Solving the Interoperability Problem: Are We On the Same Channel?

An Essay on the Problems and Prospects for Public Safety Radio

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I. INTRODUCTION

Public safety radio communication provides the essential link by which fire, police, emergency medical services ("EMS"), and other emergency personnel respond to life- and property-threatening situations. Communications enables the situational awareness, command, and operational control without which the response of multiple agencies to an emergency is less than useless. Key to this communications capability is interoperability: the capability of first responders from different agencies to communicate during emergencies.

The lack of interoperability in high-profile emergencies has highlighted public discussion of the issue, creating political pressure in Washington to "do something." These events include the first World Trade Center bombing in 1993, the Oklahoma City bombing of the Murrah Building in 1995, the Columbine High School killings in 1999, the collapse of the World Trade Center towers in 2001, and more recently, Hurricane Katrina in Louisiana, Mississippi, and Alabama in 2005. In each case, horror stories about the lack of communications among responding agencies leading to confused and ineffective responses to these disasters flooded the press. And yet, over a decade has passed and apparently little progress has been made in achieving the goal of interoperability.

This Article addresses the paradox of interoperability. While federal agencies establish programs and studies, exchange memos, and hold conferences such as this to little effect, there are states that have solved the interoperability problem and have stable, longstanding systems that provide emergency voice communications on demand among cooperating agencies, even across state lines. While existing radio systems are far from perfect and no doubt need to be updated and expanded for tomorrow's needs, interoperability can be achieved and has been achieved by a number of states, some of whose systems have been in place for over a decade with quite satisfactory results. What explains this paradox of feverish federal activity with little to show for it, while at the same time some states simply get the job done, paying little attention to the alarums and excursions emanating from Washington? Perhaps it is time for a little interoperability between the Washington bureaucrats and the troops on the ground.

II. WHY INTEROPERABILITY MATTERS

Public safety personnel respond to a wide range of events. These events can range from a simple auto accident or fire in a residential

outbuilding to bank robberies, multi-unit fires, and even full-scale hurricanes. At the low end of this spectrum, a single patrol car, fire engine, or ambulance is sufficient to handle the event. Radio is needed only to dispatch the personnel and for the personnel to report back unusual circumstances and resolution of the incident. For larger incidents, such as an apartment building fire, multiple fire companies may be dispatched to respond to the fire.

During a larger event, a strict chain of command is established at the scene, with a single designated fire commander communicating with subcommanders and personnel in the field (such as the burning building). Communication is essential not only to ensure that resources are deployed efficiently, but also to avoid uncoordinated rescue efforts which may lead to tragic and deadly accidents. Without communications, coordination in rescue efforts is poor to nonexistent; and the effectiveness of first responders—while heroic—may be useless as well as endanger the lives of others.

A real-life example illustrates the problem.[1] On April 20, 1999, two students of Columbine High School in Jefferson County, Colorado, started a shooting spree that resulted in fifteen deaths, including the shooters themselves, and wounded dozens of others. Within minutes, local police, firefighters, and paramedics arrived on the scene, soon to be joined by forces from six sheriff's offices, twenty area police departments, forty-six ambulances, and two helicopters from twelve fire and EMS agencies. Students were streaming out of the building, there were wounded in need of immediate medical attention, there were bombs the shooters had planted in the building, and no one knew the status of the shooters (they had killed themselves before the first police arrived). None of the agencies could talk with one another over their radios, which were incompatible and noninteroperable. Within a short time, cell phone towers were swamped with traffic from students, parents, the press, and others and were thus useless to first responders. The existing radio channels to communicate with dispatch centers were overwhelmed with traffic, so there was little awareness at dispatch of the situation at the school. The amazing thing about the Columbine incident is that with hundreds of heavily armed and ready-to-shoot police in a life-threatening melee in which no one knew what others were doing, no one else was killed.

Radios used by public safety personnel do not share infrastructure with civilian or other state or local users. A typical installation of a Land

1. This account of the response to the Columbine event is taken from the excellent piece by Viktor Mayer-Schönberger, *Emergency Communications: The Quest for Interoperability in the United States and Europe*, 7 INT'L J. COMM. L. & POL'Y 1, 2 (2002/2003), *available at* http://www.ijclp.org/7_2003/pdf/mayer-sch-ijclp-artikel.pdf.

Mobile Radio ("LMR") system involves a number of high antennas, a dispatch center, and mobile radios on fire trucks, patrol cars, and handheld devices. The radios operate on dedicated frequencies assigned by the FCC; a particularly popular frequency is 800 MHz, but many other frequency bands are also dedicated to public safety and are used by various agencies. Most communications transit the nearest tower; these communications may be to and from central dispatch, or they may be among commanders and firefighters or police on the scene. Communications via the towers may be monitored and recorded by central dispatch for many systems. Some radios have a "talk" or "push to talk" option, which permits direct radio-to-radio communications without using the nearest tower. An emergency situation is typically initiated with an alarm or a 911 call; the operator receiving the call will route it to one or more dispatch centers. In some states, police and fire/EMS have separate dispatchers, while in other states, a common dispatch center is used.

In many states, the local police and fire departments have budgetary control over their radio equipment as well as the system purchase decision. Different radio systems, especially those using different frequency bands, are usually not interoperable. Achieving interoperability among police, fire, and EMS, both within an operating area and across operating areas, requires planning and coordinated purchases and systems. Fragmented dispatch systems often signal radio incompatibilities and noninteroperability. The story of the response to the Columbine shootings suggests that these incompatibilities may be the norm rather than the exception.

III. WHO NEEDS TO INTEROPERATE, IN WHAT CASES?

In a typical interoperable system, a fire commander can request the dispatch center to open up a channel to speak with other fire departments that may be arriving on the scene, or to speak with police departments on the scene. This usually is accomplished using separate channels for command and control (speaking with other agency officers) and operational control (speaking with persons under the direct command of the commanders who are actually fighting the fire or dealing with a criminal situation). Multiple channels may be put in use by the dispatch center, depending on the needs of the situation. In order to speak across agencies, such as fire to police, or local police to state police, the typical interoperable system will use "mutual assistance" channels, again assigned by the dispatch center. The general rule appears to be that the fire commander manages the fire, and the dispatch center manages communications.

As noted above, for small incidents such as an auto accident or fire in an outbuilding, the required response is an individual unit (a patrol car, an ambulance, etc.) and interoperability is not an issue. For larger incidents such as a home or apartment building fire, a number of fire companies may respond, and the fire commander needs full communication capabilities with the other fire companies to gather and maintain situational awareness and control of his or her assets in fighting the blaze. Interoperability is essential for efficient and effective deployment of such resources. Note that interoperability is not appropriate for operational purposes; for example, a firefighter in a burning building wants to talk to his or her commander and not be bothered by nonessential police chitchat. Interoperability is appropriate and essential at the command and control level. It is commanders, not individual firefighters, that should be communicating across "mutual assistance" channels. Failing this, noninteroperability requires the use of suboptimal communication methods, such as swapping radios or sending runners with notes.

For even larger incidents, such as a train wreck, a factory explosion, or a school shooting, the number of responding units may be over a dozen, drawn from different geographical regions and from different agencies. In many cases, resources from across state lines may be required. Additionally, state level resources may also be required: state police, emergency management personnel, hazardous material ("hazmat") teams, transportation engineering teams, environmental cleanup teams, etc. At this level, the interoperability problem becomes acute, principally because there are so many agencies to manage. While there may be communications problems, it is perhaps more useful to think of this as a management problem: with so many resources available, how does the field commander manage these resources in an emergency environment? Establishing a chain of command and adhering to it is essential, but most first responders understand this much better than civilians. Clearly, radio communications should facilitate this function, but radios will not solve it. Many states have established Emergency Operations Centers ("EOCs") that take over the dispatch and control functions for larger incidents. It is these larger incidents in which civilian telephones, both wireline and wireless, may be swamped with traffic and consequently useless to public safety personnel. This occurred in the response to the Columbine shootings.

For even larger incidents, such as the World Trade Center collapse, communications and transportation infrastructure may be destroyed, and what is left may be overwhelmed with traffic. On 9/11, a number of Verizon central offices were destroyed, knocking out communications to much of lower Manhattan. While the incident may be localized, the damage is severe enough that many units respond, and the ability to communicate

can be severely impaired. Interoperability is imperative in these circumstances to maintain control of the emergency response. There were several significant breakdowns of public safety radio, particularly concerning the New York Fire Department, and the Fire Department's inability to interoperate with police radios received the most publicity. More importantly, it appears that there were significant lapses in chain-of-command protocols—as might be expected with a localized but horrific event such as 9/11—including infrastructure damage.

At the highest level of disaster, a major hurricane such as Katrina in 2005 that devastated coastal areas of Louisiana, Mississippi, and Alabama (including the disastrous flooding of New Orleans) brings perspective to emergency radio communications. During Katrina many cell towers were blown down, and those that remained drained their emergency batteries within hours so cellular telephones did not function.[2] There were also significant outages in wireline communications, including switching centers. A number of emergency radio towers also collapsed; those that remained standing served while their emergency generators maintained power, but the fuel for these towers was exhausted within a few days. Generally, the long-term power outages of Katrina caused significant harm to communications among public safety personnel, including command-and-control and situational awareness, a state of affairs that lasted weeks. Dozens of first responders from neighboring cities, parishes, counties, and states flooded the area to help. In addition, federal support from the National Guard and volunteer organizations like the Red Cross were on hand. Similar to 9/11, few agencies could speak with each other using their radios, and the usual chaos ensued. Alabama's communications system fared better than Mississippi's and Louisiana's, primarily because of backup systems successfully deployed during Katrina. Unlike 9/11, the destruction was not localized; it covered hundreds of square miles. Power outages exacerbated the communications problems, and power took weeks to return. The problem was not so much interoperability as operability; radios simply did not work because of the complete failure of multiple infrastructures.

The hierarchy described above has several dimensions: (i) number of units responding, from one to hundreds; (ii) responders from different geographic areas, including out of state; (iii) agencies responding (police, fire, EMS, etc.); and (iv) jurisdiction (local, county, state, federal). As the number of units, independent areas of origin, different types of responding

2. SELECT BIPARTISAN COMM. TO INVESTIGATE THE PREPARATION FOR AND RESPONSE TO HURRICANE KATRINA, A FAILURE OF INITIATIVE, H.R. REP. NO. 109-377, at 167–68, 172 (2006), *available at* http://www.gpoaccess.gov/katrinareport/mainreport.pdf [hereinafter A FAILURE OF INITIATIVE].

agencies, and levels of jurisdiction increase, the problem migrates from interoperability, to maintenance of chain of command, to any operability at all. All of these dimensions impact public safety radio, and each demands its own solution. Interoperability in the grand scheme of things is important but by no means the only communications problem for public safety. The tragic stories of noninteroperability that come from the 9/11 disaster seem to have imprinted interoperability in our collective political consciousness; but it is only one of a number of communication problems that must be addressed if we are to ask our first responders to run into burning buildings on our behalf.

IV. FEDERAL ACTIONS IN SUPPORT OF INTEROPERABILITY

The federal government has taken note of the problems of public safety radio—in particular interoperability—and has not been idle. In 2004, Congress passed the Intelligence Reform and Terrorism Prevention Act,[3] which directed the Federal Communications Commission ("FCC") and the Department of Homeland Security ("DHS") to act promptly to:

- Develop a comprehensive, national approach for achieving interoperability.
- Coordinate with other federal agencies.
- Establish appropriate minimum capabilities for interoperability.
- Accelerate development of voluntary standards.
- Encourage open architecture and commercial products.
- Assist other agencies with research and development.
- Prioritize within DHS for research, development, testing and related programs.
- Establish coordinated guidance for federal grant programs.
- Provide technical assistance.
- Develop and disseminate best practices.
- Establish performance measurements and milestones for systematic measurement of progress.[4]

The stated goals of coordinating, accelerating development, encouraging, assisting, and prioritizing are no doubt laudable. However, an actual firefighter or police officer might be excused for feeling that help is not about to arrive any time soon upon reading these goals.

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3. Intelligence Reform and Terrorism Prevention Act of 2004, Pub. L. No. 108-458 § 7303, 118 Stat. 3638 (2004).

4. LINDA K. MOORE, CONG. RESEARCH SERV., PUBLIC SAFETY COMMUNICATIONS: POLICY, PROPOSALS, LEGISLATION AND PROGRESS 7 (2005), *available at* http://www.fas.org/sgp/crs/homesec/RL32594.pdf (citing Intelligence Reform and Terrorism Prevention Act of 2004 § 7303).

The Intelligence Reform and Terrorism Prevention Act of 2004 is not the only congressional action on interoperability. The National Intelligence and Terrorism Prevention Act confirmed the assignment by the Office of Management and Budget to SAFECOM of overarching responsibility within the federal government to coordinate and rationalize federal networks and assure interoperability.[5] Presently, this program is located within the DHS Office of Interoperability and Compatibility. The following Departments help fund SAFECOM: Justice, Treasury, Transportation, Defense, Agriculture, Energy, Health and Human Services, and Interior. At this time, SAFECOM does not appear to be planning a national interoperable network.

In addition to the SAFECOM initiative, DHS, along with the Departments of Justice and the Treasury, participate in the Integrated Wireless Network ("IWN") program, whose goal is to develop a single network for federal law enforcement agencies.[6] The IWN program is targeted at achieving common systems and interoperability only among federal law enforcement, with little or no concern for interoperability with local, state, or regional first responders, except to note that IWN could become a template for others to emulate, eventually becoming integrated into a national system.[7] The reader may be surprised to discover that federal law enforcement agencies are not in fact using common interoperable systems, even though each agency is within the White House command structure.

Much congressional attention has been focused on the pending transition of spectrum in the 700 MHz band, now used for UHF television, to public safety uses. The FCC is committed, at the direction of Congress, to relocating these television signals as part of the band-clearing for the transition to digital broadcast TV.[8] The 9/11 Commission Report identified

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5. *Id*. at 7–8. According to its Web site, "SAFECOM is a communications program of the Department of Homeland Security's Office for Interoperability and Compatibility that, with its Federal partners, provides research, development, testing and evaluation, guidance, tools, and templates on communications-related issues to local, tribal, state, and Federal emergency response agencies." SAFECOM, Frequently Asked Questions: What is SAFECOM?, http://www.safecomprogram.gov/SAFECOM/about/faq/ (last visited Apr. 7, 2007).

6. *See* Integrated Wireless Network Joint Program Office, Request for Comments on Draft Statement of Objectives, High Level Acquisition Strategy and Phase I Advisory Downselect Draft Evaluation Criteria 7 (July 16, 2004), http://www.usdoj.gov/jmd/iwn/iwn draft.doc.

7. MOORE, *supra* note 4, at 8–9.

8. *See* Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communications Requirements Through the Year 2010, *Eighth Notice of Proposed Rulemaking*, WT Docket 96-86, FCC 06-34, para. 2 (Mar. 21, 2006).

increasing the availability of spectrum to public safety as critical to solving public safety radio difficulties.[9] While the FCC plans to devote 24 MHz of spectrum in this band to public safety communications,[10] it appears the Agency has already designated over 90 MHz to this function,[11] although it is highly splintered and inefficiently used. However, this is not directly related to the interoperability issue; principal attention is focused on using this spectrum for broadband emergency uses, as discussed below.

The FCC has been active in the area of interoperability, pre-dating the great interest generated by the failures of 9/11. In 1986, the FCC established the National Public Safety Planning Advisory Committee to provide the agency with recommendations concerning public safety issues.[12] In the following year, the FCC adopted its Public Safety National Plan, which, "among other things, established Regional Planning Committees . . . to develop plans that met specific needs," and also established a Public Safety National Coordinating Committee.[13] Since then, the FCC has renewed the charter of the Network Reliability and Interoperability Council ("NRIC") (among many other advisory committees).[14]

Lastly, the FCC submitted its required report to Congress on public safety radio and interoperability.[15] The focus of this report appears to be primarily on the status of the 700 MHz band and its potential use for broadband communications to and from first responders in emergency situations. It includes a number of proposals from vendors as to how this spectrum might be used for public safety.[16]

The centrality of SAFECOM to the federal role in interoperability

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9. NAT'L COMM'N ON TERRORIST ATTACKS UPON THE U.S., THE 9/11 COMMISSION REPORT 397 (2004), *available at* http://www.gpoaccess.gov/911/pdf/sec12.pdf.

10. *See* FCC, 700 MHz Public Safety Spectrum, http://www.fcc.gov/pshs/spectrum/700mhz/ (last visited Apr. 7, 2007).

11. *See Spectrum for Pub. Safety Users: Hearing Before the S. Comm. on Commerce, Science, and Transp.*, 108th Cong. (2004) (testimony of Michael K. Powell, Chairman, FCC), *available at* http://commerce.senate.gov/public/index.cfm?FuseAction=Hearings.Testimony&Hearing_ID=1300&Witness_ID=1943.

12. *See* MOORE, *supra* note 4, at 24.

13. *Id*.

14. *Id*.

15. FCC, REPORT TO CONGRESS ON THE STUDY TO ASSESS SHORT-TERM AND LONG-TERM NEEDS FOR ALLOCATIONS OF ADDITIONAL PORTIONS OF THE ELECTROMAGNETIC SPECTRUM FOR FEDERAL, STATE AND LOCAL EMERGENCY RESPONSE PROVIDERS (2005), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-262865A1.

16. There are numerous other federal agencies involved in public safety interoperability which are not covered in this Article, such as the National Telecommunications and Information Administration ("NTIA") in the Department of Commerce and the Department of Justice's ("DOJ's") Advanced Generation of Interoperability Law Enforcement ("AGILE") program.

suggests a further look at its activities. Within six months of its October 2001 establishment in the Department of Treasury, SAFECOM was moved to the Federal Emergency Management Agency ("FEMA") with a change of management team. Within another six months, FEMA again changed SAFECOM's management team. Six months afterwards, DHS was appointed managing partner and installed yet another management team. One year later, the General Accounting Office ("GAO") conducted a review of SAFECOM, finding that "[w]hile its overall objective of achieving communications interoperability among emergency response entities at all levels of government is a challenging task that will take many years to fully accomplish, Project SAFECOM, in its 2-year history, has made very limited progress in addressing this objective."[17]

With all the advisory committees, legislative mandates, the involvement of many agencies, coordinating, prioritizing, advising, developing, and monitoring, it may come as a surprise that nothing seems to have actually happened. Not only has the federal government seemed to have little (or no) impact on interoperability for state, local, and regional first responders, it appears they have had as yet no impact on interoperability for *their own federal law enforcement agencies*. It is not as if we do not know the dimensions of the interoperability problem. The GAO laid out the problems (and lack of progress towards solving them) to Congress in 2003.[18] Apparently, the need for coordination, planning, staffing, and funding, as well as strong support from Congress and the Administration, have proven insurmountable obstacles, at least as the GAO sees it.

But perhaps a more decentralized approach might work, one in which the federal government acts as a facilitator, working to define and develop standards, and making grants to states and municipalities that conform to those standards—in other words, a more federalist approach in which the heavy lifting is in the hands of the states and municipalities, and the federal government provides funding and technical guidance. While one might think this is exactly what the federal government is doing, this is not the case.

Between September 11, 2001 and July 30, 2004, DHS provided over $5.4 billion to states for public safety radio, with Administration

17. GAO, PROJECT SAFECOM: KEY CROSS-AGENCY EMERGENCY COMMUNICATIONS EFFORT REQUIRES STRONGER COLLABORATION (2004), *available at* http://www.gao.gov/new.items/d04494.pdf.

18. *Homeland Security: Challenges in Achieving Interoperable Communications for First Responders, Testimony Before the Subcomms. of the H. Gov't Reform Comm.*, 108th Cong. (2003) (statement of William O. Jenkins, Jr., Dir., Homeland Security & Just. Issues), *available at* http://gao.gov/new.items/d04231t.pdf.

appropriations of $200 million specifically earmarked for interoperability.[19] At first blush, it would appear that the above-mentioned model is exactly what the DHS has in mind. DHS has established the standard setting function in its directorate of Science & Technology ("S&T"). It has also established the grant-making function for equipment for local and state agencies in its Office of Domestic Preparedness ("ODP"). According to a recent report of the DHS Office of Inspector General, S&T has produced twelve standards, but none are related to interoperability.[20] Further, adhering to these standards is not a condition of receiving DHS money from ODP. In fact, S&T is not consistently informing ODP what standards it has set and for what equipment. While it is laudable that DHS is indeed making grants to states and municipalities, it is disheartening that the standards process is apparently not linked to equipment grantmaking, and that none of the standards relate to interoperability.[21]

Perhaps even more disheartening is to learn that in at least one case in which communications infrastructure became central to saving lives, federal grant money seems to have fallen into a black hole. Between 2003 and 2005, Louisiana received $23,495,114 in federal grant money for public safety communications; the City of New Orleans received $5,510,412 in 2003 specifically for achieving interoperability. At the time of Katrina, less than five percent of this grant had been spent.[22] Since the entire public safety system collapsed during Katrina, one might wonder exactly where the $23 million went.

If the GAO diagnosis is to be believed, the need for coordination, support, funding, and other interbureaucracy warfare is getting in the way of progress. This might suggest a more direct and more top-down approach might succeed. Perhaps if Congress and the Administration designate a specific department with full responsibility for public safety radio and interoperability, with large amounts of money, the latest technology, and the authority to mandate that all first responders comply with its systems,

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19. Press Release, Dep't of Homeland Sec., Fact Sheet: RapidCom 9/30 and Interoperability Progress (July 30, 2004), http://www.dhs.gov/xnews/releases/press_release_0470.shtm.

20. The standards cover personal protective and detection equipment. *See* DEP'T OF HOMELAND SEC., OFFICE OF INSPECTOR GEN., REVIEW OF DHS' PROGRESS IN ADOPTING AND ENFORCING EQUIPMENT STANDARDS FOR FIRST RESPONDERS 2 (2006), *available at* http://www.dhs.gov/xoig/assets/mgmtrpts/OIG_06-30_Mar06.pdf.

21. Numerous federal agencies make grants for emergency radio services, yet most fire and police departments remain unaware of what is available. *See* WILLIAM L. PESSEMIER, TOP PRIORITY: A FIRE SERVICE GUIDE TO INTEROPERABLE COMMUNICATIONS 5–6 (2006), *available at* http://www.interoperability.virginia.gov/pdfs/FireService-InteropHandbook.pdf.

22. A FAILURE OF INITIATIVE, *supra* note 2, at 175.

progress would be forthcoming. Yet, based on present evidence, cutting through interagency dithering and bureaucracy still does not seem to do the trick.

We do indeed have a model for such a top-down, all-the-money-you-need approach in developing advanced radio systems. It is the Defense Department's Joint Tactical Radio System ("JTRS"), a project started in 1997 to provide the U.S. military with integrated fully interoperable radio systems that could operate from multiple platforms in combat conditions, using the most advanced technology, such as software-defined radio.[23] In 2003, the project was very far off its trajectory, both cost-wise and performance-wise; it appeared to be in meltdown. The GAO issued an unflattering report on the management failures of the project, discussing its unstable requirements, immature technologies, overly aggressive schedules, and costly overruns.[24] As a result of this review, a number of management changes were introduced in the JTRS project.[25] A more recent GAO report lauded these changes but concluded that the basic problems of the project have yet to be solved.[26] If any radio project could be more important than public safety radio, it is military radio, where not only life but national security is on the line. Yet a highly centralized and integrated approach has achieved little more than our current public safety efforts, except to spend vastly more money (current estimate for JTRS is $37 billion).[27] On the basis of the history of JTRS, it would appear implausible that a similar program designed to standardize public safety radio and achieve interoperability based on advanced technology is unlikely to perform much better than the current desultory federal interoperability "program."

Based on these findings, it is difficult to reject the cynical hypothesis that the federal government engages in energetic to-ing and fro-ing to demonstrate its commitment to satisfying a political demand for reliable and ubiquitous public safety radio, but it is in reality a very low priority, so nothing actually gets done. It would appear that our public policy community is quite content with allowing our police to come under fire from bad guys and our firefighters to run into burning buildings without the best equipment to save their lives and the lives of others. Fixing this apparently is not high on anyone's agenda.

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23. GAO, CHALLENGES AND RISKS ASSOCIATED WITH THE JOINT TACTICAL RADIO SYSTEM PROGRAM, GAO 03-879R, at 1 (2003), http://www.gao.gov/new.items/d03879r.pdf.

24. GAO, DEFENSE ACQUISITIONS: RESTRUCTURED JTRS PROGRAM REDUCES RISK BUT SIGNIFICANT CHALLENGES REMAIN, GAO 06-955, at 1 (2006), http://www.gao.gov/new.items/d06955.pdf.

25. *Id*.

26. *Id*.

27. *Id*. at 2.

One bright spot in the federal arena is DHS's SAFECOM project. Although SAFECOM has been given impossibly grand objectives and little power to achieve them, it has focused on working closely with states, helping them with interoperability plans, helping them apply for federal grants, reporting to them on progress, and generally being helpful. SAFECOM has opted to focus on the action at the state level and to aid and support that action. It has modest but very useful objectives, which it actually seems to be achieving.[28]

V. IS THERE NO HOPE? WHAT ARE THE STATES DOING?

Despite this shameful disarray within our federal government, states and municipalities are not helpless, confused, or unable to act to solve this problem. In fact, many states have moved aggressively on interoperability, having either already achieved it or making quick progress toward it. The following abbreviated list of states and their programs[29] gives a more optimistic picture than at the federal level:

The Commonwealth of Virginia and SAFECOM have entered into a partnership premised upon applying SAFECOM principles in an effort to plan and implement statewide communications interoperability.

Indiana's Integrated Public Safety Commission was established by the Governor's office; it oversees Project Hoosier SAFE-T, which is the state's interoperability program.

Oregon's governor created the State Interoperability Executive Council in 2002; its role is to provide policy level direction for matters related to planning, designing and implementing guidelines, best practices, and standard approaches to address Oregon's public safety communications interoperability issues.

In Tennessee, the Mobile Communications Alliance Team was created to provide direction in the areas of planning, designing, funding, implementing, and governing for a shared communications system.

Alaska is still at the planning stage; a governance structure, the Alaska Land Mobile Radio Executive Council, was formed.

Mississippi created an incident command system in 2001, as well as the formation of a State Interoperability Executive Committee in 2003,

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28. The SAFECOM Web site provides useful information documenting their support of the states. It is revealing that the Web sites of most states with active interoperability programs link to the SAFECOM Web site and documents but not to sites of other federal programs. *See* SAFECOM, Welcome to SAFECOM, http://www.safecomprogram.gov/SAFECOM/ (last visited Apr. 7, 2007).

29. *See* SAFECOM, REVIEW OF STATEWIDE INTEROPERABILITY PLANNING EFFORTS ACROSS THE COUNTRY, http://www.interoperability.virginia.gov/pdfs/SAFECOM-VAResearchReport.pdf. Links to individual state Web sites describing program efforts in those states can be found at the end of this Article.

setting the state on a path to dramatically improve the response, communications, and coordination of first responders. These efforts have been reinforced by Hurricane Katrina.

New York has addressed its interoperability problem with the development of a Statewide Wireless Network ("SWN"). The SWN incorporates new infrastructure, which allows for gateways and interfaces to other public safety/service communication systems. However, there is no financial support for local systems.

A South Dakota interoperability system was funded entirely with grants and legislative appropriations. Because of this comprehensive funding, the system does not assess user fees, and a yearly budget is only needed for maintenance. The system supports about ninety-five percent of all public safety agencies in the state, and this, coupled with the lack of user fees, allows for the greatest possible local participation. This system appears to be fully operational, providing full interoperability among public safety agencies at the state and local level.

Maryland designed an Incident Management Interoperable Communications System. The system would only be intended for operation during mutual-aid or catastrophic incidents, not day-to-day interoperability use. The participants are local law enforcement, federal agencies, state police, fire departments, EMS, Department of Natural Resources, and the State Highway Department.

Pennsylvania's legislature has cautiously moved ahead with planning, but it is under substantial budgetary pressure.

Florida has also faced budgetary pressures, and it is moving ahead with various public-private programs in a five-step process.

Texas' Interagency Radio Work Group of Texas ("IRWG") works in cooperation with the Texas First Responder Preparedness Program. The IRWG is an informal group of representatives from state agencies and affiliated public safety associations chartered to promote interoperability and improve public safety communications statewide.

Missouri has urged public safety officials to look beyond traditional sources of public safety funding and seek opportunities such as private donors, corporations, foundations, or trusts to fund their interoperable communications program.

In addition, California, Oregon, Washington, Nebraska, and Montana are in various stages of planning and implementing interoperability plans.

VI. CASE STUDY: DELAWARE

In all the above-mentioned readings, reports, reviews, and proposals, we hear the voices of the federal bureaucrats, but we do not hear the voices of those who really matter: individual police officers, firefighters, or EMS

providers. While the Author has done time in Washington and is certainly familiar with the paper deluge, the absence of input from those who put their lives at risk for us seems particularly inappropriate.

To rectify this, I sought out first responders near my home in Sussex County, Delaware. Sussex County is the most rural of Delaware's three counties, the others being New Castle (urbanized) and Kent (location of the state government). Delaware is an unremarkable state; it is not where Americans look to see their future (that would be California) nor to seek fame and fortune (that would be New York or Hollywood).[30] The median income is slightly above the national average, and local taxes fall rather below the national average.

Sussex Countians love their firefighters. In many small settlements throughout the rural county, the fire hall is by far the largest building in town, often a brick building with six to eight truck bays. Staffed entirely by volunteers, Sussex fire companies have equipment that would be the envy of any big city fire department. Most EMS operations are carried out by fire companies. The position of firefighter is well-respected within the community. Further, fire companies are quite close to each other, even in rural areas. The Millville Fire Company is responsible for our home and has fire companies five miles southwest (Roxana), seven miles northwest (Dagsboro), and three miles east (Bethany Beach). All Sussex County fire, police, and EMS are dispatched via the central dispatch center in Georgetown,[31] the county seat.

In 1993, the State of Delaware purchased an 800 MHz digital trunked radio system from Motorola, built to Association of Public-Safety Communications Officials ("APCO") twenty-five standards.[32] The state accepted the system in all counties by the end of 1998, and the systems went live. After Motorola made required connectivity improvements, the system received final acceptance in 2001. This system is now in use by every police department, fire company, and EMS unit in the state of Delaware, as well as state and county government agencies, such as the state Department of Transportation ("DelDOT"), Department of Natural

30. Delaware almost never appears in the national news; a 2002 news story noted that a giant iceberg had broken free of the Ross Ice Shelf in Antarctica (named C19) and that it was larger than the entire state of Delaware. *New Antarctic Iceberg Bigger Than Delaware*, CNN.COM, May 15, 2002, http://archives.cnn.com/2002/TECH/science/05/14/large.iceberg/. Besides iceberg comparisons, national references to Delaware are rather sparse, confirming its unremarkability.

31. For legacy reasons, both Seaford and Rehoboth Beach dispatch their own public safety personnel, in full cooperation with Georgetown.

32. State Div. of Commc'ns, State of Delaware Digital 800 MHz Statewide Trunked Radio System, http://www.state.de.us/pscomm/800mhz_radio_system.htm. This Web site provides more information on details of tower location and characteristics as well as efforts to interoperate with regions in other states close to Delaware's border with Maryland.

Resources and Environmental Control ("DNREC"), State Police, and Delaware Emergency Management Agency ("DEMA"). Additionally, hospital emergency rooms throughout the state are equipped with compatible radios. The system is controlled from three dispatch centers, one in each county.

In September 2006, I conducted an extensive interview with the Assistant Chief of the Millville Fire Company, Doug Scott, who generously shared with me his time and his extensive practical knowledge of the field operation of the state's 800 MHz radio system, from the point of view of someone who must command firefighters to run into burning buildings. At the level of a major fire incident, there is no planning, prioritizing, coordinating, staff analysis, or program development. Radio systems either work or they do not work; fires extinguished and lives saved, or not. During our interview, Doug Scott was informative, helpful, measured, and quite undramatic in his mien, but it soon became clear that I was getting a report from a career under live ammunition, where communications can mean the difference between life and death. Nothing could be further from a career of federal bureaucracy. What follows is my reporting of that interview.

A. Results in Brief

The Delaware 800 MHz digital system provides first responders voice communications anywhere in the state, with the ability to communicate easily among any number of fire companies. The system also permits interoperability among fire, local police, EMS personnel, hospital emergency rooms, state police, DEMA, DelDOT, DNREC, and other state agencies. Most communications are routed through the appropriate dispatch centers, where they are recorded. In the event that first responders are out of contact with the system's towers, their radios can go direct radio-to-radio over a limited range. The system permits all the communications Doug Scott needs when on call.

B. Typical Fire Incident

When a 911 call is received, the dispatch center determines the nature of the call and what services are needed: police, fire, and/or EMS. The fire company is alerted by radio and by an annunciator board in the fire hall. The dispatch radio channel is usually one-way (unless there is a dire emergency) as dispatch communicates with all fire and EMS units simultaneously within Sussex County. Police have their own dispatch channels. Within minutes, firefighters don their turn-out gear, and the engines are rolling. Each engine has an onboard laptop computer, in which street maps and building plans are stored, so the engine crew can find its

way to the fire and knows what to expect in the building (for example, if it is a commercial, multistory building). If the fire is major, other companies are dispatched to the fire. Generally, the ranking officer of the first company to arrive is the Fire Commander. He or she establishes radio communication with the firefighters under his or her command.

C. Interoperability with Other Fire Companies

The radio system has five banks of radio channels, sixteen channels per bank. Sussex County has its own bank, split among East, Central, and West Sussex, but all channels are accessible from all radios. Millville generally uses the Fire 2 channel for operational control; this is the channel that the Millville Fire Commander uses to communicate with his or her men and women. Personnel are organized by crew, each crew with three persons, one radio per crew. If the fire is sufficiently large, other companies will show up and ask the Fire Commander for instructions. Nearby fire companies who typically support Millville know from experience that they must use Fire 2. If more companies are called, the dispatch center may assign the channels to each company as they are on their way to the fire. The Commander allocates one fire channel for command and control: this is the channel over which he or she speaks to chiefs of other companies under his or her command at the fire. Individual firefighters do not hear this channel.

EMS personnel have their own channels, EMS-2, EMS-3, and EMS-4, with which to communicate with each other and with the dispatch center. These channels are also available on all radios. There are also a number of statewide channels: 911HELP (available nationwide on any 800 MHz system), Statewide Fire, and Statewide EMS. These channels have been used when Sussex County sent rescue boats to New Castle County to help in flood relief.

Additionally, any company can switch to a "Talk" channel (Talk 1, Talk 2) which is a radio-to-radio channel that does not use the 800 MHz towers. This frees up Fire 2 for command and control. It is essential that operational channels not be cluttered with excess traffic. Every firefighter at the incident hears every call on the operational channel, including the commander, and so is knowledgeable about what is going on in his or her situation. They do not need to hear what is going on elsewhere, and such traffic simply clutters up the channel. The Fire Commander uses the command and control channel to communicate with other chiefs at the incident to coordinate activities and share information.

Key to effective firefighting, indeed all of emergency management, is "situational awareness;" the Fire Commander and all firefighters need to

have the best and most complete information about what is happening.[33] Open communications is the only way to accomplish this goal. Any information picked up by one firefighter on the scene is transmitted over the operational channel and relayed to the Fire Commander. Interoperability is key to situational awareness; in order for the Fire Commander to best deploy the resources at hand, he or she must have the most recent and complete information as possible. As many eyes and ears must contribute to that knowledge via communications.

D. Interoperability with Other Agencies

An important part of both situational awareness and the ability to command and control is interoperability with other agencies, such as police and EMS. In this situation, the dispatch center, upon request of either agency, permits use of Mutual Assistance channels (available statewide), MA-1 or MA-2, in which agencies can speak with each other, that is, interoperate. Additionally, there are four International Tactical Channels ("ITAC") which operate radio-to-radio (similar to the Talk channels), by which police, fire, and EMS can speak with each other. Again, situational awareness and the ability to coordinate command and control are well served by this interoperability.

E. Interoperability with Other States

Sussex County borders Ocean City, Maryland, as well as Worcester County, Maryland, and each area often finds itself responding to calls across the state line. The current 800 MHz system interoperates with both Ocean City and Worcester County agencies, even though the Maryland agencies use GE rather than Motorola equipment.

F. Interoperability with Federal Agencies

Law enforcement officials are sometimes required to operate cooperatively with the FBI, DEA, ATF, and FEMA. Fire companies have much less need to cooperate with federal agencies, except perhaps FEMA during disasters.[34] Doug Scott's expectation was that all communications with FEMA would be channeled through DEMA, so the command and communication structure would remain intact. However, this link had never

33. The fundamental emergency management failures at the World Trade Center on 9/11, the Columbine High School shootings, and Hurricane Katrina were the inability to maintain situational awareness and command and control of emergency resources due to a lack of communications operability or interoperability.

34. ATF agents have a forensic responsibility to investigate fatal fires. However, their role is investigative, and they show up after the fire, so there is no need to integrate them into the communications command structure.

been exercised and there was not much concern about it. I can only conjecture that the men and women who protect our lives are not counting on significant federal help to perform their jobs (other than receiving a federal grant).

G. Delaware Summary

The function of public responder radio is to enable the Commander on the scene to maintain situational awareness, to control his or her operational resources, and to command other companies and agencies assisting at the scene. Failure to master these basic communication functions severely impairs the effectiveness of response and the ability to save lives, as illustrated in the earlier example of the Columbine High School shootings. By all accounts, Delaware has been able to put a system in the hands of its first responders which meets these objectives; field personnel have had this system in place for almost ten years, and are both knowledgeable and comfortable using this system. It supports full interoperability with local and state authorities and interoperability across state boundaries where such cooperation is mutually beneficial.

VII. CONCLUSION

There is a huge disconnect between federal level activities, in which almost nothing real is happening, and states such as Delaware, in which the interoperability problems have been solved. Federal grants are welcome, but the track record of effective deployment of grant money is spotty at best. SAFECOM has been helpful in a number of states, such as Virginia, and is responsible for what little positive progress has been made at the federal level.

Delaware, an otherwise unremarkable state, has clearly demonstrated that the interoperability problem is easily solved with existing, well-established technology. Delaware is not a particularly wealthy state, so solving the problem cannot have been an insuperable financial burden, as other states have claimed. The initiative is with the states. Those states who muster the political will to properly equip their first responders have a clear path to follow, possibly with federal grants and/or advice, possibly without. This is a well-understood technology in which a number of states have much experience that they are willing to share with others.

Federal institutions seem to have an inflated concept of their potential value added in public safety radio and a significant undervaluation of what states can and have accomplished. States may look to the federal agencies for grant money, but it is very doubtful that they are looking to the federal government for leadership. The federal agencies, far from being the leaders they aspire to be, are at best playing “catch-up.” One might think that

communications integration for the military and for federal law enforcement might be the first item on the federal agenda; so far, they have not shown they can handle these tasks, much less lead anyone else. If and when communications integration arrives in the public safety sphere, it will arrive by the federal agencies adapting to existing state systems, not by states being forced into federally mandated standards and practices they do not need. Some initiatives of SAFECOM have taken on this much more modest role of supporting the states in their own initiatives and have had some success.

In fact, the case for common standards and equipment across all public safety radio in the U.S. seems weak. Delaware and Maryland have demonstrated that when states need to work together, they can do so without help from the federal agencies. In cases of major disasters, such as Hurricane Katrina, federal agencies do indeed flood into the affected region, along with first responders from across the country. However, in such cases the problems of emergency management include chain of command problems, resource availability, command of resources, and operability of any communications systems. Interoperability is a second-order effect in such situations.[35] It appears the best strategy for FEMA and other federal agencies is to adapt their systems to that of the individual states in order to handle the relatively few times that interoperability between federal and local/state personnel is required.

35. *See infra*, app.

> The sheer force of Hurricane Katrina disabled many of the communications systems that state and local authorities and first responders rely upon to communicate with each other and with FEMA. This was not an issue of interoperability, but of basic operability resulting from wind, flooding, loss of power, and other damage to infrastructure.

Hurricane Katrina: The Role of the Department of Homeland Security: Hearing Before the H. Spec. Comm. on Katrina, 109th Cong. 5 (2005) (statement of Michael Chertoff, Secretary, U.S. Department of Homeland Security), http://katrina.house.gov/hearings/10_19_05/chertoff_state101905.DOC.

VIII. APPENDIX

A. Public Safety Communications in Katrina-Class Disasters

It is apparent from the Katrina experience that public safety communications collapsed far more seriously than on 9/11. The reason was a collapse of the power system, which was not functional for several weeks in large parts of Louisiana and Mississippi, and flooding of a substantial portion of the communications infrastructure generally, coupled with the inability to move supplies (such as diesel fuel for backup generators at radio towers) reliably over the road system.

There are two solutions to this problem. The first is that 800 MHz digital systems already have "Talk" channels that do not transit the towers and are thus not dependent on the tower infrastructure. These systems are in use today and are interoperable. Achieving fully efficient use of these systems would be difficult in the event communication with the dispatch centers is lost. The second is outfitting first responders with satellite phones in sufficient quantities to handle a Katrina-class disaster. This requires not only the phones themselves but training first responders how to use the phones and how they fit into the command structure. This is one area in which federal support could be effective. The coverage area of a satellite is quite large, and federally funded satellite capacity committed to public safety (possibly bandwidth normally for commercial use that public safety could preempt if needed) would be very useful, together with standard settings. Perhaps we would then see the private sector design and build satellite radio systems for public safety use. An essential component of using satellite phones as a disaster backup is training in both readiness and operational use.

B. New Technologies for Public Safety Communications

Public safety communications is primarily oriented to voice. For law enforcement use, in-car radios are also used to access and display records (such as criminal files and motor vehicle records) and display graphics (such as photographs). Recent interest in the 700 MHz spectrum (if and when the current TV licensees are relocated) in public safety has focused on the provision of broadband capabilities to the field. Applications mentioned are live-feed video and transmission of maps and building plans, among others. The pitch to devote this spectrum to broadband has been from the radio vendors, each of which has its favorite plan. How broadband would be used in the field is another matter, and we have yet to see a compelling business case for this. During my interview with the Assistant Chief of the Millville Fire Company, there was no interest expressed in live

video feeds, and indeed it is difficult to imagine how this might be useful in general fire use. There was more interest in the transmission of maps and building plans. Doug Scott today collects maps from the county as well as maps of new developments as builders complete them. He also has building plans on file on the few multistory buildings in the Millville area. He sees that all maps are easily accessible on the onboard computers on each engine and truck available in the field. He expressed interest in having this available via broadband radio directly from the county, and therefore saw a need for such a broadband service.

However, the need to receive up to the minute maps and plans would seem limited to geographic areas in which there is ongoing construction or renovations of existing properties (such as Sussex County), so that maps or plans over, say, one week old could be out of date. In slower-growing areas, updating fire companies' maps is probably unnecessary more than once every six months, in which case distributing maps via CD rather than real-time radio is more efficient and effective.

Recently, some prominent commentators[36] have suggested that public safety communications problems could be solved using Wi-Fi-like radio networks which are "meshed," in which each radio can act as a relay point for messages, sending messages from one radio or antenna to another until it arrives at its destination, much as the Internet delivers its content. Such proposals are often couched in terminology suggesting that a quick trip to one's local Radio Shack will produce all the gear one needs to set up such a system. In fact, there are currently no commercial mesh network systems deployed and operational, and the equipment is not available at Radio Shack or any other commercial electronics store. Further, even under ideal conditions, mesh networks require a rather high density of phones and relay points to work successfully. In the event of a hurricane, it is likely that outdoor access points will be blown away just as other antennas are blown away, and such a system would often not be able to garner the critical mass needed to sustain mesh communications. Perhaps someday this might be a solution, but we are very far from such a network being feasible,[37] and

36. *See generally* Carl Malamud & Reed Hundt, *A Better Communications System for Emergency Workers*, CTR. FOR AMER. PROGRESS, Sept. 9, 2005, http://www.americanprogress.org/issues/2005/09/b1029179.html.

37. Immediately after Hurricane Katrina, a group of firms including Intel, US Wireless, MCI, Skytel, and Tropos Networks deployed thirteen Tropos MetroMesh networks in the City of New Orleans, using WiMax and directional Wi-Fi access points. Since these antennas were deployed after the hurricane, there was no risk of wind damage to them (as would be the case if they were deployed before the hurricane), and the installation was quite customized and unique to the situation at hand. *See* Press Release, Tropos Networks, Intel, MCI, SkyTel and US Wireless Use MetroMesh in Assisting Gulf Coast to Re-establish Communications Networks in the Wake of Hurricane Katrina, (Sept. 19, 2005), http://www.tropos.com/newsletters/2005-09-19.php.

certainly not in life-threatening situations. Technophiles pushing their favorite gizmo hoping the public safety folks will actually use it are close to irresponsible. Pushing one's agenda of untried systems into the emergency communications area is foolhardy in the extreme.

Focusing the discussion on flashy new technology misses the point; if interoperability is the problem, we have the technology for the solution well in hand and have had it in hand for twenty years. While new technology may eventually produce something useful to help the police officer during a drug raid or a firefighter inside a burning building, whizzy new gear is simply an answer looking for a public safety question that no one has asked.