

INTEROPERABLE COMMUNICATIONS

WHERE HAVE WE BEEN? WHERE ARE WE GOING?

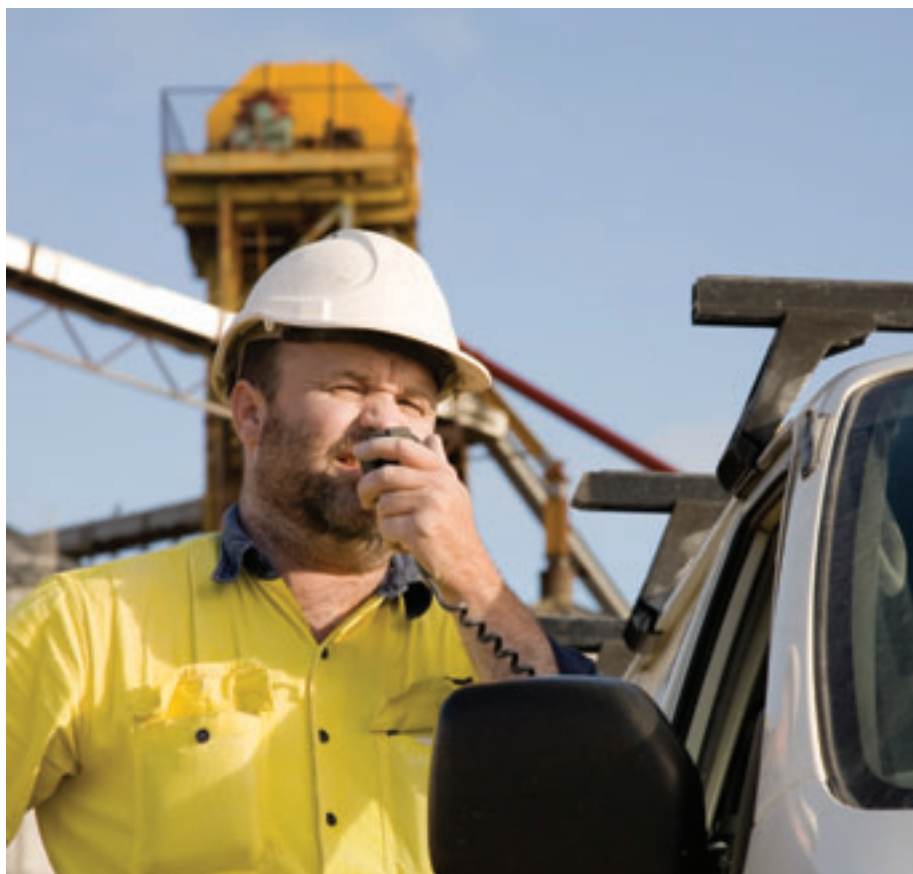
BY TIM BONNO

Interoperable communication projects have been the focus of many Homeland Security projects and grant dollars. Yet, it's hard to believe that we are still looking for ways in which to effectively communicate with each other in a disaster.

Interoperable communications refers to the ability of emergency responders to communicate and share voice and data information. As citizens (community customers), we expect the public sector to function like a business in which it provides consistent and effective customer service, everywhere and at any time. If our public safety agencies cannot communicate directly with one another by radio and data systems to coordinate life-saving activities, lives may be lost.

Why Aren't Public Safety Communications Interoperable?

- **Incompatible and aging communications equipment** – Different jurisdictions use different equipment and different radio frequencies that cannot communicate with one another.
- **Limited and fragmented funding** – There is limited funding to replace or update expensive communications equipment, and different communities and levels of government have their own budget cycles and funding priorities.
- **Limited and fragmented planning** – Without adequate planning, time and money can be wasted and end results



- can be disappointing. Agencies, jurisdictions, and levels of government compete for scarce dollars, inhibiting the partnership and leadership required to develop interoperability.
- **A lack of cooperation and coordination** – Agencies are reluctant to give up management and control of their communications systems.
- **Limited and fragmented radio spectrum** – There is a limited and fragmented amount of radio spectrum available to public safety.

Frequency Incompatibility

There are conventional, trunked, VHF, UHF, 700 and 800 MHz systems (all made by different manufacturers) in

operation throughout the country. Time can be lost while dispatchers manually relay communications between radio systems. Even if two systems are operating in the same frequency band, one manufacturer's radio may not receive signals/ transmissions from another's. This is also true of some non-trunked radio products that operate within the same band. As a result, when responding to an incident, agencies often use inefficient, non-radio methods to indirectly relay messages, severely hampering an immediate response.

Equipment Incompatibility

One interoperable solution is for all agencies in a region to purchase compatible

CONTINUED ON PAGE 34

equipment and create an infrastructure that operates in a single frequency band. The cost of deploying such a system, however, is prohibitive given the costs of equipment purchases and possible construction of additional tower sites. Characteristics of different frequency bands are such that the best solution for one agency may not be the best for another. Finally, radio channels may not be available to support all agency requirements within a single band.

Why can't they just use cell phones? Wireless systems often become overloaded during a crisis, preventing first responders from accessing them, which makes this application less desirable to use in an emergency. Public safety officials cannot depend on commercial systems that can be overloaded and unavailable.

How Can We Achieve Interoperability?

Leadership and Partnerships - Inter-agency planning and governance among participating agencies is critical. Strength in improving interoperability is built through collaboration among agencies and jurisdictions that have traditionally been viewed as competitors for scarce dollars.

- **Planning** – Performing a complete needs and gap assessment of the current and future state of communications is needed to define the problem. As jurisdictions build or upgrade current systems, planning must look at the provision of reliable and interoperable local and regional communications, and ultimately reliable and interoperable local, state, and federal communications.
- **Standards-based Equipment** – As standards develop, a number of initiatives can help solve these interoperability challenges. For example, “Project 25” compliance allows standards-based radio equipment made by different manufacturers to interoperate.
- **Additional Spectrum Allocation** – The Federal Communications Commission has allocated public safety frequencies in the 700 MHz band. As this band becomes available, it will provide opportunities for agencies or coalitions of agencies to obtain much needed additional channels.

- **Training** – Multiagency training is important to provide practice using radios to communicate with first responders of other agencies. It is important that responders in the field use interoperability equipment as part of their daily operations to ensure familiarity and preparedness.

South Carolina's statewide emergency communications radio system, the “Palmetto 800” (PAL 800), is an 800 MHz trunked network that has grown into one of the nation's largest state-wide systems.

Real-world Examples of Interoperability Solutions

A Partnership Solution

South Carolina's statewide emergency communications radio system, the “Palmetto 800” (PAL 800), is an 800 MHz trunked network that has grown into one of the nation's largest state-wide systems. It provides interoperable communications for more than 450 state, county and municipal agencies including more than 25,000 voice radios, some of which are in neighboring North Carolina, and 1,400 mobile data devices.

PAL 800 roots can be traced back to a partnership created between Spartanburg County and the power company that owns electrical utilities in South Carolina, North Carolina and Georgia. They agreed to join forces, building out from the utility's existing 800 MHz trunked radio network on a system they could both use.

The system grew to include state government and other counties. In 2001, to push forward with state-wide expansion, the utility, with the state's agreement, sold the network infrastructure to a global communications vendor who

would operate the system and fund the network's expansion. Today, the communications vendor operates PAL 800 under contract with the state. An advisory committee provides oversight and develops policies.

The communications vendor has made technology upgrades that allow both analog and digital communications. Recently, the vendor has been installing equipment that conforms to the Project 25 (P25) standard. The state requires agencies to buy P25 radios, or units they can upgrade to that standard in the future.

Not every local government in South Carolina has joined PAL 800. A few counties still operate their own networks. But since all of these use the same communications vendor's 800 MHz technology, their first responders can talk to fee-paying users on the state system. Furthermore, at least one PAL 800 radio has been given to every police and fire department and emergency medical service in the state that doesn't have interoperable communications. With that, officials feel they at least have interoperability at the command-and-control level.

The reach of PAL 800 may extend beyond the state border as South Carolina looks to make connections with neighboring jurisdictions in North Carolina as well as Georgia.

A Technology Solution

The Danville, Virginia region often encountered interoperability problems that they could resolve only with inefficient work-arounds. As in other communities, each local public safety agency had been charged with purchasing its own communications equipment, and had engineered their systems to operate independently of systems in neighboring jurisdictions to avoid interference. Additionally, agencies realized the increasingly complex job of keeping their communities safe required more than just voice interoperability. Data interoperability and real-time video systems were needed as well.

In 2005, a leading technology vendor met with the city of Danville and the National Institute of Justice (NIJ) to discuss how IP technologies could improve regional information sharing in

southern Virginia. The project's overall goals were to open up communications channels and create seamless collaboration, especially in emergency situations.

The project, the Piedmont Regional Voice over IP pilot (RVIP), involved a collaborative effort between the technology vendor, a communications vendor, the National Institute of Justice (NIJ) Communications Technology Program, and agency representatives from Virginia and North Carolina. These government agencies included the city of Danville, emergency responders from the counties of Caswell County, NC, and Pittsylvania County, VA, the state of North Carolina highway patrol, and the state police of Virginia. Additionally, Virginia Tech assessed the project for future applicability.

The project created governance models and partnerships that enabled agencies to work together to overcome hurdles. It reaffirmed that IP technology could improve government efficiency, officer safety, and service to citizens.

The project was implemented in three phases. First, the city of Danville police department took the lead implementing the solution, and then the fire departments, emergency medical services, public works department, and city utilities were all integrated into the solution. Secondly, it was expanded to include the fire departments, emergency medical services, and sheriff's offices of Caswell and Pittsylvania counties. Finally, the state police and highway patrols of Virginia and North Carolina joined the project.

The IP technology solution the vendor provided can convert incompatible signals into IP format and route them over an ordinary IP network. The solution cost a fraction of a radio upgrade, while extending interoperability among radio, VoIP, data and video. Because the IP solution put in place used the existing IP network and allowed the agencies to retain much of their equipment, the participants in the project were able to achieve interoperability for significantly less cost than upgrading every agency to a P25 or similar system. The solution will also be able to support future communications innovations that use IP technology.



A Planning Solution

In 1999, Orange County, California connected all of its responders in 31 cities on the same 800 MHz trunk radio system. The system supports more than 17,000 radios and averages about 55,000 transmissions daily. It uses 81 channels and has nearly 400 talk groups.

The key success factor for Orange County was the establishment of a

difficult to combine funding to purchase a system for all agencies at once. Each city's first responder agency began putting money aside in an escrow account and raised 100 percent of its share of the funding by the time the system was operational. The contract cost \$82.7 million. The county approved the contract in 1995 and deployed it between 1999 and 2001.

We know that interoperable communications is not a simple problem with a "one-size-fits-all" solution. There are strategies for improving interoperability through cooperation among responding agencies and jurisdictions. Other strategies will require greater planning and implementation of new systems, policies, and operating procedures.

ABOUT THE AUTHOR

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The IP technology solution can convert incompatible signals into IP format and route them over an ordinary IP network.

"technical-liaison" committee, which was made up of sworn and non-sworn personnel, technical and nontechnical personnel, field and dispatch, and all disciplines -- including fire, police and public works. The committee met monthly for six years to ensure that problems were adequately addressed.

Orange County planned for its interoperable system roughly five years in advance to overcome the challenge of each responder agency being on a different budget cycle. It would have been