

**Virtual Interoperability
The Future of Public Safety Interoperable Communications**

by

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April, 2012

COMMAND COLLEGE CLASS 50

The Command College Futures Professional Article is a 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 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.

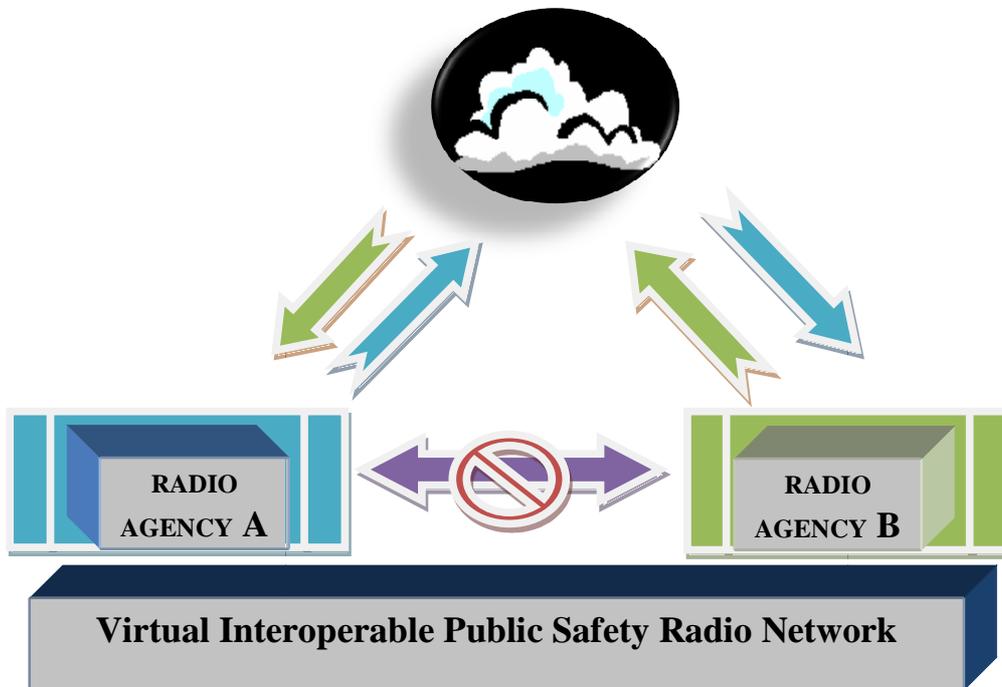
Managing the future means influencing it—creating, constraining and adapting to emerging trends and events in a way that optimizes the opportunities and minimizes the threats of relevance to the profession.

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Virtual Interoperability The Future of Public Safety Interoperable Communications



For many public safety organizations across the nation, the reality of interoperability remains an unattainable panacea. It has been more than 10 years since the tragic events of 9/11 brought to light the inability of the New York City Police and Fire Departments to communicate directly with each other as they heroically responded to the devastation that shocked the entire country that day. It has been nearly as long since the rescue and recovery efforts in the aftermath of Hurricane Katrina were severely hampered due to the lack of interoperable communications among the thousands of police officers, firefighters and emergency medical responders who descended upon the area. These tragic events did not cause the need for interoperability; they did however illuminate the severe lack of interoperable communications among first responders in this Country.

There were many lessons learned about the communication failures in the aftermath of these events; however, not enough has been done to correct them or to prevent them from ever occurring again. Since these events, technology has made great advancements and has now provided more options to consider. With the new technologies being developed, public safety organizations must look towards the future of interoperable communications. With the advent of enabling technologies, virtual interoperability is that next generation of interoperability.

The development of a virtual interoperability radio network will provide first responders with the ability to effectively and efficiently carry out their primary mission of protecting and serving their communities. For planned or unplanned events requiring a regional response, a virtually interoperable public safety radio network will enhance a region's ability to increase its available resources. The implementation of virtual interoperability will transform public safety communications and enable first responders to communicate regardless of equipment, radio networks or protocols.

Technology

The technologies that will make virtual interoperability become a reality are being developed today. The vision of this future is based on the emerging technologies of software defined radios, cloud based computing and other advancements that have been developed and are being used to improve levels of interoperability among first responders. The further development of these new technologies has immense implications on the future success of virtual interoperability.

Just as a virtual private network (VPN) enables a person to log into their employer's network and work from anywhere in the world, a virtual interoperable radio network would provide similar results for public safety personnel. TechTerms.com defines a virtual private

network as being "tunneled" through a wide area network (WAN) such as the Internet (Tech Terms 2008). This means the network does not have to be located in one physical location like a local area network (LAN). By using encryption and other security measures, however, a VPN can scramble all the data sent through the wide area network, so the network is "virtually" private. With virtual interoperability, a first responder could respond from anywhere, enter a code on their handheld radio, and communicate with other first responders and dispatchers in the affected area.

The development of Software Defined Radio (SDR) technology will enable communications across many platforms through the use of computer software. According to Radio Electronics.com, the basic concept of software-defined radio (SDR) is that a radio can be totally configured or defined by software (Radio Electronics, n.d.). Using this technology, a common platform can be used and software can be programmed to change the configuration of the radio for the function required at a given time. Using SDR technology, a single hardware platform could be used and be able to communicate using one of a variety of waveforms simply by reloading or reconfiguring the software for the particular application required. One major initiative that uses the software-defined radio is a military venture known as the Joint Tactical Radio System (JTRS) (Radio Electronics, n.d.). This is an attractive proposition, especially for coalition-style operations where forces from different countries may operate together. If radios could be re-configured to enable communications to occur amongst troops from different countries, once can imagine the benefits of having public safety first responders from across the United States being able to communicate with each other at the scene of an emergency.

The virtual environment of the Cloud will be the hub for virtual public safety communications. Walt Mossberg, in a May 2010 Wall Street Journal article, describes the

Cloud in its most basic term. According to Mossberg, “the ‘cloud’ is simply the Internet, or the vast array of servers around the world that comprise it. When people say a digital document is stored, or a digital task is being performed in the cloud, they mean that the file or application lives on a server you access over an Internet connection, via a Web browser or app, rather than on "local" devices, like your computer or smart phone” (Mossberg, 2010). The technology behind the Cloud provides an excellent opportunity to seamlessly link first responders from various locations with each other. In the public safety arena, security concerns for the Cloud must be addressed. The combination of Software Defined Radio technology and Cloud based technologies provide a great opportunity for public safety first responders to achieve virtual interoperability.

Companies also continue to develop improved platforms that will enable existing systems to be able to talk with each other. In 1989, the Association of Public-Safety Communications Officials International (APCO) created the initial concept of Project 25 (Icom, 2008). Project 25 refers to a suite of standards for digital radio communications for use by federal, state and local public safety agencies in North America to enable them to communicate with other agencies and mutual aid response teams in emergencies. According to the Project 25 Technology Interest Group, Project 25 Inter-RF Subsystem Interface (ISSI) is an enhanced version of Project 25 and allows first responders from different networks to communicate and is referred to as a migratory system. Migratory systems such as ISSI allow older, legacy systems and newer radio systems the ability to connect with each other. The further development of ISSI and similar systems could further reduce the overall costs of interoperability as agencies migrate to new technologies, radios and supporting infrastructure.

The Need for Interoperability

The tragic events of 9/11 and Hurricane Katrina highlighted the immense need for first responders to communicate with each other, yet for most jurisdictions across the country true interoperability remains on the drawing board. More than just planning for an interoperable public safety communications network must be done. Interoperability needs to become a reality as the question is not if we will need it; rather, when we will need it. Regardless of the event, the expedited response of public safety personnel and the rescue of victims depend upon the ability of first responders to communicate with each other. Ultimately, the safety and well being of the public will be enhanced due to the increased ability of public safety personnel being able to communicate without the barriers that are currently in place. The development of a virtual interoperable radio network for public safety first responders will allow members from various agencies to seamlessly communicate with each other at the scene of a mutual aid request or during a major catastrophe.

As the trend of reduced public safety resources across the country continues, the need for regional or national response to major events has become necessary. Even locally, the need to share resources and collaborate across jurisdictional lines has increased. Providing first responders with the ability to communicate regardless of equipment, radio networks or protocols must be a priority. Virtual interoperable communications via hand held radio would provide this ability and greatly enhance the level of safety for victims and first responders. Virtual interoperability is the future of public safety emergency communications and the roadblocks that have impeded earlier attempts to implement interoperability must be overcome.

Obstacles to Interoperability

True interoperability should have been fully implemented years ago. In an article by J. Eggerton “the FCC commission stated that it has been ten years since 9/11 and that the country was nowhere near where it needs to be in terms of first responder communications” (Eggerton, 2011). The obstacles of funding, competing interests and multiple protocols have kept true interoperability from being fully implemented remain. For many jurisdictions, these obstructions still need to be removed for interoperability to be implemented. The need for interoperability has been present for far too long; now time that the vision of virtual interoperability be developed.

The costs of implementing interoperability remain too high for state and local municipalities to bear given the current economic climate. The federal government must increase its level of assistance to state and local public safety organizations towards the costs of implementing interoperability. In an article by Dr. David Boyd of the Department of Homeland Security’s Command, Control and Interoperability Division, results from the National Interoperability Baseline Survey indicated, “that funding for interoperable systems remains a formidable challenge for most agencies. Only 7% reported that they had adequate funding for interoperability needs” (Boyd, 2007). Life and property are at stake and the inability to agree on the issues that are continuing to inhibit the implementation of interoperability is too much of a price to pay.

Issues such as competing interests and conflicting protocols must be resolved and the government must supplement the costs of the technology required by agencies. On April 23, 2010, the FCC established the Emergency Response Interoperability Center (ERIC) to help solve the long-standing issue of interoperability on public safety networks (Ramsay, 2010). The creation of ERIC will provide much needed leadership towards the fulfilling the vision of

interoperability and will help resolve issues over equipment, protocols and language by collaborating with public safety organizations, private companies and other government entities. According to FCC Public Safety and Homeland Security Chief Jamie Barnett, “ERIC will serve as the driving force for the development of standards that will bring true interoperability to public safety broadband networks nationwide” (Ramsay, 2010). Additionally, ERIC will help defray the costs of the technology needed by public safety agencies to implement true interoperability. Barnett also stated that the FCC would spend \$6.5 billion over the next ten years to deploy a LTE (Long Term Evolution) network for first responders. Although this is a good first step it is not enough as experts have estimated that full interoperability would cost upwards of \$16 billion. The development of ERIC and the appropriation of funds by the FCC will go a long way towards the implementation of true interoperability. Once the lessons learned from solving the issues of funding, competing interests and conflicting protocols have been realized; technologies such as virtual interoperability can be further developed and implemented as soon as possible.

Recommendations

The funding of an interoperable public safety radio network must become a priority at the national level. There have been estimates of as much as \$16 billion have been quoted for the full implementation of interoperability quoted by various experts. In a September 2005 Congressional hearing, Gary Grube, Motorola’s Corporate Vice President of Technology told a Senate Committee, “Whether they be hurricanes, tornadoes, earthquakes or even terrorist attacks, if we don’t prepare for them, we will pay one way or another” (PR Newswire, 2006). Grube urged the Senate’s Commerce, Science and Transportation Committee to provide more spectrum by clearing the 700Mhz band and provide for the full funding of an interoperable public safety

communications network. The 700Mhz spectrum public safety has been allocated; however, the funding for this important project has been limited and must be increased. Additional federal funding through an expanded grant program will allow state and local public safety agencies to upgrade their equipment and enhance their ability to protect their communities sooner rather than later. By increasing it's investment in interoperability, the federal government will upgrade the country's public safety communications infrastructure and create much needed jobs.

The United States government must provide a greater leadership role for states and municipalities in the implementation of interoperability and support the further development of virtual interoperability. In addition to the establishment of ERIC, the appointment of an interoperability czar by the President would reaffirm his commitment to attain the vision of national interoperability. This leadership position would unite the nation's public safety first responders, act as an intermediary with private companies and encourage the continued improvement of an interoperable public safety communications network. It has now been over 10 years since 9/11 and very little progress has been made towards interoperability, and we are fast approaching the new frontier of virtual interoperability.

ERIC must collaborate with the FCC to ensure that public safety organizations have sufficient spectrum for their use and limit the sale of this spectrum to wireless companies. As public safety increases its use of video and other technologies that require more bandwidth, the spectrum that has been reserved for use by public safety networks will be activated. Much like private companies seek to expand their spectrum to provide more services to their customers, public safety communications networks will need to increase spectrum to enhance the service they provide their communities. The sale of the 'D' block to private companies would severely reduce the expansion capabilities of public safety radio networks and jeopardize the safety of the

public. Goal #5 of the National Broadband Plan states, “Every first responder should have access to a nationwide, wireless, interoperable broadband public safety network” (National Broadband Plan, 2010). There remains much to be accomplished before this goal is realized.

The most important recommendation is to simply make interoperability a national priority once again. The Office of Homeland Security, FCC and ERIC have made great strides in the quest to provide full interoperability among our nations public safety first responders. With the continued support of these agencies and the potential of increased federal funding, the future of interoperability is promising and fast approaching. For far too long, regions across the country have bickered over minute details that have hindered the implementation of interoperability. The ability of our nation’s first responders to communicate seamlessly is essential. Much planning has occurred and it is time to implement interoperability once and for all.

Conclusion

The creation of a virtual interoperable radio network will transform interagency public safety communications. In the future, calamities such as earthquakes, hurricanes or a terrorist attacks will require a regional or national public safety response. A virtual interoperable radio network will allow first responders from anywhere to seamlessly communicate with each other at the scene of a mutual aid request or during a major catastrophe. The enhanced ability to communicate will add significant value to our communities. Virtual interoperability is the future of public safety communications and must become a national priority.

The philosopher George Santayana (1905) stated, “Those who cannot remember the past are condemned to repeat it”. Our nation will never forget the tragedies of 9/11 and Hurricane Katrina and must take action now to ensure the problems encountered by first responders during the aftermath of these events will never occur again. Although it is has been over ten years since

9/11, many public safety organizations still do not have the ability to communicate with other agencies in their own jurisdictions. The lessons learned from these events have clearly illuminated the plausible problems, challenges and opportunities of the future and provide an opportunity for better decisions to be made in response to these issues. Should the lessons learned during the rescue and recovery efforts of 9/11 and Hurricane Katrina not be heeded and true interoperability be fully implemented, those who may have been rescued would have died in vain.

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