

Interoperability Today



Homeland Security

A Resource for the
Emergency Response Community

Fall 2006

Firefighters on the Communications Front Line

Do fire response agencies have special interoperability needs? Fire agencies and other emergency response agencies function differently because their missions differ, but for the most part, the interoperability challenges facing fire agencies are similar to those facing other emergency response agencies, notes Alan Caldwell, SAFECOM Executive Committee member and senior adviser on government relations for the International Association of Fire Chiefs. “All agency types are in the same boat,” Caldwell says. “For instance, a police department has different needs from those of a fire department in a particular jurisdiction, but the topography, demographics, and tax base are the same for both. Most interoperability problems are pretty much the same for all.”

Interoperability Challenges

Caldwell emphasizes that a prerequisite for tackling interoperability is a fully operable system. Such a system includes suitable equipment, a well-trained force, and the capability to cover 100 percent of the jurisdiction. Given an operable system, the next major interoperability challenge is making a good plan. The plan should be geared to the conditions, hazards, and special situations of the locality. Caldwell approaches this by asking a series of questions: “First, what do we want to accomplish? When do we need to deal with other fire departments and other agencies? If there is a need, then we must develop and formalize the plan. When and how will we use this plan?”

Any good plan will likely require special communications equipment, which leads to other questions, Caldwell says. How much does the equipment cost, and do we have the money to buy it? Do we have the spectrum to use it? Do we have or do we need to acquire equipment that bridges to the equipment being used by other groups encompassed by the plan?

Charles Werner, Fire Chief of Charlottesville, Virginia, and SAFECOM Executive Committee member, says that the big challenge is providing interoperable communications across disciplines. Werner’s region covers 744 square miles, encompassing Charlottesville, Albemarle County, and the University of Virginia in Charlottesville. In this region, Werner says, fire agencies have cooperated historically out of necessity. “Last year, before installing a new 800-MHz public safety radio system, our interoperability challenge was technology. Now that our new system enables 100 percent interoperability among all public safety agencies in the region, the challenge facing us is interoperability across disciplines, not technology.”

“We have the radio systems and gateways that allow multiple devices to communicate,” Werner observes, “but we must also always have a plan about their use.” Werner underscores that all agencies must understand the plan and be trained in following it and in using the equipment. “The problem is that too many people do not see the need for and value of interoperability between disciplines.” He maintains that safety and life-threatening situations

demand interoperability and that the minimum expectation should be to procure appropriate equipment and use it to its full potential for the sake of civilians as well as responders.

Caldwell and Werner perceive the world of interoperability similarly, but are particularly unified on one point—they are adamant that the human element of interoperability stands above all others. “First and foremost, interoperability is all about people. Technology plays a smaller role than the crucial people part,” Caldwell says. Werner adds that, in his region, where agencies have been holding joint operations since 1995, “Our biggest successes have come because of the cooperation involving regional governance—comprehensive cooperation among all government levels and all agencies. It was difficult early on, but we have overcome many barriers and continue to do so. The cooperation has been all about personal relationships.”

Special Problems

Although fire agencies face many of the same interoperability challenges as other disciplines, they face several distinctive issues due to their unique situations and demands.

For instance, consider communications issues faced by hazardous materials teams, who usually operate under the authority of fire agencies. Raymond J. Hayling II, Chief of Public Safety Communications for the State of New Jersey, notes that talking through a hazardous materials suit is quite difficult. As a result, he says, “We have been testing portable voice-activated communications systems for these suits. These systems can connect directly to an interoperability box such as an ICRI.” An ICRI is an incident commander radio interface. It allows responding agencies to interconnect different communications media, such as VHF and UHF radios and mobile phones.

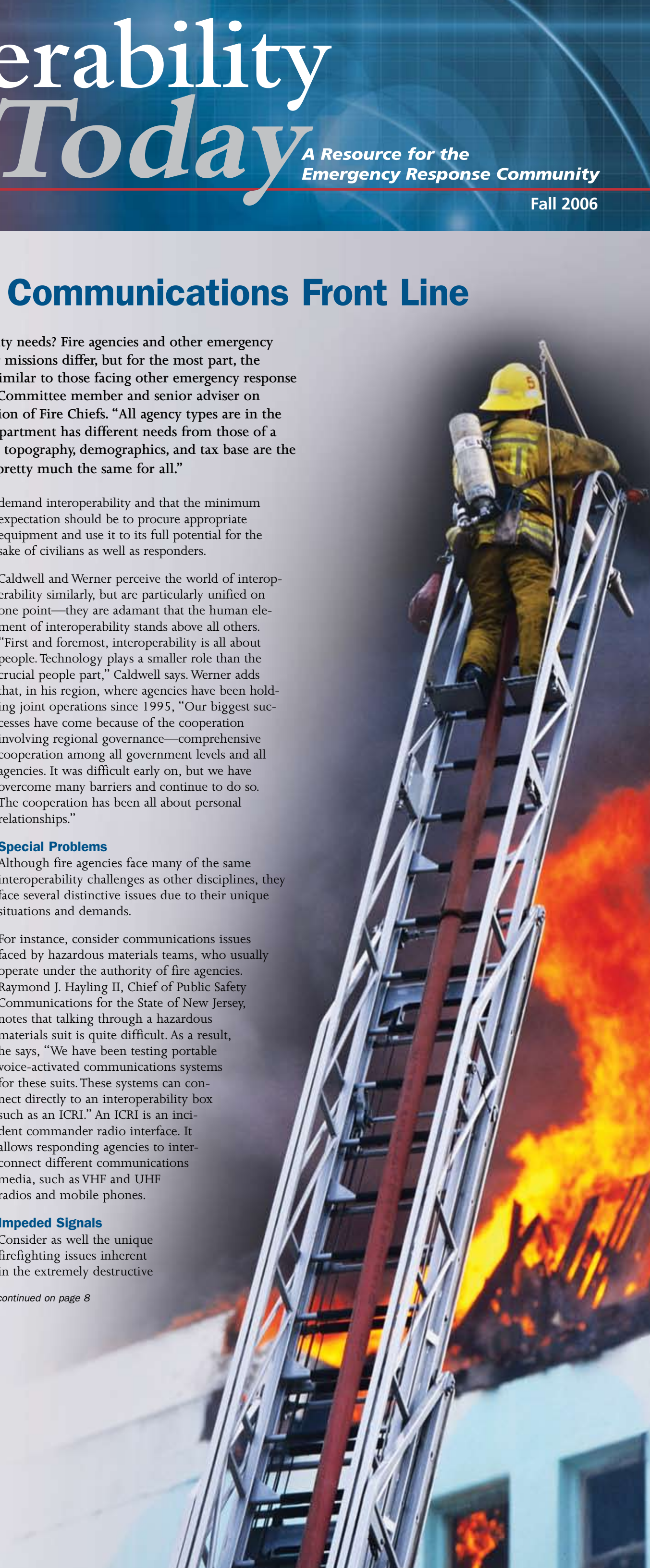
Impeded Signals

Consider as well the unique firefighting issues inherent in the extremely destructive

continued on page 8

CONTENTS

FIREFIGHTERS ON THE FRONT LINE	1
DIRECTOR’S MESSAGE	2
URBAN AREAS TEST TACTICAL INTEROPERABLE COMMUNICATIONS	3
MONTANA’S INTEROPERABILITY SOLUTIONS	4
BASELINE SURVEY UPDATE	5
NACo’S POLICY ACADEMIES	6
SPOTLIGHT/Q&A	6



About Interoperability Today

The Department of Homeland Security (DHS) established the Office for Interoperability and Compatibility (OIC) in 2004 to strengthen and integrate interoperability and compatibility efforts in order to improve local, tribal, state, and Federal emergency response and preparedness. Managed by the Science and Technology Directorate, OIC is assisting in the coordination of interoperability efforts across DHS. OIC programs and initiatives address critical interoperability and compatibility issues. Priority areas include communications, equipment, and training. OIC's communications portfolio comprises the SAFECOM and Disaster Management (DM) programs. SAFECOM is creating the capacity for increased levels of interoperability by developing tools, best practices, and methodologies that emergency response agencies can put into effect, based on feedback from emergency response practitioners. DM is improving incident response and recovery by developing tools and messaging standards that help emergency responders manage incidents and exchange information in real time.

Interoperability Today is published quarterly by the SAFECOM program at no cost to subscribers. Its mission is to provide the emergency responder community with information and updates regarding interoperability in emergency response communications, equipment, and training.

Subscriptions: Interoperability Today is available at no cost. If you are not currently on our mailing list, please call toll free 866-969-SAFE (7233) or visit the program's Web site, www.safecomprogram.gov, to subscribe by clicking on the Contact Us link.

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OIC would like to acknowledge its practitioner Editorial Review Board for the valuable input it provided in reviewing article content for this edition.

SAFECOM



Homeland Security

UPCOMING

Events & Conferences

This listing provides information about upcoming events and conferences pertaining to interoperability.

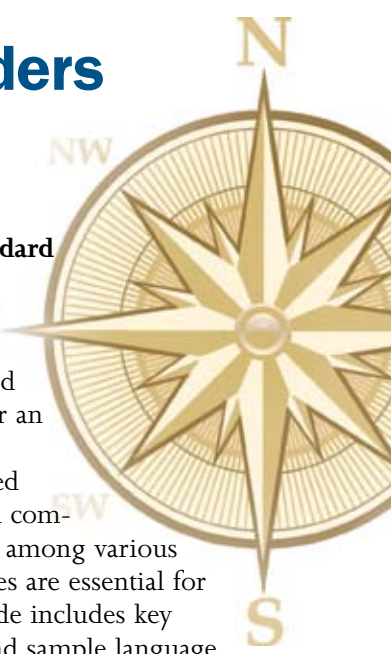
International Association of Emergency Managers (IAEM) 2006 Annual Conference and EMEX Exhibit

November 12-15, 2006
Orange County Convention Center,
Orlando, Florida
<http://www.iaem.com/events/annual/intro.htm>

DIRECTOR'S MESSAGE

New Tools for Emergency Responders

By Dr. David G. Boyd, Director, Office for Interoperability and Compatibility



Since its establishment in 2004, the Office for Interoperability and Compatibility (OIC) has been striving to strengthen local, tribal, state, and Federal emergency response and preparedness.

As important as equipment and modern technology are to this effort, we know that interoperability requires more than special devices and scientific ingenuity. Successful pursuit of our mission demands a steadfast commitment to the human element that underlies effective preparedness and emergency response. Recognizing that skilled and trained personnel are critical to incident response, OIC's SAFECOM program is developing a variety of tools geared to address the continuum of emergency response needs.

Tools and Their Development

SAFECOM's toolset consists of methodologies, templates, models, and educational materials. They are designed to help emergency response agencies plan, execute, and manage efforts aimed at improving interoperable communications.

Methodologies provide step-by-step recommendations for processes that can advance interoperability. For example, the Statewide Communications Interoperability Planning Methodology recommends a series of steps for state interoperability coordinators. They may consider these actions when coordinating the development of a comprehensive statewide communications interoperability strategic plan. Templates and models give emergency response practitioners starting points and frameworks to use in drafting documents, standard operating procedures, and agreements. These can help integrate emergency response among various jurisdictions and agencies that have otherwise disparate interests and goals. Educational materials inform practitioners about trends, best practices, and success stories.

The ideas for these tools are generated by SAFECOM field staff, who work directly with local, tribal, state, and Federal practitioners, and from practitioners who are members of SAFECOM's Executive Committee and Emergency Response Council.

How are tools developed from promising ideas? The process takes one of two paths. The first involves extensive research, practitioner validation, interviews with subject-matter experts, and the findings of working groups composed of hands-on experts on the subject. The second involves noteworthy findings generated by observations and fieldwork. When these findings are potentially replicable throughout the Nation, OIC develops a tool based on them. Essentially, this second path is the dissemination of best practices.

To ensure that our tools effectively meet the needs of the Nation's emergency responders, OIC incorporates practitioner advice, criticism, and experience throughout the process of design and development.

This year, the Department of Homeland Security is releasing five new tools:

- **Writing Guide for a Memorandum of Understanding.** This tool is designed to assist in the construction of a memorandum of understanding—a formal agreement among various jurisdictions and agencies that have disparate interests and goals. Agreements for the shared use of resources, equipment, and procedures are essential to interoperability efforts. The guide includes key questions to consider and sample language.

- **Writing Guide for Standard Operating Procedures, Version 1.** This tool is designed to assist in the establishment of standard operating procedures for an interoperability asset or resource, such as a shared radio channel. Common communications procedures among various jurisdictions and agencies are essential for interoperability. The guide includes key questions to consider and sample language.
- **Creating a Charter for a Multi-Agency Interoperability Committee.** This tool is designed to help practitioners develop a charter to formalize an interoperability committee that represents a variety of jurisdictions and agencies in a state or region. A charter designates authority, establishes clarity of purpose and a group decision-making process, specifies strategic outcomes, and directs how the group will manage itself. It thereby enables the committee to perform its functions effectively and without ambiguity. The charter tool provides key questions to be considered and sample text that can be included in a formal committee charter.
- **Request for a Proposal Guidebook for Communications Interoperability Procurement.** This tool presents helpful hints and lessons learned to assist emergency response agencies in responding to a request for proposal. The guide covers maximizing resources, avoiding unexpected roadblocks, and informing purchasing decisions in four key areas: capabilities assessment, strategic planning, systems and equipment procurement, and training and exercises development.
- **Improving Interoperability Through Shared Channels.** This tool explains the need for, and use of, a coordinated channel plan, discusses when a channel plan is appropriate, and explores principal considerations when developing a plan. A regional channel plan can allow multiple jurisdictions and agencies to share channels or talk groups during an emergency. Channel planning requires high levels of cooperation and coordination among the participating parties to develop agreements and procedures for how to use the plan. More detailed versions of this tool are being developed for future release.

Value to Emergency Responders

OIC is committed to developing tools—methodologies, templates, models, and educational materials—that emergency response agencies can use immediately. SAFECOM tools help emergency response practitioners in the following ways:

- Validating and recommending approaches
- Reducing the time it takes to complete tasks
- Providing roadmaps and reference points for complex processes
- Transferring knowledge and best practices

The tools already available can improve the planning and preparedness that make interoperability and effective response possible when disasters strike. With them, emergency response agencies will be better able to manage the challenges of interoperability.

Resources:

All SAFECOM tools developed by OIC are posted in the Tools section of the SAFECOM Web site at www.safecomprogram.gov/SAFECOM/tools.

Urban Areas Test Tactical Interoperable Communications Through Exercises

September 2004 marked the official completion of the Rapid Emergency-Level Interim Communications Interoperability initiative, or RapidCom. But for many urban areas, RapidCom's completion marked more of a beginning than an end. Communities identified long-term opportunities to build upon RapidCom's successes and to continue improving incident-level, interoperable communications.

Launched in May 2004 by the U.S. Department of Homeland Security (DHS), RapidCom was designed to strengthen capabilities for immediate, incident-level, and interoperable emergency communications in 10 high-threat urban areas. SAFECOM and its Federal partners worked with emergency responders in each of these areas to strengthen the ability of incident commanders to adequately communicate with each other and with respective command centers within one hour of a major incident. RapidCom exercises revealed interoperability challenges, such as incompatible proprietary systems and infrastructure, lack of adequate standard operating procedures (SOPs), and ineffective multijurisdictional, multidisciplinary governance structures.

To help communities address these interoperability issues, RapidCom worked with emergency response practitioners to develop the Interoperability Continuum. The Continuum is a framework that graphically depicts the five critical elements of interoperability success—governance, SOPs, technology, training/exercises, and usage of interoperable communications—in the context of leadership, planning, collaboration, and sustainability.

In support of the Interoperability Continuum's framework and RapidCom's findings, the Department's Office of Grants and Training (G&T) included a new requirement in its grant packages: grantees must develop plans that enable their communities to achieve, at a minimum, tactical-level interoperability. G&T defines tactical interoperable communications as the rapid provision of on-scene, incident-based, mission-critical voice communications among all emergency response agencies, as appropriate for the incident, and in support of incident command and operations personnel.

This year, 75 Urban Area Security Initiative communities and other state-designated metropolitan areas developed Tactical Interoperable Communications Plans (TICPs), which they tested through full-scale exercises (FSEs). Completed in September 2006, the TICP FSEs focused on validating tactical

interoperability among law enforcement, fire response, and emergency medical services (EMS).

According to Tony Frater, Deputy Director of the Office for Interoperability and Compatibility (OIC), OIC provided \$5 million to support the infrastructure necessary for the TICP development process. The TICP initiative, also referred to as "RapidCom 2," represents "the biggest set of interoperability operations in the country," Frater says.

This past summer, each site developed a TICP focused on interoperability among law enforcement, fire response, and EMS. Sites tailored plans to local issues but aimed to cover all aspects of incident response, including incident command, operations, planning, logistics, and finance. To validate the TICP, sites designed emergency scenarios and completed FSEs.

Scenarios for the exercises varied. Some involved local sporting events, community celebrations, national security vulnerabilities, and public and military facilities. Others addressed response to hurricanes, acts of bioterrorism, and other forms of terrorism.

The goal is to make the communities ready to respond, Frater says, and the exercises are designed to accomplish that goal.

Currently, G&T is evaluating and scoring each site's FSE. The compiled results are due out later this year. The intent of the review process is to help grantees identify successes in their TICPs as well as areas needing improvement.

Frater says the broader participation designated by a TICP has the potential to foster partnerships between emergency response agencies and other response organizations that help local communities achieve interoperability goals. Developing partnerships within the interoperability community also will encourage more research, he says, adding that "programs that are related are starting to have more synergy." Because successful interoperability is a team effort, he says, the more partnerships that are developed, the more successful those efforts will be.

For more information:

- Tactical Interoperable Communications Planning Guidance and Template: <http://www.ojp.usdoj.gov/odp/docs/TICPGuidanceandTemplate.pdf>
- Tactical Interoperable Communications Plan Review Process: www.ojp.usdoj.gov/odp/docs/TICP_Review_Process.pdf

Operational Guide for the Interoperability Continuum

The *Operational Guide for the Interoperability Continuum: Lessons Learned from RapidCom* outlines the importance of each Interoperability Continuum element, identifies common challenges to consider when working toward improving interoperability, and recommends actions for increasing interoperability capacities. In addition to providing communities with a framework for strengthening interoperability, this guide captures best practices, lessons learned, and key findings collected throughout the RapidCom initiative.

For more information:

The *Operational Guide for the Interoperability Continuum: Lessons Learned from RapidCom* is available on the SAFECOM Web site at: www.safecomprogram.gov/SAFECOM/library/interoperabilitybasics/1242_operationalguide.htm.



Louisville's MetroSafe—An Example of Success

Among the Tactical Interoperable Communications Plan (TICP) exercise participants was MetroSafe, the Louisville, Kentucky, Emergency Management Agency. Formed in September 2005, MetroSafe brought together all of Louisville's emergency response agencies under one roof. Law enforcement, fire response, emergency medical services, and 911 services now share operating space and work cooperatively.

MetroSafe's full-scale exercise was unique in that the jurisdiction used a live event—Thunder Over Louisville—to test its TICP. Part of the Kentucky Derby Festival, the annual celebration includes an air show and fireworks display that draw more than a million spectators. Event logistics include coordinating communications among all Kentucky city, county, and state emergency response services. Because Thunder Over Louisville takes place on the Ohio River, which separates Kentucky and Indiana, MetroSafe also included Indiana officials in the site's TICP.

"Because we tested the plan during a live event, we were able to see what worked," says Debbie Fox, Deputy Director, Louisville Emergency Management Agency/MetroSafe. "Everything went really well... We were able to communicate with all of the people involved, including people on the ground and on the river. This included police, fire, emergency medical services, state and Federal [agencies], ATF, and the Coast Guard."

To improve preparations and interoperable communications prior to Thunder Over Louisville, SAFECOM brought together MetroSafe's emergency response agencies for an Interoperability Communications Coordination Session. The session represented the first time agencies overseeing the event had met beforehand to prepare coordinated responses. The session helped MetroSafe develop Louisville's TICP.

Fox notes that "public safety is usually reactive, not proactive. Our Tactical Interoperable Communications Plan gave us the opportunity to see where gaps in service might be and address them before they became a problem."

Local Participation Drives Montana's Interoperability Solutions

Faced with more than 550 miles of Canadian border, rugged topography, and remote facilities, Montana's emergency responders are well-versed in the necessities and challenges of interoperable communications. Montana's efforts to improve statewide interoperability gained momentum after September 11, 2001, when the state replaced topdown projects with a locally driven initiative known as the Interoperability Montana (IM) Project.

What began as a partnership between local agencies has grown into 9 consortia composed of representatives from Montana's 56 counties and 7 Native-American Nations. Consortium members elect project directors, who represent each consortium on the IM Project Directors Board. Federal and state partners, such as the State Interoperability Executive Council and the Public Safety Services Bureau, provide input and support to the project directors, who retain voting powers.

"Radio waves have no political boundaries, and working within the consortia system also helps to erase boundaries," says Scott Bradford, Communications Technology Manager for the state. "When you're as big as we are with so few people, you learn that you sometimes need to call on your neighbors for help. We're trying to do this together so we don't end up with separate systems that work okay on their own, but don't work together."

IM is committed to working in partnership with local, county, tribal, state, and Federal agencies to serve the state's critical emergency response needs. The project's bottom-up approach gains from the valuable input of Montana's emergency responders, including law enforcement, firefighters, emergency medical services, and personnel from other agencies that frequently rely on radio communications. According to Bradford, since most residents maintain an independent, "frontier" attitude, preferring to do things on their own rather than rely on government agencies, this approach has worked well.

"This is really a cooperative effort," says Bradford. "We said, 'Put your needs on the table, bring your assets, and we'll work with you to help you build

the system.' Agencies have worked with each other to combine resources to their mutual benefit, with strategies that include a variation of the old-fashioned barter system."

Driven by practitioner needs, IM aims to:

- Improve communication capabilities.
- Create the highest level of interoperability possible.
- Integrate local, tribal, and state efforts.

Concept Demonstration Projects

Central to IM's strategy are two Concept Demonstration Projects (CDPs)—the Southwest Interoperability Project, also known as CDP I, and the Northern Tier Interoperability Project, also known as CDP II. These projects aim to interconnect standards-based systems to maximize existing resources and enhance communication capacities for communities across the state.

Based on demonstration project results, the consortia comprising the IM project will develop a state-wide implementation plan using a phased approach.

CDP I

IM's CDP I focuses on Lewis and Clark County, which is larger than the state of Rhode Island and home to the state's capital, Helena. Interoperable communications are critical to the area, where local, tribal, state, and Federal agencies routinely coordinate to serve the region. Available funding from an existing mill levy and a grant package made the region a viable starting point.

To serve the region's complex interoperability needs, the CDP I system is designed to:

- Work in a large geographic area; the coverage area extends beyond Lewis and Clark County into parts of three other consortia.
- Combine Project 25 (P25) trunked and P25 digital/analog conventional capability.
- Allow communication between P25 narrowband digital trunked and existing conventional users.
- Use frequency in the VHF band and a digital microwave backbone.
- Provide advanced channel management for shared use of frequencies and seamless roaming throughout the trunked areas.
- Enhance responder safety through use of embedded signaling.
- Use current mutual aid channels.
- Incorporate backward compatibility with existing systems.

The CDP I system continues to evolve through user feedback and input. The project began operations in 2005 and phased in user agencies through summer 2006, when it became operational county-wide. The project remains under budget.

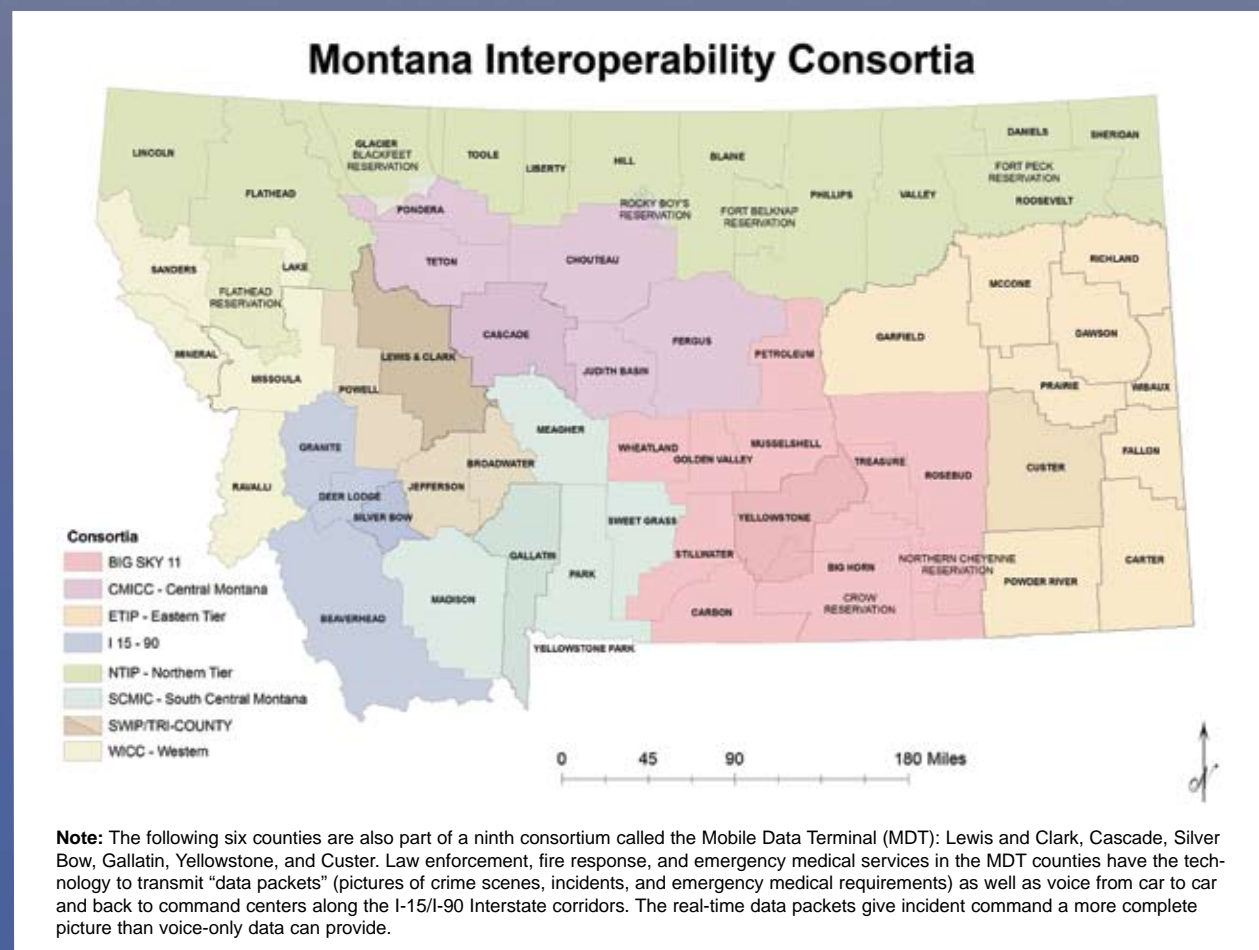
Chris Christenson, Chief of Montana's Public Safety Services Bureau, says existing sites will be upgraded and new ones added as funding becomes available: "An ideal goal would be to have the entire state operational in five years, but because of limited funding, that may not be possible."

Maximizing Funding and Existing Resources

In 1999, the budget of the Lewis and Clark County Sheriff's Office showed a deficit of \$500,000 in funds needed to maintain regular operations. The county formed a citizens' advisory group, which brought to light several problems, including a failing communications system. The advisory group recommended a ballot measure for an ongoing mill levy, part of which—\$125,000 annually—would be earmarked for communications. Seven years later, the levy continues.

The ongoing levy led to other forms of assistance, including a Federal Emergency Management Agency grant in 2002 and endorsement as a CDP by then-governor Judy Martz in the same year. Additional grant funding allowed the project to purchase radios for the Sheriff's Office, fire and rescue services, public works, the health department, and various other state agency offices. Consortia members learned about working with vendors and developed the concept of a hybrid VHF narrowband system that uses both conventional and digital radios. CDP I built repeater towers and assisted in arranging agreements between agencies to share existing sites and frequencies.

Although the region's emergency responders face radio equipment learning curves and ever-evolving



standard operating procedures, Lewis and Clark County Sheriff Cheryl Liedle notes the success of CDP I in increasing communications capacities across Lewis and Clark County. "I've been so deeply immersed in moving this project forward that I haven't had a good chance to take a step back and really appreciate what we have accomplished in radio coverage alone," says Liedle. "I can now talk to my deputy in Augusta from my office in Helena, which is 90 miles away over very rugged terrain, and the communication is crystal clear. That alone is something we've never been able to do before."

IM leaders are leveraging the lessons learned and experience gained from the first phase of CDP I as the project advances into its second phase, which aims to link CDP I with CDP II.

CDP II

Effective communications are critical to local, tribal, state, and Federal emergency response agencies that work along Montana's border with Canada. Unfortunately, emergency response agencies often have difficulty communicating across the northern region's expansive, rugged terrain. A 2006 shooting incident underscored the region's inadequate communications. County law enforcement responding to the incident could not effectively communicate with the U.S. Border Patrol.

"For the Northern Tier, this project represents a very essential service," says Glacier County Sheriff Wayne Dusterhoff. "Right now, we have a lot of local emergencies to deal with, and when they happen, it's hard to communicate. Our radio systems jam up and we'd be in real trouble if it weren't for cell phones. It's very crucial for us to complete this project."

To address these communications issues, CDP II is building a radio tower network in the mountains that will provide connectivity to the Helena area and to state agencies. Dusterhoff expects the system to be operational by the end of 2006.

The initiative is not without challenges, including land ownership issues along with the mountainous topography. When CDP II needed to build radio towers in Lincoln County, home to Glacier National Park, the project had to identify sites that skirted the park's borders.

CDP II leaders must also contend with limited funding to purchase radios for the emergency response agencies in the consortium. Although the sparsely populated consortia have fewer emergency responders to equip, they also have fewer funding resources.

"Funding is a very critical issue," Dusterhoff says, adding that although the Northern Tier received some U.S. Department of Homeland Security grants after September 11, 2001, all of that funding went into building the tower system.

As a result, consortia members and their partners actively pursue any funding avenue that becomes available. They also barter services and expertise to

maximize limited funds. "For example, the Montana Highway Patrol is providing maintenance for digital microwaves in the Northern Tier project [CDP II]," Bradford says. "They don't have a lot of cash to share, but they do have expertise in maintenance."

According to Dusterhoff, CDP II leaders are addressing funding issues and other challenges one step at a time. "For us in the Northern Tier, we're slowly moving ahead," Dusterhoff says. "We just need to remember there are still 41 other counties that will need to be tied into the system, and that we have to figure out how that will happen."

Commitment to Partnerships

IM's locally driven approach and commitment to partnerships have proven invaluable to overcoming the challenges of instituting a communications system across a sprawling state. Examples of the important relationships forged are many. IM representatives point to state agencies' management support for local consortia and to the personal support provided by Montana Governor Brian Schweitzer and Montana Chief Information Officer Dick Clark. For IM representatives and the state's emergency responders, these partnerships are just as critical to advancing interoperability progress as the construction of radio towers and standardization of procedures.

"The network we built among ourselves is more valuable than any equipment we could possibly put on the mountaintops," says Liedle. "It was a painful process that delved into a lot of issues, but it was more valuable than anything else we did. We came out of it working together, with a better understanding of each other's problems."

Montana Interoperability Project: Lessons Learned

- ◆ Emphasize a bottom-up approach.
- ◆ Involve stakeholders at the grassroots level.
- ◆ Encourage innovative thinking and cooperative efforts (for example, "bartering" maintenance for services).
- ◆ Work to "erase" political boundaries.
- ◆ Invite feedback and participation from neighboring states and territories.
- ◆ Provide encouragement and assistance from the top as needed and requested.

Baseline Survey Results Will Help Leaders Make Informed Decisions

Earlier this year, in an unprecedented analysis, SAFECOM surveyed 22,400 law enforcement, fire response, and emergency medical service (EMS) agencies nationwide. Known as the National Interoperability Baseline Survey, this landmark assessment had a response rate of 30 percent with participation nearly evenly split between law enforcement and fire response/EMS.

The survey was the first interoperability assessment derived from a comprehensive definition of interoperability designed in partnership with the emergency response community and founded on the SAFECOM Interoperability Continuum. This definition recognizes the importance of governance, standard operating procedures, technology, training and exercises, and usage. Survey questions assessed randomly selected agencies' stages of development in each of these five areas.

Due out later this fall, the Baseline Survey findings will help emergency response leaders and policymakers make informed decisions about strategies for improving interoperability. With a clear representation of national capacities and vulnerabilities, the emergency response community and policymakers will be able to better plan for and identify next steps and milestones.

NACo's Policy Academies Offer Training for Local Officials

When it comes to the complex subject of interoperability, many local government officials and policy-makers could use assistance. Emergency responders speak in an unfamiliar jargon, using terms such as "P25," "backward compatible," and "available frequency." Vendors insist they have the latest and most cost-effective technology. The media requests facts and figures on what is being done to promote local emergency preparedness and security. Many county budgets now include line items specifying new radio equipment for local law enforcement, and it's critical to get the right equipment for the right job.

Over the next two years, the National Association of Counties (NACo) is using funding it received in early 2006 from the U.S. Department of Homeland Security (DHS) to offer a series of policy academies on emergency response communications and interoperability for local officials. The intense training, made possible through a funding agreement with DHS's SAFECOM program, should help local officials by building knowledge and awareness of interoperable communications issues.

Marilyn Praisner is a member of Maryland's Montgomery County Council who currently chairs both the SAFECOM Executive Committee and NACo's Telecommunications and Technology Steering Committee. Praisner says she hopes the

academies will help NACo members become informed and effective leaders on a critically important issue.

The goals of the policy academy program, according to Praisner, are:

- To improve local emergency preparedness by educating local policymakers about wireless interoperability.
- To help local policymakers gain a better understanding of the complex issues in interoperability, resulting in their making better decisions.

"I think we definitely need to present a 101 primer, and also tell them what their states are already doing. We need to tell them about Federal resources. We want to introduce them to SAFECOM and get them to use the SAFECOM Interoperability Continuum as a training and tracking tool. We want them to understand Project 25." The Continuum (see page 7) captures critical success factors for interoperability, while "P25" is a suite of standards intended to help produce equipment that is interoperable and compatible regardless of manufacturer.

"The key to all this," Praisner continues, "is to get the officials educated, so they feel comfortable with

the terminology and the technical concepts. They also need to understand their roles and be able to ask the right questions when they are presented with purchasing options. They're making a 'once in 15 years' decision and they want to do it right. No one wants to make a purchasing mistake that might end up costing someone's life."

Praisner adds that educating officials to ask the right questions is especially important to leaders in the emergency response community, who wholeheartedly support the planned policy academies. "They want to be sure that the people who raise their hands to spend the money understand what they're buying."

In addition to presenting "Interoperability 101," the policy academies will provide information on model programs and will help spur networking among various counties and states, Praisner says. The academies will study a variety of model programs to account for the range of factors affecting interoperability, including geography, population, and economic needs. For example, she explains that even a relatively small state such as Maryland ranges from urbanized and affluent Montgomery County to rural and sparsely populated Garrett County, which is tucked into the mountains between Pennsylvania and West Virginia.

SPOTLIGHT

Prevention: An All-Crimes Strategy

(Ret.) Major Alecia Webb-Edgington is the Executive Director of the Kentucky Office of Homeland Security (KOHS). Webb-Edgington believes that prevention is paramount for effective homeland security. An "all-crimes" strategy is the key to her approach. Under her leadership, KOHS has developed and begun executing several initiatives on voice-related interoperability. Her office aims to improve the ability of emergency responders to communicate, despite variable terrain, across jurisdictions and disciplines.

Prior to joining KOHS, Webb-Edgington was the Chief Information Officer for the Kentucky State Police (KSP). During her distinguished 20-year career in law enforcement, Webb-Edgington held various posts in drug enforcement and executive security and received several prestigious awards, including the KSP Commendation for Outstanding Achievement and the Kentucky Women's Law Enforcement Network (KWLEN) Contributions to Law Enforcement Award.

As past president of KWLEN, Webb-Edgington served on the board of directors for the National Consortium for Justice Information and Statistics. She currently sits on the board of directors of the Appalachia High Intensity Drug Trafficking Area, a drug control coordination effort, and the National Institute for Hometown Security.

Webb-Edgington holds a master of science degree in criminal justice from Eastern Kentucky University and a bachelor of arts degree in sociology/criminology from Western Kentucky University.



Q&A With (Ret.) Major Alecia Webb-Edgington

Q. What made you interested in your current job?

A. It's been quite a journey to get to this point and I have greatly enjoyed my career, which has taught me so much along the way. I had the honor of serving in the law enforcement field for the past 20 years, until I retired from the KSP in 2005. I have a tremendous deal of respect for my profession and the people who work in it and I think that made this position in homeland security so interesting to me.

Homeland security is about prevention, and Kentucky incorporates an all-crimes approach in our statewide strategy. My background in law enforcement opened the door to help KOHS start up the [Intelligence] Fusion Center here in Kentucky, and I was detailed to KOHS from the State Police.

Soon after, I retired from policing and went to work full time with KOHS, where I was promoted to Executive Director last fall. This position has offered me the chance to continue my life's work in the law enforcement profession and has also allowed me the opportunity to continue it in a broader fashion. The field of homeland security is so important, and there are so many valuable contributions we can make to increase public safety each and every day—that will continue to be my driving force while I'm in this position.

Q. What is the biggest lesson you have learned from your job?

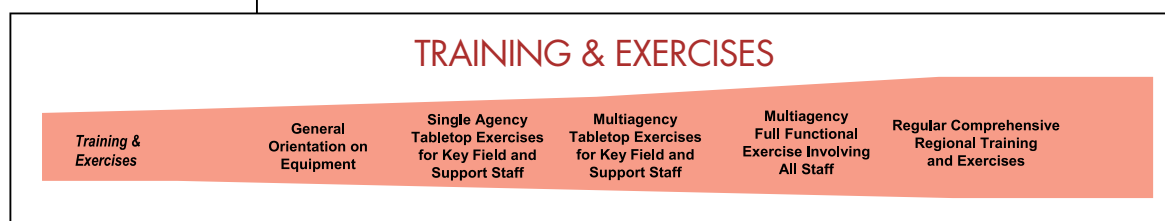
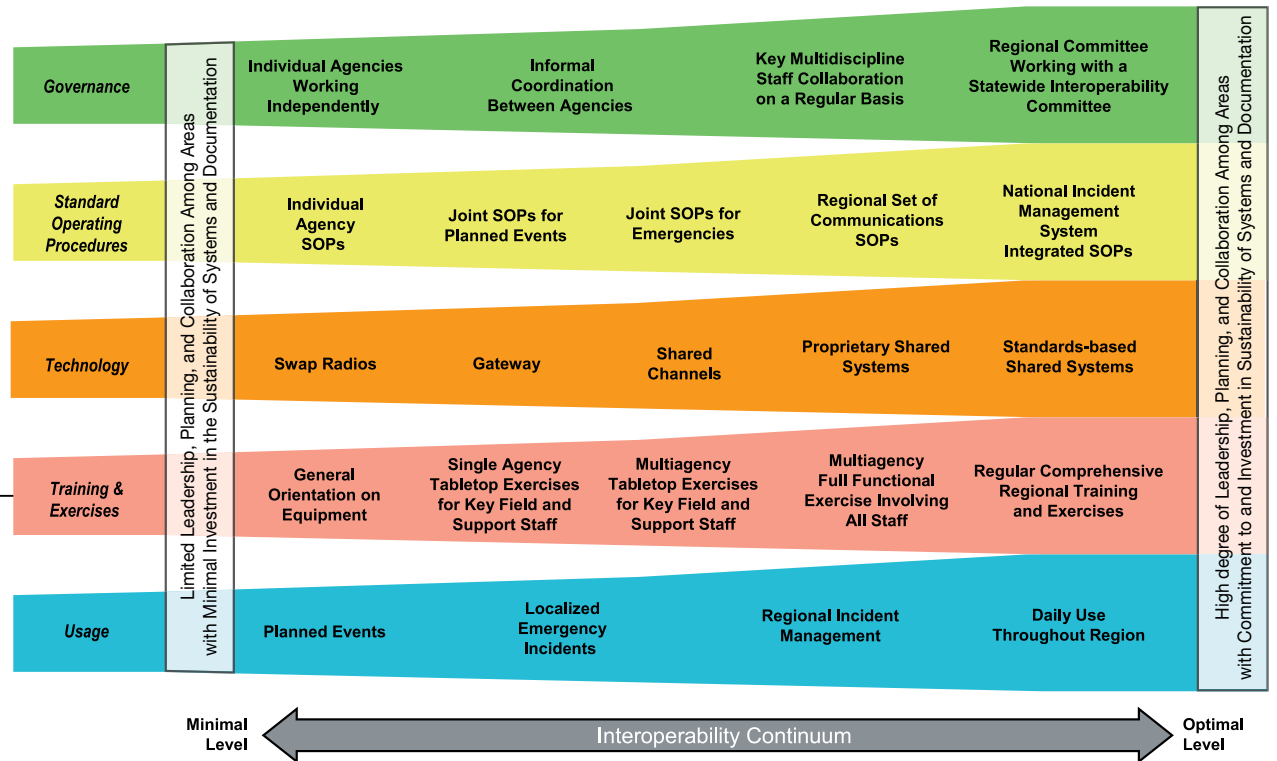
A. One of the biggest lessons I have learned is the need to educate the general population on public safety issues. That's critical, along with the need to leverage the organizations, agencies, and individuals who can help us accomplish the things we need to do. All of this helps to prevent potential problems before they arise and thus makes our communities safer.

Interoperability Continuum

“Sometimes it isn’t so much a lack of equipment or knowledge of equipment, as it is that the relationships needed to promote interoperability don’t exist,” she concludes. “Sustaining interoperability is as hard, if not harder, than getting it started. Sometimes you get the idea rolling, then there’s an election and there’s entirely new leadership with different ideas.”

For more information on the National Association of Counties, visit: www.naco.org/.

Editor’s Note: The first interoperability academy for public officials took place October 10–12, 2006, in conjunction with the Mid-Atlantic All Hazards Forum in Baltimore, Maryland. The Forum, a public-private partnership of Mid-Atlantic states and private corporations, was designed to improve regional homeland security and emergency management by assisting dialog among state directors and by increasing interaction among stakeholders.



Q. If you weren't doing this type of work, what would you be doing?

A. In all honesty, I can't imagine doing anything else. Since I was in the sixth grade, I knew that I wanted to work in the criminal justice field. At one time, I thought I might want to be an attorney, but I have never wavered from my desire to be a public servant in the criminal justice arena.

Q. When did you first realize the importance of interoperable communications to emergency response professionals?

A. Shortly after I graduated from cadet school, I was working the roads in northern Kentucky and we had set up a barricade line. We had all of our folks in place, but we had to set up the barricade just over the top of a hill and it was somewhat difficult to see. Soon after, we heard the Boone County Police coming quickly with the sirens going and we knew they probably wouldn't be able to stop. At that time, we had no way to let them know that we were already set up and as soon as they came close, they hit the brakes and skidded close. The guy they were chasing wasn't so fortunate, and that incident taught me very quickly just how important it is to be able to communicate with one another.

Q. What types of interoperability challenges do Kentucky's emergency responders face? What solutions to those challenges are in development?

A. In Kentucky, most emergency responders cannot communicate across jurisdictions and disciplines during day-to-day operations or large-scale incidents. Incident response communications between local, regional, state, and Federal emergency response agencies are often limited to cell phones and runners. The issue is complicated by Kentucky's unique blend of vulnerabilities, which includes diverse terrain, natural events, and high-profile targets.

Our office and the emergency response community in Kentucky envision a working environment where emergency responders can operate seamlessly across jurisdictions and disciplines on a statewide communications system.

Currently, our office, in partnership with the Commonwealth Office of Technology and the KSP, just completed a statewide data network for all emergency responders. We are also in the process of outfitting hundreds of law enforcement vehicles across the state with mobile data computers, and we expect to provide a great deal more funding for this equipment later this year.

Q. Can you describe interoperability-related initiatives that you are currently leading?

A. Our voice-related efforts include the state's mutual aid and Base Interface Module (BIM) projects, along with the continued enhancement of the Kentucky Emergency Warning System (KEWS) and a statewide interoperability pilot project sponsored by SAFECOM. A full rundown of these projects follows:

■ **Mutual aid.** Mutual aid interoperability gives agencies the capability to tune into a dedicated frequency, using a standard protocol, to establish interoperable voice communications with other emergency responders at the scene. The mutual aid project includes an enhancement to Kentucky's three existing frequencies (150 MHz, 450 MHz, and 800 MHz) to create both intra-channel connectivity—the ability to communicate within each of the three frequencies—and interchannel connectivity that links the three frequencies. The interchannel connectivity component provides full interoperability across the frequency spectrum. Therefore, when tuned to the appropriate mutual

aid channel, all emergency responders can communicate, regardless of the frequency they use.

■ **Base Interface Module, or BIM.** This project will provide the means to patch a given law enforcement agency into the frequency or channel of a neighboring law enforcement agency. The frequency chosen may be either the agency's primary operating frequency or a secondary frequency owned by the agency. (This decision is up to the agency.) KSP has agreed to monitor and provide patches as requested by participating law enforcement agencies.

When completed, the BIM project will provide law enforcement agencies with the ability to interconnect within and across the 150-MHz, 450-MHz, and 800-MHz bands currently in use, as well as on any new bands acquired in the future. This capability will be implemented by purchasing radios, cards, and patching modules with Department of Homeland Security grant funds, allowing the Commonwealth to provide this capability at no cost to participating law enforcement agencies.

■ **Kentucky Emergency Warning System, or KEWS.** KEWS is a statewide telecommunications network designed to be shared by a wide range of state agencies. It utilizes 144 wireless radio tower sites throughout the state with reliable battery and generator backup that provides an "always on" microwave backbone or transport for state emergency response agencies.

KEWS was authorized by the Kentucky General Assembly in 1976, and service on the system was initiated in 1979. The Commonwealth still uses the original system, not only for the agencies for which it was specifically designed, such as KOHS, Kentucky Educational Television, KSP, Kentucky Vehicle Enforcement, Kentucky Department for Military Affairs, and the National Weather Service, but also for local agencies such as county sheriffs, fire and 911 dispatch, and emergency medical personnel.

■ **Interoperability enhancement pilot project.** SAFECOM recently completed a pilot project to enhance interoperable communications throughout the Commonwealth. Numerous meetings were held with local emergency responders to determine their needs, with the goal of constructing an interoperability road map for the state. As a direct result of these meetings, the 2006 General Assembly passed legislation revamping Kentucky's tax on cell phones. This legislation increased funding to local 911 centers and created a new grant fund to help centers upgrade their equipment and merge together. In addition, the General Assembly agreed to pay for all mobile data system maintenance and mandated that local agencies will not be charged to use the system or for its maintenance. Next steps will be to re-energize the Kentucky Wireless Interoperability Executive Committee, which has been tasked with writing a blueprint to reach full statewide interoperability.

Q. What is the value of interoperable communications to Kentucky's emergency responders? To the Nation?

A. The need to ensure that our state's and Nation's emergency responders can communicate with one another when needed is vital in our efforts to keep America safe. There is perhaps no other issue that is more vital to our efforts to prevent crime and terrorism than to ensure that our public safety professionals can communicate. In doing so, we must do it cost effectively and then migrate toward a regional ability to communicate with other states.

FIREFIGHTERS • continued from page 1

California wildfires that raged in San Diego County in October 2003. San Diego County and neighboring Imperial County—together covering an estimated 10,000 square miles—had deployed a wireless communications network that linked most local, county, and state agencies. The network used many 800-MHz frequencies and more than 40 repeater sites to relay signals. Unfortunately, several problems hampered the system, including interference from Mexican frequencies and a rash of busy signals due to overloaded cell-phone channels. Perhaps most troubling was the incompatibility between the counties' interoperability network and systems for responding agencies that were not linked to the network.

Problems affected all responding agencies, including firefighting teams battling conflagrations burning in deep gorges and valleys. With the landscape obstructing the signal pathway to a permanent tower or a temporary repeater, the firefighters could not effectively communicate. Plans had called for installing temporary repeaters on various high points, but smoke and the Santa Ana winds prevented installations, resulting in dead zones. At times, power outages also rendered communications ineffective.

Chief Werner considers terrain-caused dead zones to be in the broader category of impeded radio signals. Permanent repeater towers built in the right locations can reliably direct radio signals to where they are needed. Even so, this solution is not always applied, due to the expense of towers and objections to spoiling scenic views.

Werner also cites a radio interference problem related to towers and the emergence of new technologies. "Typically, towers transmit high-power signals [that is, several hundred watts] and shoot low," he says. "Technologies for cell phones and handheld devices use low-power signals [3 to 5 watts] and shoot them close to the ground. Tower frequencies were found to conflict with those of the low-power devices, and consequently, portable radios and walkie-talkies no longer worked as reliably as they once did."

Buildings and Tunnels

The World Trade Center terrorist attacks of September 11, 2001, brought unprecedented attention to the tragic consequences of impeded signals caused by buildings and building materials. When responding to emergencies in tunnels or high-rise buildings like the World Trade Center, firefighters often lack reliable wireless communications due to building structures. The problem of in-building and in-tunnel communications affects other disciplines across the Nation, but fire agencies more regularly confront this communications difficulty.

To be understood or decoded, radio signals must be of sufficient strength. Because of reflection,



refraction, absorption, and diffraction, signals lose strength in the process of penetrating materials—molecules in the air, raindrops, clouds, trees and vegetation, hills, dirt, and manmade objects such as buildings. Whether impeded radio signals are attributable to terrain or structures, Chief Werner finds that the problem affects both operability and interoperability.

He cites three components of structures that weaken signals or produce dead zones:

- **Window treatments.** Add-ons to windows during or after construction must be considered. For example, shielding may be installed to block ultraviolet waves or to block light for the sake of heating and cooling efficiency. Such shielding reduces signal strength and therefore the penetration of buildings by signals.
- **Building materials.** Type and density matter. For example, the reinforced concrete of a high-rise weakens signals much more than the wood used to construct smaller buildings. Ceiling ducts, foil insulation, aluminum siding, metal stairs, I-beams, and concrete are common signal-weakening materials. Sometimes, new or unusual construction materials are used that reduce signal penetration, and fire departments do not learn about it until later, and perhaps not until an emergency.
- **Building dimensions.** Structure length, width, height, and depth reduce signal strength. This is because the greater the distance from the signal source, the greater the likelihood of encountering more materials. For example, penetration to lower basement floors and tunnels is often poor.

"Every community has buildings or facilities where communications problems exist," says Werner. "The proper course is to identify them and develop a communication strategy for each before an emergency occurs."

There are three main permanent solutions for improving in-building communications. Each can be deployed by itself or in some combination with the others. Each involves some expense, which can be considerable for large structures:

- **Radiating cable, or "leaky coax."** Coaxial cable functions as a continuous antenna. This solution helps make signal transmission and reception fairly even wherever it is strung in a structure.

- **Antennas.** One antenna or more strategically located in a structure improves signal coverage. Two or more antennas are usually connected by coaxial cable to increase effectiveness.
- **Bidirectional amplifier systems.** One or more bidirectional amplifier systems can increase signal strength. Such an apparatus is usually connected by cable to an external donor antenna, which is usually installed on the roof, as well as to one or more internal antennas. These systems can deliver complete in-building coverage, but they must be properly designed. Furthermore, they are more expensive, especially when retrofitting a structure.

Technology and the Human Element

There is general agreement that the technology needed to address firefighting challenges such as dead zones, in-building communications, and interoperability is available. Among the relatively new technologies, Hayling says, are suitcase repeaters, which are portable radio transceivers the size of a luggage bag. "They provide an on-scene repeater plus a mobile radio," Hayling states. "The repeater can be on one frequency band and the mobile on another, providing immediate interoperability." Werner stresses that a variety of Project 25-compliant land mobile systems and gateways offer short-term fixes for legacy systems.

As industry develops and markets new products, Caldwell notes the importance of assessing how emerging technologies align with and support an agency's strategy and operations. "A manufacturer will come along with a new machine that is full of bells and whistles and will say it promises great things, and the device probably does have amazing capabilities," Caldwell says. "The right question, however, is this: 'How does this machine fit into your plan?' Making a good plan is the hard work."

For More Information

For more information about overcoming impeded radio signals, visit the Technology Solutions & Standards section of the SAFECOM Library at www.safecomprogram.gov/SAFECOM/library/technology, which includes the reports: "Antenna System Guide, NIJ Guide 202-00," "In-Building/In-Tunnel User Considerations," and "Public Safety In-Building/In-Tunnel Ordinances and Their Benefits to Interoperability."