Smartphones: Bridging the Gap in Public Safety Field Communications

by

Lt. Brent Smith
Ceres Police Department

March, 2013

COMMAND COLLEGE CLASS 52

The Command College Futures Study Project is a FUTURES study of a particular emerging issue of relevance to law enforcement. Its purpose is NOT to predict the future; rather, to project a variety of possible scenarios useful for strategic planning in anticipation of the emerging landscape facing policing organizations.

This journal article was created using the futures forecasting process of Command College and its outcomes. Defining the future differs from analyzing the past, because it has not yet happened. In this article, methodologies have been used to discern useful alternatives to enhance the success of planners and leaders in their response to a range of possible future environments.

Managing the future means influencing it—creating, constraining and adapting to emerging trends and events in a way that optimizes the opportunities and minimizes the threats of relevance to the profession.

The views and conclusions expressed in the Command College Futures Project and journal article are those of the author, and are not necessarily those of the CA Commission on Peace Officer Standards and Training (POST).

© Copyright 2013
California Commission on Peace Officer Standards and Training

Ariel, a twenty-six year public safety veteran, watched technology advance at a rate not seen by any preceding generation. She is a professional, and excited to see her plans come together for public safety as it has for the private sector. Today Ariel finds herself responding to one of the most stressful endeavors in policing; she is walking into a mobile command center in response to a major natural disaster in Wonderland County, California.

News of the dead and injured, and widespread looting, are playing on the screens that line the walls. She begins thinking about how the public safety response will play a crucial role in this situation. She begins the process of requesting mutual aid that includes local, state and national agencies as she removes the key to unleash this advanced response from the clip on her waistband. Through applications on her smartphone, she assumes Incident Command in a new system that will prove to be less chaotic than previous responses. She and her colleagues advocated this technology since our nation's response to Hurricane Katrina in August 2005, and this is its first real-time test.

As responders begin arriving in the area, they logon to a specifically designed application on their Smart phones and tablets. Within this application is access to communications for public safety officials, EOC and other responding groups. In it is the current Incident Action Plan. The action plan allows team leaders to brief their people in the field without responding to the EOC or staging area. Teams go directly to their assignments while being tracked by personnel in the EOC through GPS location software in each Smartphone. In the meantime, Ariel has little traffic inside the EOC, allowing for key personnel to concentrate on this critical, but fluid situation. The lack of distractions enhances their ability to make quick changes in the response like a game of chess.

Ariel, like many public safety leaders across the country, had identified historic issues with the discrepancies responders to previous large-scale incidents have always had with regard to response, control, and recordkeeping in disaster management. She and her colleagues co-opted a readily available technology, the Smartphone, as their best solution due to its inherent communications and computing ability. In essence, the everyday phone on each officer's belt became a mobile data computer and police radio in one device. This made it not only an effective tool for law enforcement, but cost effective as well. One might think the capacity to repurpose Smartphones for these uses is beyond possibility. Nothing could be further from the truth.

Communications

Today, because of a lack of interoperability, it takes more personnel to operate an Emergency Operations Center (EOC) during a multi-jurisdictional catastrophe. Each group using a different frequency or talk group must be represented inside the EOC. The three important tools in any EOC is the radio system, cellular telephones and the mobile data computer. None of them are truly capable of working perfectly with one another, and do not tend to compliment each as well as they should, at least not at the moment. Fortunately, a companion technology in telephony has become so commonplace it can become the interoperable management tool of the future. No doubt, you are probably wearing it right now; it is the everyday smartphone.

Today, the smartphone is the primary tool used by most people for business and personal use to stay "connected". It may take on many different shapes as time goes on, and may even become a part of our clothing or eyewear (Dillon 2011), but it definitely seems we cannot do without being connected anymore. The real question is; what will the Smartphone do for public safety? Ariel's scenario doesn't yet exist; however, it isn't a far stretch from what the future

holds for this device with regards to public safety use. Although progress is slow, there is a path being taken to lead us there.

The first mechanism that put Smartphones on the path was before they were even in use. In 1989, the Federal government upgraded their existing communications to what is known as P25. Project 25 was adopted by Congress and administered through the Association of Public Safety Communications Officials (APCO). It addressed the issue of proprietary equipment between companies that provide communications equipment to public safety (such as Motorola, Harris, and Tait, to name a few). Although P25 is meant to address interoperability issues between agencies during emergencies (Hawkins, 2007), it also sets rules to which manufacturers must abide to make most of their equipment compatible with their competition. With the evolution of P25, requirements for public safety radio now include migrating to digital communications. When manufacturers equipment becomes compatible, it allows public safety to have more choices, which can save money and allow for better technology. It also eliminates the question of whether or not it will work with an existing system. Upgrading to digital communications modernizes our systems, and also lays the foundation to optimize the use of today's smartphone technology.

Some of us in public safety can remember 1989. That year San Francisco suffered the largest earthquake since the big one in 1906. The Loma Prieta earthquake was a magnitude 6.9 and lasted 15 seconds (Tierny 1993). It shocked the Bay Area infrastructure, knocked down bridges, and separated power, gas and water lines. At the time, the only means of fluid communication was by placing a representative from each responding agency inside the EOC. Each person would then communicate with their agency, and relay information one piece at a time. Naturally, the process of completing simple messages and relaying critical information was

excruciatingly slow. This incident identified a need for improved communications between public safety responders that still lingers today. This example, among many other man-made and other natural disasters in recent years, prompted adoption of P25 compliance standards for the United States in 1989.

A second example, 12 years later, is the terrorist attacks on the United States on September 11, 2001, that exposed a profound issue with public safety communications infrastructure. On that day in New York City, 411 public safety personnel lost their lives. An inability to communicate amongst multiple police, fire and emergency services jurisdictions played a role in this death toll. Public safety's communications issues continued at the three rescue operations areas; New York City, the Pentagon, and Somerset County, Pennsylvania (911 Commission, 2002). Had there been interoperability between police and fire, more public safety lives may have been saved at the Twin Towers.

Interoperability currently continues to hinder public safety. The reasons are many, but one large factor is the sheer number of public safety organizations in the United States. According to the National Institute of Justice, additional radio spectrum is needed, along with additional infrastructure. Every time an organization upgrades their communications system, they purchase something different from their neighboring agencies, or those agencies are limited on funds to upgrade at the same time. Regionalizing communication systems does help, but two issues slow this process.

Some administrators feel they lose local control, and there are three different frequencies to communicate for public safety land mobile radio, UHF, VHF and 700-800MHz. They do not communicate with each other effectively. Additionally some agencies use "Trunking" which essentially allows an agency to make several talk groups using two or more channels. Trunking

technology is not friendly to mountainous terrain without a large expense, so some cities use it while both the county sheriff and all fire agencies use non-trunking technology. County agencies tend to have more issues with terrain than cities, while fire needs to communicate within a county and throughout the state for wildfire response mutual aid. Without having multiple radios in a vehicle, the agencies cannot communicate from one agency to the next.

In August 2005, the California Highway Patrol responded to Hurricane Katrina in Louisiana, to assist in the disaster, (California POST, 2006). 100 CHP Officers, 50 vehicles and 3 CHP Helicopters responded. The logistics alone was enough of a shock; they were told to be totally self-sufficient. They prepared the best way they could by trying to figure out how they were going to communicate, eat, shower, and fuel their vehicles. In the end, they found that some officers brought GPS locating devices and mapping software, which worked very well because the street signs were either missing or under water and they could not figure their location otherwise. They brought several types of communication devices, including satellite telephones. None of it worked, and they realized quickly that the only means of communications was by having the helicopter in direct line of sight of the officers on the ground. The helicopter in turn relayed the information back to the EOC, where CHP officials stood by to give information to the Incident Command.

The three examples of "wildcard" events (Loma Prieta, 9/11 and Katrina) give us insight to gaps in capacity and our weaknesses. It is through events such as these, though, that positive change occurs. Through the recommendations of the 9/11 Commission and Congress Passing H.R. 3630 in 2012, the Federal Government is attempting to improve public safety communication. A Bill titled, "The Middle Class Tax Relief and Job Creation Act of 2012,"

contained a provision for public safety called “D Block” Legislation. In short, this legislation is intended to produce a national public safety broadband network, (Perera, 2012).

The P25 standard and “D Block” Legislation are two pieces to a puzzle that are falling into place for public safety interoperability. This standard mandates all public safety to use the same type of equipment, thus increasing compatibility. The question is what device will be the answer to our problems in the end? Here is one more indication the Smartphone will be the very tool that ends the problem of interoperability. P25’s current standard is digital communications, which fits nicely with 4G technology and is the key to having the ability to talk over any public safety P25 system. 4G technology greatly increases bandwidth and uses Internet protocol, making the 4G smartphone a small computer device as well (Levine 2012). There is new talk of saving a certain amount of 4G LTE spectrum solely for public safety use nationwide (Steen 2012).

As our technology and culture changes it will end the issues public safety endured during Katrina and others. New technology tested at the 2012 Republican National Convention in Florida is proving to be one of those changes. Several large communication and computer companies working together made it possible for the smartphone to communicate with public safety radios using 4G LTE technology. During the test, it was noted that they did carry a pack, which contained a small modem device to make it possible. They conceded the technology could be incorporated into the device itself (Steen 2013). The second problem in such disasters as Katrina is a complete failure of cellular towers during a catastrophe. iDAWG (Intelligent Deployable Augmented Wireless Gateway) specifically designed for public safety uses, is a new emerging technology making it possible for devices to connect to each other and bypass the cell

tower altogether during emergency situations (Pittman 2012). This technology gives the smartphone the advantage for public safety communications.

There is a need for specifically designed applications for public safety, such as command and control software regarding emergency operations as given in the scenario involving Ariel. Two companies, Twisted Pairs and Raytheon have developed a means to connect Smartphones to a P25 radio system. (Businesswire, 2012) Law enforcement leaders should get on board now and provide input on the construction of a Smartphone specifically for our interoperability needs. An off the shelf Smartphone could give the employee the ability to use the device for making routine phone calls, while having the ability to link itself to public safety communications and software applications. Public safety leadership should think ahead and make the determination of whether we want to have public safety Smartphones in the future, or whether we could supply an application on phones bought from the store for our people to communicate. One solution may be to give the portable radio the ability to have cellular connectivity, along with having an off-the-shelf Smartphone. These are some of the issues we will need to tackle, and very soon.

Computing ability

When local agencies gain the ability for smartphones to communicate over their own communication system, there will not be a need to purchase so many expensive portable and mobile radios. Cloud technology for data storage will share a future role as well. As the cloud continues to develop, public safety software will produce the ability in a manner of speed not seen today. For example, there is facial recognition software called Pitt Patt made for a mobile device. When a police officer photos someone in the field, the software sends the photo to the cloud, which searches for the face on the Internet, including Face Book Accounts. Using facial recognition software, the officer tracks down the identity of the person in minutes, Keller (2011).

When we link this technology with NCIC and other law enforcement databases, it could make today's license plate readers look like child's play.

Smartphones will save agencies money, while increasing capability. Like all others, public safety uses smartphones as a telephone and to text. These modes of communication are particularly useful when a suspect may be monitoring police frequencies. Increasingly, the police are also using phones for photos and video, and to co-opt the GPS mapping functions. For instance, some applications made for public safety are specific to SWAT and perimeter scenarios that are capable of using mapping software from the Internet such as Google Maps. The Dragon Force application seems to be moving in this direction with software specifically designed for public safety through the smartphone (DragonForce 2012). Dragon's specialty is specific to personnel tracking, with operational programs for day-to day work and for emergency management. The software is not tied to any record management system, but can be used by individual users over a network with 256-bit AES encryption and stored on the Internet (DragonForce 2012). To make the scenario involving Ariel a reality, three things need to occur: The ability to talk to any police or fire frequency with a smartphone, software developed to work with public safety's records management systems, and the approval to connect the smartphone to law enforcement data services such as the National Crime Information Center (NCIC).

For large-scale events where there are multiple agencies involved, a common software application for the smartphone could be used to do the necessary things needed by first responders. If the application is tied together, on a common records management system, then a permanent record of what happened is recorded. An example is the door-to-door checks for people, either injured, or dead, which took place during hurricane Katrina. If we take what we learned form the CHP's professional response to Hurricane Katrina, we can realize how

technology in tomorrows Smartphone will fulfill all the missing things the responders needed to make the response a seamless one. There was no software available to do this type of inventory, other than manually writing it down and spraying the United Nations symbols on the doorways. In the future, groups of first responders will be tracked in the field from the EOC, regardless of what agency they are from. Each group will enter the data on their smartphone by checking boxes, and all data is retrieved from the application, which is reviewed by the EOC to ensure the search is complete, and that we are not searching the same places multiple times. On top of that, streaming video, and photographic evidence is used and broadcast to the EOC where command and control decisions are made. Any of the first responders will have the ability to speak to the EOC using their smartphone to talk over public safety land based radio. Likewise, all Incident Command Forms could be available and requests could be made to the appropriate branches or groups through the device.

The University of Maryland is testing camera and video devices that feed live video to officers in the field from the reporting party through the 911 dispatch giving the ability for the officer to see what the caller is seeing, McKenna (2012). In fact, the only limits to possible uses are our ability to imagine how the technology might be used to protect the public. Fire could have the ability to better size up a fire situation while responding to the call and ambulance personnel could communicate with family members or bystanders while en route to a medical emergency, giving them vital first aid information. All of the information is stored in records management systems automatically, which means less personnel needed for records keeping and data entry. Likewise, if officers can solve more crimes within minutes, using this technology, there may be fewer personnel in the field, or at least the organization can focus their attention on specific matters for day-to-day operations.

Conclusion

When smartphones have the ability to communicate on public safety frequencies, it will be a game changer. It is safe to say that software companies will see the change as an opportunity when this happens and begin producing the needed software specifically for handling large-scale events, as well as day-to-day operations. It will save money by not having to provide all personnel with expensive portable radio equipment. Most government agency employees currently have smartphones issued to them so there is no need for a special smartphone with a high price tag. This is especially important for police, who can use the smartphone inconspicuously during under cover operations.

It is paramount for public safety officials to recognize the capability of this technology when it comes to field operations. Paying attention to this is equally important because we should be an important factor over how we want this technology to improve public service. The best choice points towards using an off the shelf smartphone, "Some say the way of the future will be for this type of communication — off-the-shelf devices with dedicated applications that do what public safety officials need — to replace traditional police radios (Steen 2012)." If the Federal government comes through with reserving portions of the 4G LTE spectrum and 700-800 MHz Public safety communications frequencies for the entire nation, we are well on the way. We can simplify operations and make them lees chaotic by having ICS based (incident command system) software, which incorporates such things as video, communications and GPS tracking of all responders placed into one device, that can be used efficiently during emergencies.

References

Dillon, Clay. "Glasses Packed withy Smartphone Tech Could Help Visually Impaired People See Again." *http://www.popsci.com/science/article/2011-07/glasses-packed-smarphone-tech-could-help-visually-impaired-people-see-again*. Ed. Suzanne Labarre. N.p., 6 July 2011. Web. 13 Feb. 2013.

DragonForce command and control software from Drakontas. (2012, August 16). In http://www.securityinfowatch.com. Retrieved February 28, 2013

Hawkins, Dan. "Project 25: The Quest for Interoperable Radios." *COPS Interoperable Communications Technology Program* 6 (2007). Web. 5 Dec. 2012. <www.cops.usdoj.gov/publications/project25interopradios.pdf>.

Keller, J. (n.d.). Cloud-powered facial recognition is scary. Retrieved March 23, 2012, from http://www.theatlantic.com/technology/archive/2011

Levine, R. J. (2012, February). Police walkie- talkies: From primary to backup. Law and Order, 60(2), 28-32.

McKenna, C. (2012, February 2). Smartphone application will give Campus Police a virtual look at an incident. In Emergency Management, Strategy and Leadership in Critical Times. Retrieved March 4, 2012, from http://www.emergencymgmt.com/safety/smartphone-application

Perera, David. "Public Safety Poised to Take Control of D Block." *http://www.fiercegovernmentit.com/story/public-safety-poised-take-control-d-block/2012-02-21*. N.p., n.d. Web. 21 Feb. 2012

Pittman, Elaine. "3 Emerging Technologies That Will Impact Emergency Management." *http://www.emergencymgmt.com/disaster/3-Emerging-Technologies-Emergency-Management.html?page=3&*. N.p., 6 Dec. 2012. Web. 14 Feb. 2013.

Steen, Margaret. "LTE Test Provides Insight into Nationwide Public Safety Network." *http://www.emergencymgmt.com/safety/LTE-Test-Nationwide-Public-Safety-Network.html?page=2&*. N.p., 17 Jan. 2013. Web. 14 Feb. 2013.

Tierny, K. J. (1993). Lessons from the Loma Prieta earthquake. In University of Delaware Library. Retrieved February 28, 2012

"Twisted Pairs Solutions Partners with Raytheon." *http://www.fool.com/investing/businesswire/2012/10/01/twisted-pair-solutions-partners-with-raytheon-to-s.aspx*. N.p., n.d. Web. 1 Oct. 2012.

9/11 Commission. (2002). 9/11 Commission Report (Official Government ed.). In A. Falk &. (Eds.). Washington, DC: U.S. Government Printing Office