Executive Summary

Federal, state, and local governments have made significant progress toward advancing interoperable communications; however, many challenges remain. The 2008 National Governors Association Center for Best Practices (NGA Center) Homeland Security Directors’ Survey identified public safety interoperability as one of the top priorities of state and territorial homeland security advisors. Interoperable communications allow first responders, public safety agencies, and leadership to communicate and operate effectively during an emergency situation—a need emphasized by the events of September 11, 2001, and by the 2005 Gulf Coast hurricane season. Remaining challenges for the states in advancing a strengthened and sophisticated interoperable solution include:

- Informal oversight and governance;
- Uncoordinated Standard Operating Procedures;
- Incompatible and obsolete technology;
- Infrequent and inconsistent trainings and exercises; and
- Difficulty integrating interoperability into routine, daily use.

Governors can play a critical role in meeting each of these challenges by providing leadership to create statewide and regional communication interoperability capacity. This leadership can be exercised most effectively by employing the following strategies:

**Strengthen governance by gaining commitments from all disciplines in the state through a statewide interoperability coordinator.** Interoperability requires the commitment of different agencies in the public safety community with responsibilities in a time of crisis. Leadership buy-in will expedite interoperability. To that end, 31 states have used a Statewide Interoperable Governing Body (SIGB) to administer interoperability programs in state government. These multidisciplinary committees, created by formal legislation or executive order, bring diverse opinions and expertise to state interoperability efforts.
In addition, identifying a central point of contact for statewide interoperability is essential. A statewide coordinator brings together traditional partners—such as police, fire, and emergency medical services—as well as other leaders during a time of crisis—such as public works, public health and natural resources—to enrich the state’s interoperability capabilities to respond to an incident. For example, Virginia created the Commonwealth Interoperability Coordinator’s Office in 2004, the first of its kind in the nation, to bring these partners together for collaboration. Currently, 24 states have full-time coordinators with an additional 24 states planning to create full- or part-time statewide interoperability communication coordinator positions.

**Foster development of Standard Operating Procedures through collaboration across disciplines.** A state that achieves full interoperability will create a statewide system that is robust and has a highly effective capability to respond to emergencies when they occur. Minnesota’s response to the I-35 bridge collapse in 2007 is an example of a well-maintained interoperability system, using local, regional, and state radio interoperability to successfully respond to an incident and save lives.

**Fund technology for the long-term by planning and budgeting for ongoing updates to systems, procedures, and documentation.** Interoperability is not a one-time investment. Aging infrastructure, technological advances, and turnover in personnel require continued maintenance to protect public safety. To ensure continued revenue for interoperability maintenance and training, Indiana’s Project Hoosier SAFE-T is funded by a $1.25 surcharge on all Department of Motor Vehicle transactions.

**Develop routine trainings and exercises for interoperable communications.** Training and exercising interoperable communication skills and equipment familiarizes end users with the protocols necessary to make technology useful during an emergency. States have not only developed basic training and exercises of interoperable communication equipment, but have used routine events as an opportunity to test interoperable communications with other jurisdictions.

**Encourage the use of interoperable communications on a routine basis.** Investments in interoperable communications are not solely for use during an emergency. The regular use of interoperable systems will build the capacity of end users to effectively use new equipment and strategies during an emergency. Without regular use, the equipment and potentially effective technology will be cumbersome and inhibit a coordinated response. For example, South Carolina’s Palmetto network supports 350 jurisdictions on an 800MHz network. In 2005, the system supported 200 agencies during a chlorine gas leak from a train derailment in Graniteville.

This Issue Brief highlights remaining challenges for states and recent state actions toward achieving interoperability.

**What Is Interoperability?**

In general, interoperability refers to seamless operation between emergency responders using differing communication systems or products. Wireless communication interoperability is the specific ability of emergency responders to use voice and data communication in real-time, without delay. For example, police, fire, and emergency medical services responding to an incident are interoperable when they can all communicate with one another over otherwise incompatible wireless communication systems. Interoperability makes it possible for first responders from any jurisdiction to communicate with one another at catastrophic incidents and disasters and allows for emergency planners and personnel to coordinate their efforts in advance of major events, such as state fairs, college bowl games, and presidential visits to a state.
Recent Developments in Interoperable Communications

In the last three years there have been several developments in interoperable communications. Most notably, the Interoperability Continuum (IC), developed by state and local practitioners and released through the Department of Homeland Security (DHS) SAFECOM Program, is a tool to assist decision makers in advancing interoperability. The IC represents an iterative process, whereby a state may reassess its progress from year to year.

The IC, shown below, demonstrates how a state can advance interoperable communications, focusing their efforts on five key components: governance, standard operating procedures, technology, training and exercises, and usage. States use the IC to gauge their progress toward a robust interoperable communications capability by tracking their progress across a component lane. For example, developing governance models in a state requires a movement from independent agencies developing their own governance structures working independently to coordination of protocols between agencies. This progression through a component lane culminates in a highly developed and powerful interoperable communication capability that will be of use to the state.

**SAFECOM Interoperability Continuum**


Statewide Plans

All states were required to submit a statewide communications interoperability plan (SCIP) to the DHS Office of Emergency Communications by December 3, 2007, in order to receive funds available under the Public Safety Interoperable Communications (PSIC) grant. The PSIC grant program totals $968 million, which is the amount provided to the states out of the proceeds of the auctioning of the 700 MHz spectrum. The total amount generated from the auction of four
blocks of bandwidth was $19.1 billion. As a result of the PSIC requirement, for the first time there now exist 56 statewide plans (states, U.S. territories, and the District of Columbia) that were developed using a consistent set of criteria based on the IC. The SCIPs address all aspects of the statewide strategy and implementation needed to achieve interoperability and highlight areas that are deficient.

In July 2008, DHS released the National Emergency Communications Plan (NECP), developed in collaboration with state, local, and tribal stakeholders. The NECP provides a national roadmap that incorporates statewide plans for advancing interoperability, building from the user perspective. The NECP provides guidance to all first responders on interoperable issues and fosters development along the IC.

**Challenges to Achieving Interoperability**

States have made progress by creating plans with consistent criteria, but implementation remains a challenge in five key areas:

- Informal oversight and governance;
- Uncoordinated Standard Operating Procedures;
- Incompatible and obsolete technology;
- Infrequent and inconsistent trainings and exercises; and
- Difficulty integrating interoperability into routine, daily use.

**Informal oversight and governance**

Interoperability requires agencies working in concert to communicate beyond their agency and across their borders with other jurisdictions. Individual agencies—working independent of the state collaboration—develop governance, procedures, and purchase equipment that may be incompatible with the rest of the state. Informal agreements with other jurisdictions, while a positive first step, must be integrated into a formal plan that has verifiable agreements and procedures. To be successful, interoperability requires shared management, control, policies, and procedures and must be multidisciplinary and multijurisdictional.

While many states have a statewide interoperability governing body, they may not have the participation needed from key stakeholders to build out a communications system for public safety users. Without full inclusion, mistrust among agencies and jurisdictions can significantly hamper progress as stakeholders question how their concerns are being addressed by the governing body.

In addition, the current governance structure may not have the authority—either legislatively or by executive order—to compel jurisdictions to adopt a statewide system. Localities may resent having to provide resources to a statewide system if they are not convinced that their users will benefit from its capabilities.

**Uncoordinated Standard Operating Procedures**

Standard Operating Procedures (SOP), the concise written instructions for incident response, are an essential component of sophisticated interoperability. Without uniform procedures, localities will develop differing policies. In the midst of a critical incident, the slightest differences, such as the meaning of basic words, can hinder first responders on the scene, causing confusion and casualties.
While states and localities are aware of the need for developing SOPs that contain both operational instructions and technical instructions for the users, the resources often are not dedicated to this important activity. This is due primarily to the cumbersome process needed to produce SOPs that are inclusive of all stakeholders and that provide them an opportunity for input as well as a review and approval of the procedures.

By not developing SOPs, agencies make sharing resources with other agencies, jurisdictions, and states difficult. In the event of an emergency, the use of the Emergency Management Assistance Compact (EMAC) and other mutual aid agreements are based on integrated SOPs. SOPs should be integrated with the National Incident Management System (NIMS) so that any jurisdiction in the country can integrate into a local response, if requested.

**Incompatible and obsolete technology**

Technology is the primary tool of interoperability. The use of equipment such as radios, towers, and trunking systems are the tangibles of interoperability technology. Aging equipment, obsolete technologies, and the cost of replacing radio systems hinder states in developing interoperable communications. As manufacturers discontinue radio systems, states are forced to purchase new systems to remain interoperable. Proprietary systems often hinder compatibility with other jurisdictions’ radio systems. Full interoperability must include strength in the other issues, such as governance and standard operating procedures that ensure the hardware is compatible, affordable, and universally open and accessible across a state.

For example, a law enforcement officer may carry several radios so that he or she can be in contact with multiple agencies and jurisdictions. In some cases, an officer may have an interoperable radio that is used on a statewide system but still carry a radio that is for use within his/her jurisdiction. Given the use of different technologies, there may not exist an interoperable solution that bridges radios or, when new technology is acquired, that will use similar standards. The evolution of technology—from swapping radios between jurisdictions at an incident to using gateways that retransmit communications, to shared channels between jurisdictions, to the optimal standards-based shared system—shows that technological advances rely on developing the existing infrastructure.

**Infrequent and inconsistent trainings and exercises**

Radio equipment is useless to the first responder unless accompanied by regular trainings and exercises. Regular training and exercises maintain equipment; expose vulnerabilities in planning; and increase the knowledge, skills, and abilities of end users to effectively use interoperable technology. Although introductory orientations and departmental exercises are useful to familiarize end users with interoperable technology, only routine exercises and trainings will reinforce and build interoperable communications. Without routine training and regular exercise, interoperable communications are unlikely to be used on a daily basis.

Training and exercises include not only proper use of equipment, but also training for first responders in SOPs and the Incident Command System (ICS). Trainings and exercises prepare first responders for the unexpected—extraordinary incidents that require leadership that can adapt to the demands of managing the incident. Without proper training in the ICS, a communications
expert may be useless in the emergency management context because of the lack of training in SOPs.

**Difficulty integrating interoperability into routine, daily use**

Usage refers to how often interoperable communications technologies are used. Without daily use of interoperable communication tools, the expectation that jurisdictions will be able to communicate over new equipment and use new technologies during a real-time disaster is unreasonable. Merely using technologies at yearly exercises and drills does not develop the seamless integration needed to put powerful interoperable communication tools to effective use.

**Strategies for Advancing Interoperability: The Role of the Governor**

Governors can provide leadership and vision for creating statewide interoperable public safety communications. They can build support at the federal, state, and local levels for the necessary investment and coordination to achieve interoperability. One method of building broad-based support is to create an all-inclusive executive committee to establish priorities and work with a statewide interoperability coordinator to develop a funding strategy. State and local governments widely acknowledge the importance of interoperable communications investments, especially since the terrorist attacks of September 11, 2001, and the Gulf Coast hurricane season of 2005.

Furthermore, governors can use the following strategies to achieve statewide interoperability:

- Strengthen governance by gaining commitments from all disciplines in the state through a statewide interoperability coordinator;
- Foster development of SOPs through collaboration across disciplines;
- Fund technology for the long-term by planning and budgeting for ongoing updates to systems, procedures, and documentation;
- Develop routine trainings and exercises for interoperable communications; and
- Encourage the use of interoperable communications on a routine basis.

**Strengthen governance by gaining commitments from all disciplines in the state through a statewide interoperability coordinator**

Interoperability requires the commitment of leadership within the public safety community with responsibilities in a time of crisis. Leadership buy-in will foster agency-wide support and acceptance of new interoperability methods. A Statewide Interoperability Governing Body (SIGB) is a useful coordinating tool used to gain commitment and buy-in. Most states have utilized an SIGB, or State Interoperability Executive Committee, to administer interoperability programs in state government. These multi-disciplinary committees—created by formal legislation or executive order—bring diverse opinions and expertise to state interoperability efforts. **Arkansas** formed AWIN—the Arkansas Wireless Information Network—to gain leadership commitments from state emergency management, county and local courts, local fire chiefs, sheriffs and police chief associations, and state information technology and finance departments to develop and oversee a statewide public safety radio system.

**Montana** used the state’s Interlocal Agreement Act to establish authority for the Interoperability Montana (IM) Governance Committee. This model was useful as it was a grassroots, practitioner-driven approach and had support from local sheriffs, in addition to having gubernatorial support. The statewide team also found that the active involvement from the governor’s office was a key
factor in Montana’s success in building partnerships and in gaining support from all levels of state government.\textsuperscript{10}

In 2007, \textbf{Minnesota} Governor Tim Pawlenty signed an executive order establishing the Statewide Radio Board (SRB) as Minnesota’s State Interoperability Executive Committee. The SRB established an Interoperability Committee with broad multidiscipline state, regional, local, tribal, and federal representation to address broader issues of public safety communications interoperability within the state, between states, and along the Canadian border.\textsuperscript{11}

\textbf{Washington} involved key stakeholders in the statewide planning process to better reflect their needs and expectations. Stakeholder input was achieved through additional planning forums and increased communication, consistent with best practices. The governor’s cabinet and subcommittees, such as the State Interoperability Executive Committee, the Domestic Security Executive Group, and the Committee on Homeland Security, informed the state executives about their role in planning. In addition, Washington held a statewide interoperability summit to discuss planning components and opportunities for further collaboration.

When states use leadership commitments for interoperability management, agency executives become champions for interoperability in their respective agencies. But it also is important for the governor or governing body of interoperability to name a statewide interoperability coordinator who is responsible for overseeing the implementation of the statewide plan. This coordinator also ensures that the investments made statewide are compatible with the plan and not wasteful. The roles and responsibilities of the coordinator typically include outreach to stakeholders, program management, grants management and policy development, and measurement of progress towards interoperable communications.

Several states, such as \textbf{Alabama}, \textbf{Arkansas}, and \textbf{West Virginia}, have hired or designated a full-time statewide interoperability coordinator, a critical success factor to improving interoperability statewide. The full-time coordinator oversees and manages day-to-day implementation of the statewide system. The coordinator also reports to the governing body to provide status updates on the system build-out as well as issues related to bringing on new towns and localities.

The \textbf{Indiana} Public Safety Commission (IPSC) oversees the statewide interoperable communications system, known as Project Hoosier Safe-T. IPSC houses a statewide coordinator, who manages interoperable activities, including building stakeholder buy-in to the system and encouraging its use. The statewide system provides public safety with a communications system for local, state, and federal jurisdictions. Supporting both analog and digital radios, Safe-T provides Indiana with 95 percent mobile radio coverage statewide. Goals of this integrated approach include seamless interoperable communication between jurisdictions and agencies, reduction of costs and barriers to communication, and eliminating regionalization of radio systems.\textsuperscript{12}

In \textbf{Virginia}, the Commonwealth Interoperability Coordinator’s Office (CICO) centralizes coordination between local, state, and regional interoperable communications. The office resides in the Governor’s Office of Commonwealth Preparedness and was the first of its kind in the nation. The CICO works closely with the State Interoperability Executive Committee (SIEC) and its working groups. Specifically, the CICO and the SIEC employ Initiative Action Teams (IATs) to convene stakeholders and experts in specific fields to collaborate on interoperability issues. Having a CICO has helped the state gain buy-in from local governments and state agencies for building out an interoperable communications system.
**Foster development of Standard Operating Procedures through collaboration across disciplines**

A state that achieves full interoperability will find that it has a robust system and highly effective capability to respond to emergencies when they occur. The Interoperability Continuum sets a high standard for interoperability. The ideal system will have collaboration and coordination from all stakeholders. The state executive interoperable committee will collaborate with regional interoperability committees. Standard Operating Procedures will integrate locally through the NIMS model. Technology systems will be standards-based and not encumbered by proprietary technology.

For example, the Washington, DC, region supports the CapWIN program. CapWIN is an interoperable first responder data communication and information sharing network, managed in joint partnership by the state of Maryland, the Commonwealth of Virginia, and the District of Columbia. Emergency responders from all three jurisdictions have been trained on equipment that links the region’s law enforcement databases and provides secure access and instant messaging through multiple commercial wireless providers. CapWIN is designed to coordinate the partners’ communications and actions during a multi-jurisdiction incident.

Recognizing that SOPs can help eliminate confusion during response, Virginia also established its Common Language Protocol to facilitate the use of standardized language for internal radio communications. Common, basic language across jurisdictions aides first responders so that codes and orders are uniform, no matter from where a first responder might arrive on the scene. The Protocol is being adopted for nationwide use.

**Fund technology for the long-term by planning and budgeting for ongoing updates to systems, procedures, and documentation**

Interoperability funding challenges are not as obvious as traditional program funding challenges. For example, the cross-jurisdictional approach to interoperability can make implementation cost-prohibitive for smaller communities that cannot afford new technology. Lack of coordination among funding streams for updating or replacing radio communications equipment hampers overall interoperability because each jurisdiction may be using different equipment. Different agency and community funding priorities and budget cycles exacerbate the problem. Without strategic planning, investments often are made in systems and equipment that are not interoperable. Agencies and jurisdictions also compete for limited federal funds, which can undermine the partnerships necessary for interoperability.

States are taking a comprehensive approach to funding interoperable communications projects. Instead of piecemeal funding of interoperable communications through agencies or jurisdictions, states are integrating state and federal funding streams. Also, states are developing novel ways to fund interoperability to keep systems current. Minnesota’s Department of Transportation funded 50 percent of their state and local communications infrastructure using bonds and state highway funds. In addition, Minnesota’s statewide 911 fee charged on phone lines pays the debt service on bonds used to construct the statewide system, as well as provides funding for the statewide interoperability program and the operation and maintenance costs of the system. Additionally, during Minnesota’s 2007 legislative session, the state team’s strategy and planning was used by Governor Tim Pawlenty to propose a budget for funding the Allied Radio Matrix for Emergency Response (ARMER) system. The legislative act provided $186 million in bonding authority (911
revenue bonds) to finance the construction of the ARMER backbone in the remaining 55 counties of the state.

In **Arizona**, the Public Safety Communications Advisory Commission (PSCC) is charged with providing recommendations to the Public Safety Interoperable Communications (PSIC) office at the Government Information Technology Agency on the development of standards based systems that provide interoperability of public safety agencies’ communications statewide. The PSIC office plays an integral role in reviewing project and grant proposals involving interoperable communications. To maximize the impact of limited federal, state and local funding, Arizona encourages regional partnerships and the build out of statewide infrastructure to leverage funds while aligning individual agency/community priorities with statewide needs.

**Develop routine trainings and exercises for interoperable communications**

Radio equipment is useless to the first responder unless accompanied by regular trainings and exercises. Training and exercises maintain equipment, expose vulnerabilities in planning and increase the knowledge, skills, and abilities of end users to effectively use interoperable technology. An optimal training and exercise program includes orientations, tabletop exercises for single and multiple agencies, functional exercises of a particular task, routine comprehensive regional training, and full-scale exercises. Of course, training and exercises cannot account for every possible disaster, but routine training and exercise will keep users prepared with the knowledge of their equipment and the confidence to adapt to the particular incident. In fact, regularly scheduled community events can offer good practice for first responders on interoperability protocols.

In **Florida**, for instance, the Tampa Urban Area Working Group recently used the annual Gasparilla Festival to exercise its procedures. In addition, the group introduced a Web-based portal that provided real-time situational awareness to Tampa police, Hillsborough County sheriffs, and the U.S. Coast Guard during the event. It also conducts exercises at other routine events to help prepare for future emergencies.

Training and exercise also help expose weaknesses in a hypothetical setting before the weaknesses appear during a real incident. In **Nevada**, the Regional Communications Interoperability Pilot Program identified local, tribal, state, and federal stakeholders to review and develop the state’s existing statewide interoperability plan. The stakeholders participated in an initial tabletop exercise for a hazardous materials spill on Interstate 15. The exercise exposed gaps and weaknesses in the state’s emergency communication structure. In collaboration with DHS SAFECOM, Nevada developed after-action reports to correct communications issues, including routine training, exercises, and communications across jurisdictions.

**Encourage the use of interoperable communications on a routine basis**

Regular use of interoperable systems will build the capacity of end users on a daily basis. This sustained, routine use of complex radio systems will help first responders effectively master new equipment and strategies. Without regular use, the equipment and potentially effective technology will be a burden instead of an asset during an emergency or disaster.

Likewise, daily use of interoperable communications is essential to maintaining the skill set of first responders. Daily use of interoperable communications can be scheduled around regularly planned activities, such as festivals and sporting events. Localized emergency incidents like vehicle collisions give first responders the opportunity to use interoperable radio communication during a real-time incident. Regional responses to natural and man-made disasters allow for
testing and use of the system. Finally, daily drills and routine communication between first responders provide opportunities to use the technology and keep skills current.

Learning from the lessons of the devastating wildfires in 2003, first responders in southern California built more capacity and increased user training in the San Diego County-Imperial County Regional Communication System (RCS). The region stresses the daily use of its shared communication system, so that first responders are prepared in the event of a disaster. In October 2007, wildfires burned in much of southern California, and the RCS managed the incident. As a result, delays and busy frequencies were reduced by 71 percent and response time was greatly improved.17

Virginia and North Carolina participated in a pilot project supported by a public-private partnership to promote regional interoperability along the border for multiple agencies with disparate radio systems. Using a Voice over IP system that could deploy voice and data, the Danville, Virginia, police department, along with the Virginia State Police, North Carolina Highway Patrol, and several other agencies, used this flexible and economical solution without having to replace existing systems. Piloting the system promoted regular use among agencies. Now, when there is an emergency, first responders are quickly able to communicate using the equipment. The participating agencies have used the technology improvements to foster governance, collaboration, and coordination along the border.18

Conclusion

Governors are well-positioned to provide the leadership across disciplines to foster interoperability for their state. The lack of an integrated approach across state, local, tribal, and federal jurisdictions encumbers the state’s ability to achieve interoperability. Good governance, strong standard operating procedures, collaboration, and frequent use will keep investments in equipment maintained and prepared to serve in a time of crisis. Without a unified effort, the capability of radio interoperability will become useless during an emergency and may hinder, rather than hasten, response.

Emergencies such as the September 11 terrorist attacks, the 2005 Gulf Coast hurricanes, and the I-35 bridge collapse in Minnesota provide crucial lessons in emergency response, from complete communication failures to successful management on the scene. They bring attention to gaps in planning and allow policymakers to renew their commitment and make public safety a priority in emergency response. Interoperability, when properly maintained, funded, and used, has the potential to save lives during a disaster. Executive leadership will provide the impetus to make interoperability a reliable and efficient capability in emergency response.
Resources

Office of Emergency Communications (OEC):
http://www.dhs.gov/xabout/structure/gc_1189774174005.shtm

Office for Compatibility and Interoperability (OIC):
http://www.dhs.gov/xres/programs/gc_1217622031181.shtm

SAFECOM Program: www.safeicomprogram.gov

Interoperable Emergency Communications Grant Program:
http://www.fema.gov/government/grant/iecgp/index.shtm

National Institute of Justice (NIJ) Communications Technology program:
http://www.ojp.usdoj.gov/nij/topics/technology/communication/

Notes

1 Will Ware, 2008 State Homeland Security Directors Survey (Washington, DC: National Governors Association, March 6, 2009), http://www.nga.org/Files/pdf/0903HSASURVEY_PDF.
3 The Association of Public Safety Communications Officers International maintains an exhaustive list of current states using the SIEC structure. The links to these SIECs are available at http://www.apcco911.org/frequency/siec/documents/documents.htm.
4 The term, SIEC, was coined by the Federal Communications Commission (FCC). The FCC asked all states to designate an SIEC as a point of contact. While most states did this, the governance structure is unique to all states. For instance, SIECs in some states is more of an advisory body, while another governance board may oversee operations and build-out of systems. There term is used generically in this document and does not necessarily denote the FCC SIEC.
7 The 700 MHz wireless spectrum was once used for analog television transmission. With the creation of digital broadcast and cable transmission, analog transmission was unnecessary for broadcasters and was unused. The 700MHz bandwidth was previously used for UHF channels. The publically held bandwidth was divided and auctioned off in several blocks, generating considerable revenue.


