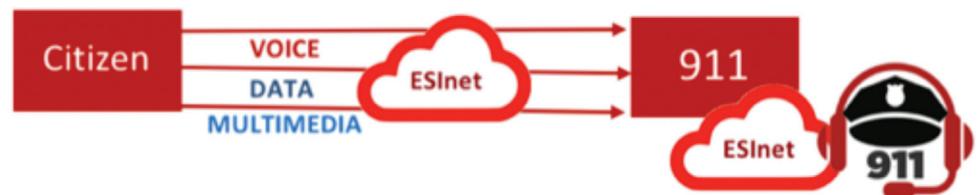
¹ Text 911 Master PSAP Registry as of December 21, 2017 - Last Accessed December 22, 2017 <https://www.fcc.gov/file/12285/download>

infrastructure needed for true end-to-end connectivity, as well as the specialized communication capabilities required to deliver a faster, better-informed and more effective emergency response. As a result, PSAPs have a way to overcome their current technology limitations and can provide the best possible service to save lives.

Legacy E911 Network Today



Future NG911 Network Tomorrow



Legacy and Future Emergency Service Network Topologies

Avaya's Approach to Emergency Communications & Response

Avaya is the only communication solution provider spanning the entire continuum of care – from the enterprise office worker placing an emergency call, to a PSAP, to mobile first responders, and to healthcare professionals at hospitals and trauma centers. It's a role we take seriously.

We've worked closely with our Avaya DevConnect Technology Partners on innovative ways to transform the emergency response ecosystem. Together we're bridging the originating networks that contain rich, multimedia data with the "final mile" that exists among first responders, hospitals and trauma centers. Our approach is to layer open but specialized workflow and services for emergency response on top of a powerful, standards-based unified communications infrastructure.

Step 1: Adopt an Open Foundation

It's time for PSAPs to step away from costly proprietary infrastructures and adopt the same, proven, IP-based unified communication networks used successfully by businesses and organizations around the globe every day. These standards-based

solutions are affordable to implement and easy to upgrade and evolve. In addition, agencies no longer have to worry about being locked into costly, specialized equipment that doesn't keep up with the times.

Making the move couldn't be easier. In some cases, it's simply a matter of extending existing resources. A local government using an Avaya Aura® platform, for example, could simply extend its network to encompass emergency call centers across the region – providing a foundation for multimedia call-handling that keeps up with the reality of today's modern-day demands. Or a single PSAP with an Avaya Aura environment could extend its network to encompass other regional call-taking centers for redundancy and efficiency of scale.

In other instances, organizations can take advantage of cloud-based Avaya Aura services – whether their move to the cloud is planned or unplanned. When existing local network resources are compromised or a PSAP wants the flexibility to deploy in a cloud-based model, Avaya makes a move to the cloud simple and non-disruptive – enabling an immediate recovery or elimination of a CAPEX investment, should that make sense. This is the scenario Avaya customers rely on daily to help them succeed in communication-intensive businesses, such as travel, healthcare and retail.

Regardless of the deployment scenario, when your PSAP adopts an Avaya foundation, you can take advantage of new Avaya-compatible innovations that help you work seamlessly across the emergency services continuum – connecting and sharing the right information, with the right people and at the right time.

Step 2: Layer on Next-Gen Software for Emergency Response Workflow

Avaya is working with DevConnect Partners such as Beta 80 to address a critical aspect of any emergency response ecosystem – what happens on the receiving end of an emergency call in order to best support incident management and dispatch, while eliminating any workflow gaps.

Beta 80's iO Computer Aided Dispatch (CAD) serves as a hub that enables call takers to process emergency calls and streamline communication, regardless of the technology used to reach the PSAP. Unlike the proprietary solutions today that may impede progress in the emergency response arena, iO Cad is based on NENA i3 NG911 open standards. That makes it easy to scale and to update with new software-based functions and technologies. The end result: the PSAP, first responders, hospitals and trauma centers have a full range of information at their fingertips so they can make better-informed decisions.

What can PSAPs using an Avaya-Beta 80 solution do differently?

You can establish a free flow of information among first responders and hospital staff and better coordinate emergency activities. And you can do it while complying with HIPAA and other security and privacy policies.

You can break free from voice-only calls and readily share text, photos and videos. You can even capture information from social media and crowd-sourcing apps, such as Facebook, Twitter and Waze for traffic data. That's especially important in situations where peak call volumes reach unexpected highs.



Computer Aided Dispatch and Geo-Spatial Boundary Mapping

During 2017's devastating flood in Houston, Texas, for example, the local PSAP simply didn't have enough call takers to answer incoming emergency requests. Desperate residents turned to social media to post situation details and plea for help. While the PSAP had access to social media, it did not have the tools or the staff required to respond to outreach from citizens, first responders and the thousands of volunteers streaming in to help. Because of this, tens of thousands of requests for assistance went unanswered.

How Next-Gen Connectivity Bridges the Information Gap

Linking Emergency Responders and Hospitals

The Beta 80 iO CAD provides the connectivity your PSAP needs to span all the players in any emergency scenario and to manage multiple types of media. Dispatchers can use the solution to capture patient name, incident type, severity, location of incident and any other crucial information gathered at the time of the report – complete with text messages, photos, video or other incident data. They also can receive and share pertinent information stored in a health system's electronic medical records platform to deliver quicker, safer and more effective care that reflects any underlying conditions.

A Beta 80 mobile app lets first responders equipped with tablets or smartphones easily access information your PSAP sends them. The same software can be used to capture and transmit clinical information collected on the scene, including vital

KEY FEATURES OF BETA 80'S AVAYA- COMPATIBLE DISPATCH SOLUTION

The Beta 80 iO CAD interface is built by dispatchers, for dispatchers. It is simple to use and places all the information you need at your fingertips. It also can be easily tailored to fit your PSAP and your operating procedures.

A few examples: iO CAD supports both legacy and next-gen call handling, streamlines incident creation and triage, offers advanced multimedia/multichannel features for dispatch and unit management, provides mobile functionality for PDAs and smartphones, and integrates with PBX, radio systems, AVL systems, CAD to CAD systems and mobile apps.

statistics and test results. Your PSAP can then share the patient's status with hospital personnel via cellular or radio connectivity and can update the electronic medical record.

Choosing the Most Appropriate ER

PSAPs using an integrated Avaya-Beta 80 solution are able to receive and process information on hospital bed counts, overcrowding, other emergencies the hospital is managing and their severity. And you can use the information to make smarter decisions. An algorithm embedded in the iO CAD system collects a patient's clinical data from first responders, analyzes it against hospital status and travel time, and suggests where the patient should be taken for the best and most timely treatment. You can make better-informed, faster decisions that can make all the difference in patient outcomes.

Avaya Partner Solutions For Emergency Response in the Enterprise

In addition to solutions that bridge the gap between first responders and healthcare personnel, Avaya is working with other DevConnect partners on innovations that span the broader emergency response continuum. Our approach is to deliver unique value to any enterprise customer, public agency or organization that touches the call.

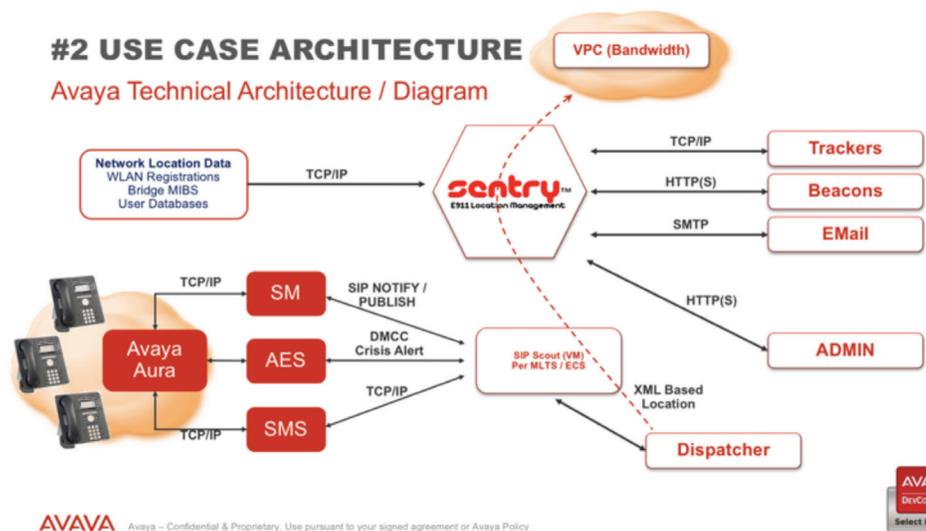
We begin with the same powerful Avaya Aura platform and then layer on compatible technologies focused on important aspects of emergency response technology. Here are two examples:

Collecting Richer Location Data at the Point of Call Origination

Avaya DevConnect Select Product Program partner Conveyant Systems is helping shorten response times by collecting and then correlating richer data on a caller's location and environment. The additional information can be especially important on an IP network serving several buildings on large campuses – or serving team members based across broad geographies who bring their phone number with them, possibly on several devices at the same time.

#2 USE CASE ARCHITECTURE

Avaya Technical Architecture / Diagram



Conveyant SENTRY use case architecture and components

Avaya-compatible SENTRY™ Emergency Location Management Solutions designed together by Avaya and Conveyant Systems use innovative database discovery technologies, trackers and beacons to track IP phones, soft clients and wireless handsets, regardless of where on your network they reside. No matter if a caller is at headquarters, a branch location, home office or other remote site, emergency calls and on-site notifications are processed and routed correctly.

Tracking information gathered by SENTRY allows the Avaya Aura platform to establish the proper route for the call automatically, allowing it to reach the right PSAP in the right community. This can greatly reduce the likelihood of life-threatening errors and delays that have been at the core of 911 ‘glitches’ and deaths for decades.^{2,3}

Additionally, SENTRY is capable of triggering email and screen-pop alerts to notify on-site personnel when a 911 call is made. Since the actual location of the caller is known, alerts can be routed to specific personnel, along with floor plans, photos and any other relevant data that can help on-site personnel support the caller, open access doors and provide vital assistance to first responders when they arrive on the scene. The alert function also tracks acknowledgements. If an alert goes unacknowledged for a defined period, a secondary alert is generated to notify others of the 911 call event and the fact that the initial alert was not acknowledged – raising the urgency of a response.

Conquering the Challenges of Remote Worker Mobility

IP technology has helped workers break free from the solid walls of our facilities and connect from remote locations. But this means administrators need to care for the proper handling of emergency calls placed by these employees.

² The Washington Post, Man Found Dead in Office 10 Hours After 911 Phone Glitch Confuses Rescuers, last accessed December 22, 2017, <http://www.washingtonpost.com/wp-dyn/content/article/2006/04/20/AR2006042001923.html>

³ KFOR, California Boy Dies as Schools 911 Call Routed Through Canada, last accessed December 22, 2017, <http://kfor.com/2015/02/05/california-boy-dies-as-schools-911-call-routed-through-canada/>

The circumstances can be challenging. Let's say an employee is in a remote facility with no local trunking. If the PSAP servicing the remote location also services your main office, the address of the remote location needs to be presented to the PSAP. If the remote location is in an area that is not in close geographic proximity to your main office, emergency call routing becomes problematic.

In the first scenario, the caller ID presented to the local carrier needs to present an appropriate address that is tied to the phone number. The system needs to understand where a device is physically located so the appropriate Emergency Location Identification Number (ELIN) caller ID can be applied to the outgoing emergency call. Additionally, any calls to this ELIN need to be dynamically routed to the device making the call to enable callback in the event a call is disconnected.

The second scenario is slightly more complex since the connectivity to 911 networks is very localized. In addition to sending an appropriate caller ID, the network needs to be able to route the call to the 911 network servicing the appropriate PSAP agency for that specific address. For example, if you are in New Jersey while your PBX is in Colorado and your trunking terminates in a data center in Ohio, you have a serious 911 call routing issue. You have no local trunks, only an IP phone. In this case, the dynamic callback feature mentioned previously becomes even more critical.

This is where Voice Over IP Positioning Carrier (VPC) comes to the rescue. The VPC acts as a long distance carrier service for 911. Because of this, the VPC has the ability to interconnect calls to nearly any of the more than six thousand 911 centers in the United States, Canada and the Caribbean.

The logic behind the VPC is simple and often requires no specialized CPE hardware or gateways. Calls sent to the VPC are routed to a specific location based on the configuration of the ELIN caller ID. In an NG911 environment, the location is dynamically presented to the VPC in the SIP header of the call. This SIP header information (called Presence Information Data Format - Location Object, or PIDF-LO) is a connector to additional external data that public safety can use where available, such as floorplans or video feeds.

Since Conveyant products maintain a constant communications path with the VPC cloud, several tools and applications are available to update location information dynamically. Precise location accuracy and granularity are provided on each and every 911 call, and since the data is dynamic, a minimum number of ELINs are required to support large environments. This operational model generates a significant savings over other solutions requiring a unique ELIN per device to manage device-specific information.

VPC solutions manage a wide range of scenarios, including remote offices, mobile workers in the field and work-at-home employees. Mobility of any of these users is fully supported. While they are in an office, an in-building 911 solution is applied to their user profile, regardless of the device – beginning from the split second they appear on the network.

Helping PSAPs Bring It All Together With Multimedia

An effective command and control environment for emergency response depends on being able to receive and process all the facts needed to take appropriate action. In today's mobile world, that means not just voice, but also video, text, audio files, photos and geolocation data.

Avaya DevConnect partner Synergem Technologies offers the Evolution911 Elite™ call-taking solution that helps both public and private emergency services organizations keep up with the times in a multimedia, omni-channel environment. Call takers can accept, process and manage multiple media streams through a single, easy-to-use interface. They can work smarter and faster with these new media forms, and in any environment, from a fixed position in a PSAP, to an on-scene tactical dispatch deployment, to the back of a mobile command post vehicle connected by LTE broadband. A corporate security team could pull up building schematics and safely evacuate employees in the event of a fire blocking key exits, while that same data could be provided to first responders who are on scene planning the rescue.

The Synergem Evolution911 Elite solution can be layered onto the Avaya Aura IP network or deployed as an Avaya-powered hosted service that works with the legacy TDM network.

Synergem and Avaya are also working to support important new emergency services regionalization trends. Instead of working in silos, regional and even state-level communities of call takers are being formed. Avaya and Synergem can help call takers from different locations operate as a dynamically formed virtual team, supported by a single, highly reliable and scalable platform.

WANT A BIRD'S EYE VIEW? ADD DRONES!

Drones are the latest big thing in emergency response – valued for the important information they can deliver about what's going on at the incident site. And adding drones to your emergency response network may be easier than you think.

At their essence, drones are simply “plug and play” mobile video endpoints easily added to your open, standards-based Avaya network. Using a simple HDMI cable to connect the drone controller to your Avaya Scopia® workstation brings in video from anywhere and makes it available to anyone interested, wherever they are. You will easily be able to see and share images that can prove to be invaluable to first responders, as well as to command and control teams on site or at a remote post during a major emergency. In addition, important officials will be able to review disaster damage from the safety of their office, rather than having to travel into a danger zone.

EXAMPLES OF AVAYA'S EMERGENCY RESPONSE LEADERSHIP

- Collaboration with emergency number associations in the US and Europe (NENA-EENA and APCO Intl.) to establish standardized emergency response and modernization strategies.
- Development of an innovative emergency services contact center solution deployed across Europe that processes eCall telemetry data transmitted by cars involved in an accident.
- Development of Avaya Breeze™ applications useful for notification solutions, as well as providing critical off-board location processing found in Android devices through the new AML (Advanced Mobile Location) functionality.
- Development of end-to-end NG unified communications solutions that enable first responders to send voice messages to the central situation control center for more effective field coordination.
- Effective lobbying for on-site notification alerts and for **Kari's Law**, a U.S. Senate bill that requires multiline phone systems to be configured for direct dial of emergency numbers – eliminating the need to first dial “9.”

To Learn More

To learn more about public and private safety solutions from Avaya and its DevConnect Partner community, explore the following resources:

- **Presentation** on Avaya's [Public Safety Architecture](#)
- **Avaya DevConnect "8 & Out" podcasts**. Recent interviews feature experts from [Beta 80](#), [Conveyant Systems](#) and [Synergem Technologies](#).
- **Avaya DevConnect background**. Visit the [Avaya DevConnect Marketplace](#) and the [Avaya DevConnect Select Product Program](#).

About Avaya

Avaya enables the mission critical, real-time communication applications of the world's most important operations. As a global leader in delivering superior communications experiences, Avaya provides the most complete portfolio of software and services for contact center and unified communications — offered on premises, in the cloud, or a hybrid. Today's digital world requires communications enablement, and no other company is better positioned to do this than Avaya. For more information, please visit www.avaya.com.

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