

What Does Next Generation 9-1-1 Mean to Me?

A Discussion Document

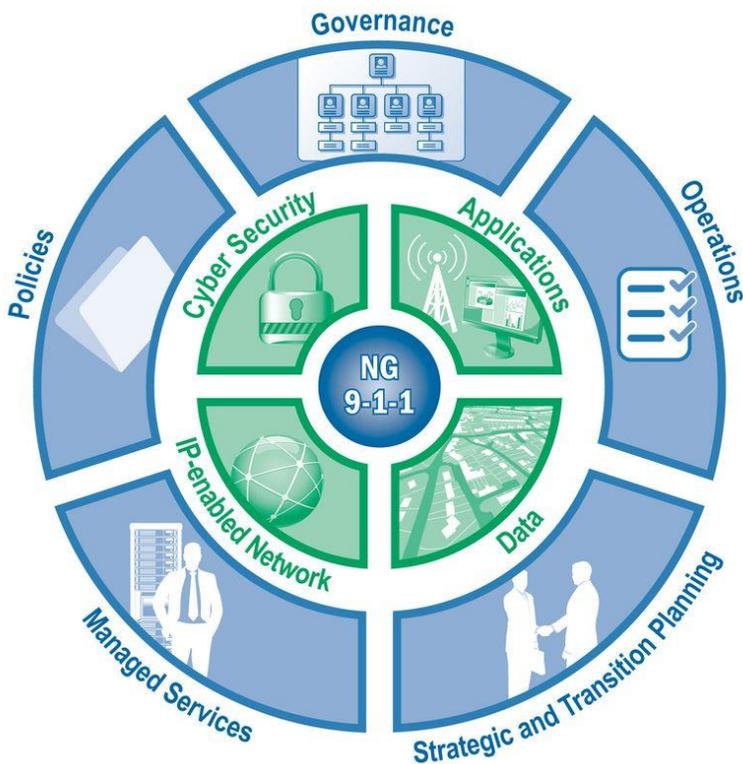


Diagram courtesy of CDI/ L.R. Kimball

by: Larry L. Hatch & Cheryl Bledsoe

In cooperation with



November 17, 2015

BACKGROUND

The National 9-1-1 Office, 911.gov, states the following *“For more than 40 years, the 911 system has served the needs of the public in emergencies. Next Generation 911 (NG911) will enhance the 911 system to create a faster, more flexible, resilient, and scalable system that allows 911 to keep up with communication technology used by the public.*

Put simply, NG911 is an Internet Protocol (IP)-based system that allows digital information (e.g., voice, photos, videos, text messages) to flow seamlessly from the public, through the 911 network, and on to emergency responders.

While the technology to implement NG911 systems is available now, the transition to NG911 involves much more than just new computer equipment. Implementing NG911 will include activities of many people, who will coordinate efforts to plan and deploy a continually evolving system of hardware, software, standards, policies, protocols and training.”

So what does this mean to me? First, 9-1-1 calls will move from an analog network to a digital, Internet based protocol (IP) network. Work is currently underway in Oregon to make this happen. NG911 is just one reason; the current network architecture has also reached its “end of life” and will no longer be supported.” This move is being supported by the Oregon Department of Administrative Services (DAS) who has developed a Request For Proposal (RFP) to get pricing on this new statewide network.

Along with this work, the Office of Emergency Management 9-1-1 Program Office is reviewing telephony equipment at each of the 43 Public Safety Answering Points (PSAPS) in the state to determine how many systems need to be upgraded or replaced before they can operate on this new IP network.

All of this work does not result in NG911, it just moves us from old network technology to new network technology. The OEM 9-1-1 Office is working with DAS and the PSAP community on how the NG911 infrastructure will be integrated into this new network. It is currently estimated that NG911 would be fully operational statewide in 2020.

WORKLOAD

With that background, let’s jump forward to 2020, look into our crystal ball, and make some assumptions based on what we know today. The PSAP will be provided new information sources; text messages, photographs, and video. The hearing impaired community also wants the PSAP to be able to receive live video of a caller using sign language to communicate with the Calltaker. There are also an untold number of internet-based application developers

designing 'apps' for people to use to create data to be shared with emergency responders, the local PSAP, or both.

Examples of emerging Next Generation data includes:

- Video from cameras pre-positioned in static locations throughout a jurisdiction (for traffic, surveillance, or investigative purposes);
- Dynamic video capture from moving video cameras (attached to vehicles, officers or drones);
- Web-based telephony alternatives that use IP-based technology to circumvent traditional phone lines (via skype, text-to-landline, video gaming devices or other information-sharing & notification/alerting applications);
- Map-based applications where residents may report problems/issues during an emergency (SeeClickFix);
- Crowd-sourced images and graphic videos of both disaster and criminal activity;
- Social media pages & video streams being shared to incite or motivate group-based behaviors;

The current model of 9-1-1 services sends call for service information to the field for analysis and decision-making; however, the ability to collect new forms of incoming data begs the question - "Who should perform the analysis function of all this new data?" Does the 9-1-1 agency risk overwhelming the emergency responder with too much data? What is the right balance of information to enhance the safety or response capability of field users?

Currently staffing levels at the majority of our PSAP's are not optimal and staff - at peak times - struggle to keep up with the call volume and field activity they manage today. What will the impact be for these additional input sources mean for the local PSAP? Without clear criteria and definition of the term "public safety," PSAPs risk significant workload increases as our communities become more knowledgeable about using these various resources.

The Canadian FCC, the Canadian Radio-television and Telecommunications Commission, produced a report in 2013 on their vision of NG911 and the impact it would have. It was titled ['A Report on Matters Related to Emergency 9-1-1'](#). This is an excerpt from that report regarding PSAP operations.

D. Operations

162. The Canadian Interoperability Technology Interest Group (CITIG)³⁸ expressed the concern that the need to transfer data downstream (and the quantity of data) will increase significantly in the coming years, and that the digital assets that may go with a given call will put a strain on existing equipment and technical resources.

163. For example, if Canadians can submit videos, pictures or other digital assets in conjunction with 9-1-1 calls, the resources required to manage 9-1-1 calls will increase significantly. While in some cases videos or pictures may provide valuable information, too much information could be a danger. If multiple videos show up regarding a fire call or a major traffic accident, the PSAP may not have the time or resources to view all videos in a timely way.

164. In addition, the lack of resources to view multiple videos in real time may create legal liability for PSAPs, particularly in cases where serious injury or death occurs in the incident. If PSAPs accept the videos, they may very well be accepting the liability that goes with it. CITIG noted that provinces such as New Brunswick and Manitoba have created legislation that limits the liability of PSAPs in such situations, so that they cannot be sued for not having sufficient staff to view the number of videos that may come in on a given call.

165. CITIG also identified secondary impacts to the above, including: increased data storage requirements; an increase in PSAP technical resources to manage the increased storage and network demands; and the traumatic impacts on dispatchers who view graphic scenes (accidents, fires, suicides, etc.). In addition to the technological challenges of introducing NG 9-1-1, there will be operational challenges, such as increased call handling time, standard operating procedures, liability protection and perhaps even legal challenges. The flow of multimedia information between the public, PSAPs and first responders will put a strain on networks. These ideas and observations were broadly shared among respondents and interviewees who work in PSAPs.

They also produced a [video](#) regarding NG911 and state *“It is anticipated that budgets may need to increase by as much as 30%. This estimate, while not yet fully quantified, includes all resources including staffing, infrastructure and technology.”* While we have the benefit of infrastructure and parts of the technology being paid for by the State, it is clear there will be other financial impacts which will affect the PSAP budget.

Early adopters of text to 9-1-1 currently report little to no impact on 9-1-1 operational workload; however, current national public messaging has also widely shared that this capability is not widespread. As people become more familiar with the service, the number of text to 9-1-1 messages will increase. Similar reports occurred during the transition from landline to wireless calls and now, ***nearly 70% of incoming calls to 9-1-1 are made from a wireless device.*** Current research does indicate that text-based calls take longer in both the duration of the conversation and the processing compared to calls over a voice line. Add in photographs and video coming into the PSAP and having processes in place for interpreting and processing this information including sending them out to field units, and it doesn't take much imagination to envision call processing increasing beyond acceptable levels

In a recent report on [KGW News](#), a bicyclist captured video of a dangerous driver passing him as he rode on a community street. Portland Police Bureau was able to use the video to track down the driver and issue a citation. During the interview, Portland's Public Information Officer commented on their ability to follow up on all video reports as they struggle to keep up with current demand for services.

The Department of Homeland Security suggests even more data sources and inputs will be coming our way.

OPERATIONS

So that's a look at the crystal ball, but what may be the operational impacts to a 9-1-1 Center?

- **The role & responsibility of who analyzes the information needs to be determined.**
Some have suggested that the PSAP will have a Fusion Center component and that staff would be responsible for sifting through this data and making decisions on what should be done with it. Other models may involve creating a new position inside of a 9-1-1 center which is primarily focused on data sifting. This model may have Calltakers for voice-based communications, data sifters for data analysis & validation and dispatchers which take inputs from both.

Below is a list of advanced services which will be available in the PSAP in the future:

- Advanced Services
 - Social Media Mining
 - Social Media External Communications
 - Internet of Things Ingest
 - Data Analytics (Descriptive, Predictive, Prescriptive)
 - Video Surveillance
 - Media Analytics (Video, Audio)
 - Situational Awareness
 - Analytics Visualizations

In a data-centric world, additional responsibilities for data analysis and validation may be critical roles to minimize the amount of spoofing and rumors that may manipulate already limited public safety resources.

- **Filtering criteria should be established for use of new internet-based applications before new applications are accepted into a 9-1-1 environment:**
 - Does the data enhance officer safety?
 - Does the data visualize life-safety issues?
 - How would the new incoming data be prioritized in light of current data being collected?
 - "Need to have" or "nice to have"?
 - "Immediate" or "Can Wait" for assessment?
 - Collected or dispatched?
 - Dynamic data collection or point-in-time collection?

- What are the storage requirements for public records sake?
- **Operational Protocols Need to Be Developed.**
Operational practices with NG911 data need to involve both emergency responders and 9-1-1 practitioners. To develop active protocols in silos risks the unintended consequences that may make agencies more vulnerable to cyber security violations or missing critical data that could save lives.
- **Additional training for 9-1-1 staff will be required.** Not only will staff need to be educated in social communication, but transacting, recalling and collecting the data will require new forms of technology that is data-centric and not primarily voice-based. It is clear that the training time for our staff, on both operational and technical arenas, will increase as they learn about these new inputs into the system. Also, how local policies have been developed to deal with these inputs including enhanced legal liabilities for public records, data mining and decision-making roles.

Finally, a note about perceived cost savings associated with NG911. The proper use of the NG911 network and equipment may cost less than their legacy counterparts as it will no longer be necessary to have backroom standalone equipment at every PSAP. That expensive infrastructure can be virtualized and/or housed in two or three data centers allowing PSAP's to connect over the NG911 network. This is, however, where any anticipated cost savings will stop.

Costs at both the PSAP and emergency responder level will be evident in the following areas:

- **Full implementation of FirstNet:** This project aims to lay a public-safety grade broadband network that offers prioritization of the network to emergency responders. Connection & monthly costs associated with this project are yet to be determined.
- **Access & Recording of Incoming Streams of Data:** The cost of web-based applications may appear cheaper to the end user because of the current pricing models which keep costs low to the consumer and charge infrastructure owners for access to the data.

Additionally, PSAPs are reliant on Computer Aided Dispatch (CAD) systems which serve as the brains of any PSAP. As long as CAD systems are proprietary, interfaces will need to be written for new streams of data. These costs alone will be significant for PSAP's who use commercial off the shelf (COTS) based CAD systems and are seeking to integrate various types of Next Generation data.

A third area of need will be logging recorders and storage facilities for visual images and video recordings. While text and voice take up a certain amount of space currently

in PSAP's, video imagery is of a much larger size and the ability to properly record and store this type of data may pose some interesting challenges.

- **Enhancing Cyber Security Detection & Response systems:** As systems become more internet-reliant, they also become more porous to intrusion. Network administrators will need to employ significant levels of penetration testing and operational response planning to ensure that networks can be maintained. As we continue to move down the path towards interconnectivity, we also head to a world where multiple centers or modes of communication may be commandeered by hackers, leaving large holes of infrastructure offline until it can be secured.
- **PSAP Staffing:** As mentioned earlier, if the role of data sifter is to remain inside of the PSAP environment, this will result in the need for additional staffing that will be trained to focus on data analysis and validation, which is a different skill set than what is currently hired for in most dispatch centers.

At the end of the day, any infrastructure "cost-savings" will simply be placed elsewhere as we aim to complete our primary mission.

To recap, Oregon is currently scheduled to begin implementation of NG911 in 2020. PSAP's are already dealing with data integration issues related to NG911 and that will only grow after full implementation and there will be a need to process that data in a different fashion than we handle telephone calls today. We wanted you to be aware of these issues as we believe they will require additional staffing and therefore increase operational costs.

The good news is, there are geographic areas of the United States that are already beginning to step down this road with implementation of Next Generation 9-1-1 technologies. We will be able to watch and learn from them as they work through these many issues.