April 2007

FIRST RESPONDERS

Much Work Remains to Improve Communications Interoperability

GAO

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FIRST RESPONDERS

Much Work Remains to Improve Communications Interoperability

Why GAO Did This Study

As the first to respond to natural disasters, domestic terrorism, and other emergencies, public safety agencies rely on timely communications across multiple disciplines and jurisdictions. It is vital to the safety and effectiveness of first responders that their electronic communications systems enable them to communicate with whomever they need to, when they need to, and when they are authorized to do so. GAO was asked to determine, among other things, (1) the extent to which Department of Homeland Security (DHS) funding and technical assistance has helped to improve interoperable communications in selected states and (2) the progress that has been made in the development and implementation of interoperable communications standards. To address these objectives, GAO reviewed grant information, documentation of selected states' and localities' interoperability projects, and standards documents.

What GAO Recommends

GAO is making recommendations to DHS, which include assessing how states' grant requests support statewide communications plans and modifying its guidance on acquiring interoperable equipment. DHS disagreed with the latter recommendation, but GAO believes that it is important to provide more flexibility until completed subsets of standards have been fully defined. DHS agreed or deferred comment on all others.

www.gao.gov/cgi-bin/getrpt?GAO-07-301.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Linda Koontz at (202) 512-6240 or koontzl@gao.gov.

What GAO Found

According to DHS, $2.15 billion in grant funding was awarded to states and localities from 2003 through 2005 for communications interoperability enhancements. This funding, along with technical assistance, has helped to make improvements on a variety of specific interoperability projects. However, states that GAO reviewed (see table below) had generally not used strategic plans to guide investments toward broadly improving interoperability. Further, no national plan was in place to coordinate investments across states. To its credit, DHS has required states to implement a statewide plan by the end of 2007, and DHS has recently been required to implement a National Emergency Communications Plan. However, no process has been established for ensuring that states' grant requests are consistent with their statewide plans. Until DHS takes a more strategic approach to improving interoperable communications—such as including in its decision making an assessment of how grant requests align with statewide communications plans—progress by states and localities in improving interoperability is likely to be impeded.

Until recently, the private-sector coordinating body responsible for developing Project 25 standards—a suite of national standards intended to enable interoperability among the communications products of different vendors—has made little progress. Although one of the eight major subsets of standards was defined in the project's first 4 years (from 1989 to 1993), from 1993 through 2005, no additional standards were completed that could be used to develop Project 25 products. Specifications for three additional subsets of standards were defined over the past 2 years. However, ambiguities in the published standards have led to incompatibilities among products made by different vendors, and no compliance testing has been conducted to determine if these products are interoperable. Nevertheless, DHS has strongly encouraged state and local agencies to use grant funding to purchase Project 25 radios, which are substantially more expensive than non-Project 25 radios. As a result, states and local agencies have purchased fewer, more expensive radios that still may not be interoperable and thus may provide few added benefits. Until DHS modifies its grant guidance to provide more flexibility in purchasing communications equipment, states and localities are likely to continue to purchase expensive equipment that provides them with minimal additional benefits.

DHS Grant Funding to Improve Interoperability in Selected States

State	Grants from 2003 through 2005
New York	$145.5 million
Kentucky	$50 million
Oregon	$53.4 million
Florida	$55.7 million

Source: GAO analysis of DHS data.

Contents

Figures

Abbreviations

COPS	Community Oriented Policing Services
DHS	Department of Homeland Security
FBI	Federal Bureau of Investigation
GHz	gigahertz
ICTAP	Interoperable Communications Technical Assistance Program
IP	Internet Protocol
IWN	Integrated Wireless Network
kHz	kilohertz
MHz	megahertz
NIST	National Institute of Standards and Technology
OEC	Office of Emergency Communications
TIA	Telecommunications Industry Association
TICP	Tactical Interoperable Communications Plan
UASI	Urban Area Security Initiative
UHF	ultra high frequency
VHF	very high frequency
VoIP	Voice over Internet Protocol

GAO
Accountability * Integrity * Reliability

United States Government Accountability Office
Washington, DC 20548

April 2, 2007

The Honorable William Lacy Clay
Chairman
Subcommittee on Information Policy, Census, and National Archives
Committee on Oversight and Government Reform
House of Representatives

The Honorable Dennis J. Kucinich
Chairman
Subcommittee on Domestic Policy
Committee on Oversight and Government Reform
House of Representatives

Emergency "first responders"—personnel such as firefighters, police
officers, and ambulance services who are the first to arrive at the scene of
an emergency—are supported by a variety of public safety agencies,
including 911 call center staff and other local, state, and federal
authorities. Timely communications, often via wireless radios, are vital to
the effectiveness and safety of first responders and their supporting
agencies, as well as the safety of the public at large. Communications
interoperability—also referred to as compatibility or connectivity—refers
to the capability of different electronic communications systems to readily
connect with each other and thus enable timely communications.

Facilitating interoperability has been a policy concern of public safety
officials for many years. Toward that end, two major Department of
Homeland Security (DHS) efforts under way to improve interoperable
public safety communications are: (1) grant funding and technical
assistance provided by the Office of Grants and Training to high-risk
regions at the state and local level for on-site support as they work to
improve their interoperability and (2) the SAFECOM program, intended to
strengthen interoperable public safety communications at all levels of
government. The program is intended to provide research, development,
testing and evaluation, guidance, tools, and templates on
communications-related issues. In addition, DHS supports Project 25, a
joint initiative by government and commercial organizations to develop a
set of national standards for vendors to use when designing radio
communications equipment for first responders.

You asked us to assess the extent to which DHS has made progress in improving interoperable communications for first responders. Specifically, our objectives were to determine (1) the extent to which DHS funding and technical assistance have helped to improve interoperable communications in selected states, (2) the progress the SAFECOM program has made in improving interoperable communications, and (3) the progress that has been made in the development and implementation of interoperable communications standards.

To address our objectives, we conducted case studies of four states (Florida, Kentucky, New York, and Oregon) and 11 selected localities within those states. We used a number of factors to select states, including those that had received relatively large amounts of DHS funding, as well as those that routinely face natural disasters. The localities we selected included (1) large, high-risk urban areas, referred to as Urban Area Security Initiative (UASI) regions, which received the most funding from DHS within our selected states, (2) the non-UASI counties that received the largest amount of DHS funding within these states, and (3) the counties and cities where the state capitals are located.[1] To assess each state's use of DHS grants and technical assistance to improve interoperability and to identify common issues among states, we analyzed documentation obtained from state and local officials, such as grant allocation information and communications interoperability plans. To determine the progress SAFECOM has made in improving interoperable communications, we analyzed program management documentation (such as program goals, initiatives, and performance measures) and interviewed state and local officials regarding their use of SAFECOM tools and guidance. To determine the status of the development and implementation of interoperable communications standards, we obtained and analyzed documentation from DHS, the National Institute of Standards and Technology (NIST), and the four states. We performed our work from April 2006 to February 2007 in accordance with generally accepted government auditing standards. Further details of our objectives, scope, and methodology are provided in appendix I.

Results in Brief

According to DHS, $2.15 billion in grant funding was awarded to states and localities from fiscal year 2003 through fiscal year 2005 for communications interoperability enhancements. This funding, along with

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[1]We were unable to meet with local officials from Florida's state capital region.

technical assistance, has helped to make improvements on a variety of specific interoperability projects. However, in the states we reviewed, strategic planning has generally not been used to guide investments and provide assistance to improve communications interoperability on a broader level. Specifically, not all states had plans in place to guide their investments toward long-term interoperability gains; no national plan was in place to coordinate investments across states; and while UASI officials stated that the technical assistance offered to them had been helpful, DHS curtailed full-scale exercises, limiting their value in measuring progress. Further, although DHS has required states to implement statewide plans by the end of 2007, no process has been established for ensuring that states' grant requests are consistent with their statewide plans. Until DHS takes a more strategic approach to improving interoperable communications—such as including in its decision making an assessment of how grant requests align with statewide communications plans—and until more rigorous exercises are conducted, progress by states and localities in improving interoperability is likely to be impeded.

The SAFECOM program has made limited progress in improving communications interoperability at all levels of government; however, the program has not addressed interoperability with federal agencies, a critical element to interoperable communications required by the Intelligence Reform and Terrorism Prevention Act of 2004.[2] The SAFECOM program has focused on helping states and localities improve interoperable communications by developing tools and guidance for their use. However, based on our review of four states and selected localities, SAFECOM's progress in achieving its goals of helping these states and localities improve interoperable communications has been limited. Officials from the states and localities we reviewed often found that the tools and planning assistance provided by the program were not helpful, or they were unaware of what assistance the program had to offer. The program's limited effectiveness can be linked to poor program management practices, including the lack of a plan for improving interoperability across all levels of government and inadequate performance measures that would provide feedback to better attune tools and assistance with public safety needs. Until SAFECOM adopts these key management practices, its progress is likely to remain limited.

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[2]Intelligence Reform and Terrorism Prevention Act of 2004, Pub. L. No. 108-458, section 7303, 118 Stat. 3638, 3843-44, Dec. 17, 2004.

Until recently, little progress had been made in developing Project 25 standards—a suite of national standards that are intended to enable interoperability among the communications products of different vendors. Although one of the eight major subsets of standards was defined in the project's first 4 years (from 1989 to 1993), from 1993 through 2005, no additional standards were completed that could be used by a vendor to develop elements of a Project 25 system. To its credit, over the past 2 years, the private-sector coordinating body responsible for Project 25 has defined specifications for three additional subsets of standards. However, ambiguities in the published standards have led to incompatibilities among products made by different vendors, and no compliance testing has been conducted to ensure vendors' products are interoperable. Nevertheless, DHS has strongly encouraged state and local agencies to use grant funding to purchase Project 25 radios, which are substantially more expensive than non-Project 25 radios. As a result, states and local agencies have purchased fewer, more expensive radios, which still may not be interoperable and thus may provide them with minimal additional benefits. Until DHS modifies its grant guidance to provide more flexibility in purchasing communications equipment, states and localities are likely to continue to purchase expensive equipment that provides them with minimal additional benefits.

We are making recommendations to DHS to enhance the effectiveness of the department's efforts to improve interoperable communications, including assessing how states' grant requests support their statewide communications plans as a factor in the grant allocation process, implementing a program plan and establishing performance measures to assess the effectiveness and usefulness of SAFECOM tools, and modifying guidance to states and localities regarding acquisition of communications equipment to allow a more flexible approach until completed subsets of standards have been fully defined, and products have been certified compliant.

We received written comments from the Deputy Secretary of Commerce and the director of the DHS liaison office for GAO and the Office of the Inspector General. Letters from these agencies are reprinted in appendixes III and IV. Commerce provided updated information and technical comments, which we have incorporated, where appropriate.

In its response to our five recommendations, DHS agreed with two, stated that it would defer commenting on two, and disagreed with one recommendation.

DHS agreed with the intent of our recommendation that it develop and implement a program plan and stated that it is currently working to develop such a plan. DHS also agreed with our recommendation to develop quantifiable performance measures for the program.

DHS disagreed with our recommendation on modifying grant guidance to provide more flexibility in purchasing communications equipment until standards for completed interfaces have been fully defined, stating that the recommendation would require SAFECOM to amend its interoperability grant guidance until after the entire Project 25 suite of standards is complete, and would undermine the final remaining negotiations between the public safety community and equipment manufacturers. We agree that not all interfaces need to be fully defined before agencies can begin acquiring Project 25 products; thus we have clarified the recommendation to reflect this. However, we are not recommending that the public safety community be prohibited from acquiring Project 25 equipment, and thus we do not believe negotiations with equipment manufacturers would be undermined.

DHS also provided technical comments that we incorporated as appropriate.

Background

Public safety agencies include the nation's first responders (such as firefighters, police officers, and ambulance services), 911 call center staff, and a number of local, state, federal, and regional authorities. Communications, often through wireless land mobile radios, are vital to these agencies' effectiveness and to the safety of their members and the public. Wireless technology requires radio frequency capacity in order to function, and existing wireless technology is designed to work within specified frequency ranges.

Interoperability in the context of public safety communications systems refers to the ability of first responders to communicate with whomever they need to (including personnel from a variety of agencies and jurisdictions), when they need to, and when they are authorized to do so. It is important to note that the goal of being able to communicate when necessary and authorized is not the same as being able to communicate with any other individual at any time—a capability that could overwhelm the communications infrastructure and would likely impede effective communication and response time.

Different first responder groups each have different professional practices, public safety missions, emergency response procedures, communication protocols, and radio frequencies. These differences have created a variety of obstacles to effective interoperable communications among first responders. Thus, facilitating interoperable communications has been a policy concern of public safety officials for many years.

Land Mobile Radio System Technology

Land mobile radio systems are the primary means of communications among public safety personnel. These systems typically consist of handheld portable radios, mobile radios, base stations, and repeaters. Handheld portable radios are typically carried by public safety personnel and tend to have a limited transmission range. Mobile radios are often located in vehicles and use the vehicle's power supply and a larger antenna, providing a greater transmission range than handheld portable radios. Base station radios are located in fixed positions, such as public service access points or dispatch centers, and tend to have the most powerful transmitters. A network is required to connect the different base stations to the same communications system. Repeaters are used to increase the effective communications range of handheld portable radios, mobile radios, and base station radios by retransmitting received radio signals. Figure 1 below illustrates the basic components of a land mobile radio system.

Figure 1: Basic Components of a Land Mobile Radio Communication System

Portable radio user   Repeater   Base station   Transmitter tower   Mobile radio user
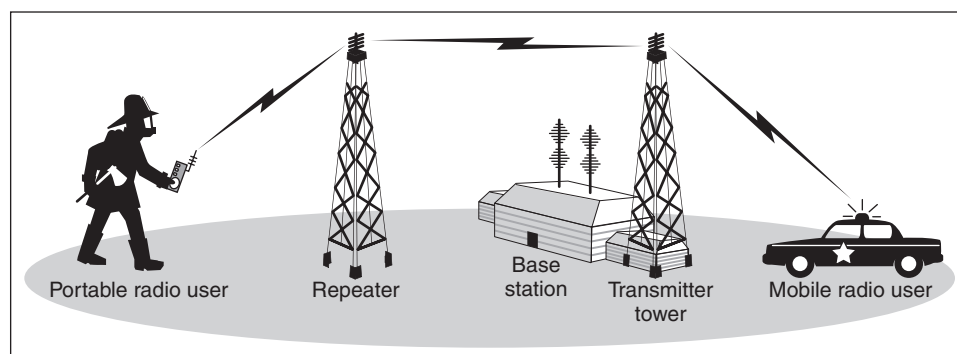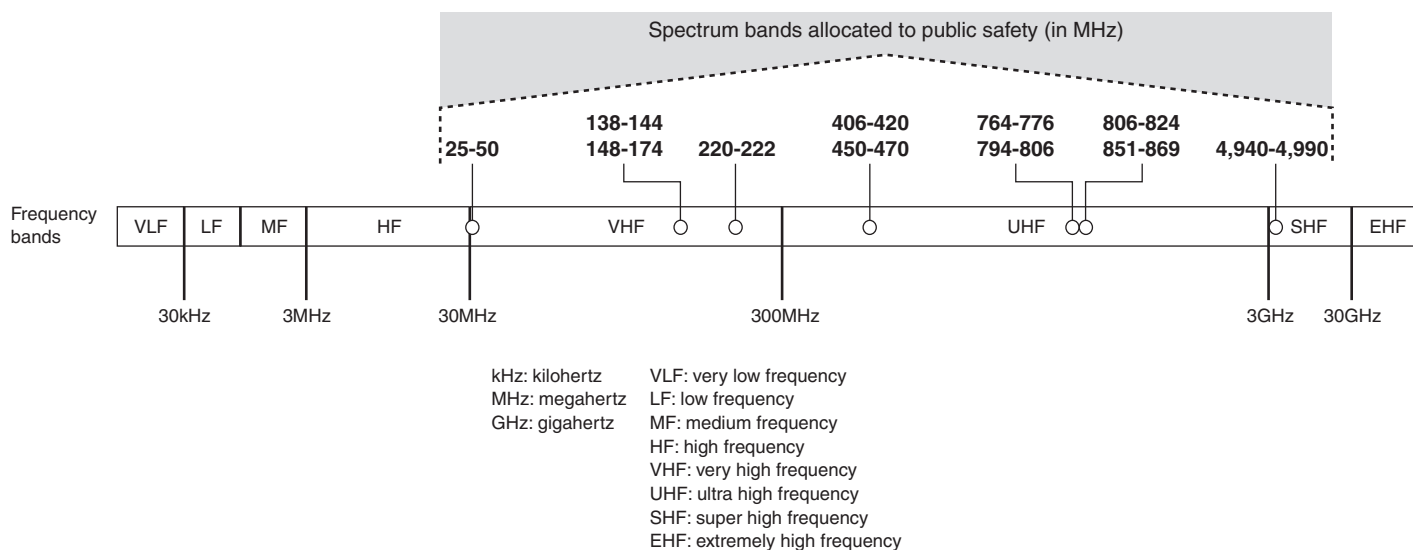
Sources: GAO and DHS.

The transmissions between the elements of a land mobile radio system consist of electromagnetic waves that propagate along designated frequencies of the radio spectrum. Each communications link uniquely occupies a specific frequency or set of frequencies for as long as information is being transmitted. The radio spectrum is a fixed, limited

resource that is shared among government and nongovernment entities for many uses in addition to public safety communications, such as television broadcasting, AM/FM radio, and aeronautical radio navigation. Most public safety agencies use their allocated frequencies for voice communications but are increasingly using their portion of the spectrum to support more advanced technologies, such as data, imagery, and video transmissions. The specific frequency bands allocated to public safety agencies are shown in figure 2.

Figure 2: Public Safety Agency Radio Frequency Bands and Their Location on the Radio Spectrum

kHz: kilohertz   VLF: very low frequency
MHz: megahertz   LF: low frequency
GHz: gigahertz   MF: medium frequency
                    HF: high frequency
                    VHF: very high frequency
                    UHF: ultra high frequency
                    SHF: super high frequency
                    EHF: extremely high frequency

Sources: GAO and DHS.

Major frequency ranges that are used for public safety communications include the very high frequency (VHF) range and the ultra high frequency (UHF) range. VHF signals travel farther than UHF signals and thus are useful in suburban and rural areas. However, they generally cannot penetrate building walls very well. In contrast, UHF signals are more appropriate for denser urban areas as they penetrate buildings more easily, and it is less critical that the signals be able to propagate for long distances. The frequencies used by federal agencies are managed by the National Telecommunications and Information Administration, while the Federal Communications Commission manages state and local government frequencies.

Radio systems are classified as either conventional or "trunked." Conventional radio systems have dedicated frequencies—also referred to as channels—assigned to individual groups of users. When a user makes a call, other members of the group cannot use the channel until the call is over. In contrast, trunked systems allocate pools of channels for use by multiple individuals. When a call is made by a user on a trunked system, an available channel is automatically selected from the pool of channels, leaving the remaining channels available for others. While trunked systems are more complex and require more infrastructure than conventional systems, they allow for more efficient use of communication channels, reducing congestion.

Lack of Interoperable Communications Has Long Hindered Emergency Response

In order to effectively respond to emergencies such as natural disasters and domestic terrorism, public safety agencies need the ability to communicate with their counterparts in other disciplines and jurisdictions. However, the wireless communications systems used by many police officers, firefighters, emergency medical personnel, and other public safety agencies do not provide such capability. For example, emergency agencies responding to events such as the bombing of the federal building in Oklahoma City and the attacks of September 11, 2001, experienced difficulties in trying to communicate with each other. The 9/11 Commission concluded that communications interoperability problems contributed to the large number of firefighter fatalities that occurred at the World Trade Center.[3]

Historically, first responder communications interoperability has been significantly hampered by different and incompatible radio systems. Different technologies and configurations, including proprietary designs, by different manufacturers have limited the interoperability of public safety wireless communications systems. These systems have also operated on different frequencies of the radio spectrum. In particular, public safety agencies have been assigned frequencies in new bands over time as available frequencies became congested, and as new technologies made higher frequencies available for use. Existing radios are unable to transmit and receive in all of the public safety frequencies, often making communications between first responders from different jurisdictions

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[3]National Commission on Terrorist Attacks Upon the United States, *The 9/11 Commission Report* (Washington, D.C: 2004), 322-3.

difficult. Additionally, as we have previously reported,[4] there is a need for better frequency planning and coordination. Further, public safety agencies have historically planned and acquired communications systems without concern for interoperability, often resulting in multiple, technically incompatible systems in operation throughout any given local jurisdiction.

A variety of technical approaches have been adopted to help improve interoperable communications, including the following:

- *Swapping radios:* Agencies maintain a cache of extra radios that they can distribute during an emergency to other first responders whose radios are not interoperable with their own. The advantage of this solution is that it does not require that all existing radios be replaced, an important consideration when funds to buy new equipment are limited. However, this approach requires significant logistical support and careful management to implement successfully.

- *Patching:* Two or more incompatible radio systems are connected to a central switchboard-like system that translates a signal sent from one connected system so that it can be received by any of the other connected systems. The principal advantage of this solution is that agencies can continue to use existing systems that would otherwise be incompatible. A major disadvantage is that patching requires twice as much spectrum because a patched transmission occupies separate channels on each connected system.

- *Shared channels or mutual aid channels:* Agencies agree to set aside a specific channel or channels for connecting to other incompatible systems. This approach provides direct interoperable communications and only occupies one channel per conversation. However, it can cause congestion since these channels require dedicated frequencies and thus have limited capacity.

- *Shared systems:* The use of a single or common radio system—typically a trunked system—to provide service to most agencies within a region. Shared systems are the most robust form of interoperability and do not require dedicated channels. While this approach produces optimal

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[4]For more information on the need for better frequency planning and coordination, see GAO, *Homeland Security: Federal Leadership and Intergovernmental Cooperation Required to Achieve First Responder Interoperable Communications*, GAO-04-740 (Washington, D.C.: July 20, 2004).

performance, it can be very expensive, because it generally requires purchasing all new radios and transmission equipment. Technologies that can help implement shared systems include the following:

- *Internet Protocol based systems:* Using the Voice over Internet Protocol,[5] advanced communications systems can offer the flexibility to transmit voice conversations over a data network such as the Internet or a private network.

- *Software-defined radios:* These are intended to allow interoperability among agencies using different frequency bands, different operational modes (digital or analog), proprietary systems from different manufacturers, or different modulations (such as AM or FM). However, software-defined radios are still being developed and are not yet available for use by public safety agencies.

However, interoperability cannot be achieved solely by implementing technical solutions. Coordination among different agencies and governmental entities is also critical. Response to an emergency may involve all levels of government and many different disciplines, such as law enforcement organizations, fire departments, emergency medical services, transportation, natural resources, and public utility sectors. Each of these agencies is likely to have its own policies, procedures, and communications protocols when responding to an incident. A simplistic example is the word "fire," which to a firefighter means that something is burning but to a police officer is a command to shoot a weapon. Resolving such cultural and procedural differences can be challenging.

Further, the extent to which interoperable communications are needed among different agencies, disciplines, and levels of government (federal, state, local, and tribal) varies based on the size, significance, and duration of an emergency event. Increasing degrees of interoperability may be needed for (1) routine day-to-day coordination between a few agencies in a local area, (2) extended operations involving agencies from multiple jurisdictions working on a larger problem (such as the 2002 sniper attacks in the Washington, D.C., metropolitan area), and (3) a major, large-scale event that requires response from a range of local, state, and federal

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[5]Voice over Internet Protocol, also called VoIP, is the routing of voice conversations over the Internet or any other Internet Protocol network.

agencies and disciplines (such as major wildfires, hurricanes, or the terrorist attacks of September 11, 2001).

In 2004,[6] we reported that a fundamental barrier to successfully addressing interoperable communications problems for public safety was the lack of effective, collaborative, interdisciplinary, and intergovernmental planning. We recommended that DHS take a number of actions to address this barrier, such as determining the current status of interoperable communications across the nation and encouraging states to establish comprehensive statewide interoperability plans and certify the alignment of their grant applications with their statewide plans. DHS has taken steps to address these recommendations. For example, it recently completed a national survey of first responders to determine the current status of their interoperability capabilities, and it has required states to develop statewide communications plans by the end of 2007.

Programs Aimed at Improving Interoperable Communications

SAFECOM is a DHS program intended to strengthen interoperable public safety communications at all levels of government. The program provides research, development, testing and evaluation, guidance, tools, and templates on communications-related issues. We previously reported[7] that changes in leadership delayed progress during the initial years of the SAFECOM program and that the program suffered from a lack of leadership and focus.

Since 2004, SAFECOM has spent $20.4 million developing several tools and providing assistance to help guide states and localities as they work to improve the interoperability of their communication systems. Table 1 outlines several tools and guidance that SAFECOM had developed as of July 2006. The program continues to develop additional tools.

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[6]GAO-04-740.

[7]GAO, *Project SAFECOM: Key Cross-Agency Emergency Communications Effort Requires Stronger Collaboration*, GAO-04-494 (Washington, D.C.: Apr. 16, 2004).

Table 1: Description of SAFECOM Guidance and Tools

Guidance or tool	Description
Statement of Requirements	This document is intended to define and identify the range of future requirements for voice and data communications to enable interoperability. It provides definitions of a variety of interoperable communication subjects, such as public safety communication needs, public safety roles and functions, and the levels of operability and interoperability for each major public safety discipline.
Public Safety Architecture Framework	This framework is intended to provide a methodology to plan and develop the migration from current public safety architectures to the interoperable systems outlined in the Statement of Requirements.
Interoperability Continuum	The Interoperability Continuum provides a graphical depiction of five critical success factors for achieving interoperability that SAFECOM developed based on feedback from first responders. This tool is intended to provide a framework that emergency response agencies can use to baseline their planning and implementation of interoperability solutions.
RapidCom	RapidCom provided assistance to 10 high-threat urban areas, including New York City, Miami, and Los Angeles, to help improve incident-level communications interoperability capabilities in those locations. RapidCom was intended to help incident commanders communicate with each other and their command centers in a timely manner by helping them to establish objectives, identify solutions, and take steps toward implementation.
Regional Communications Interoperability Pilot projects	SAFECOM officials worked with public safety officials at all levels of government in Nevada and Kentucky to help them develop both short-term and long-term goals aimed at improving interoperability within their states.
Statewide Communication Interoperability Planning Methodology	The methodology describes a step-by-step process for developing a locally driven statewide strategic plan for enhancing communications interoperability.
Grant Guidance	SAFECOM's grant guidance is intended to provide consistent criteria for agencies to use when purchasing equipment with federal funds.

Source: GAO based on DHS data.

We previously recommended that in order to enhance the ability of SAFECOM to improve communications among emergency personnel from federal, state, local, and tribal agencies, SAFECOM officials should complete written agreements with the project's identified stakeholders (including federal agencies and organizations representing state and local governments) that define the responsibilities and resource commitments that each of those organizations will assume and include specific provisions that measure program performance.[8] Since we made our recommendation, SAFECOM program officials have established a governance charter for the program, which outlines the roles, relationships, and operating guidelines for participating stakeholders.

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[8]GAO-04-494.

The Office of Grants and Training, which is scheduled to become part of the Federal Emergency Management Agency, is a separate entity within DHS that is responsible for, among other things, providing grants and technical assistance to states and localities to help them improve their interoperable communications. Grants and Training provides funding to states and requires that at least 80 percent of grant funding provided to states through the Homeland Security Grant Program be passed to localities. Grants and Training also provides additional funding to address the unique planning, equipment, training, and exercise needs of UASI areas.[9]

DHS uses a partly risk-based approach to allocate grant funds. State agencies submit proposals to DHS which form the basis for its risk-based decisions. During the most recent grant allocation process in 2006 for the Homeland Security Grant Program, each state and territory received a portion of its grant funding through a base allocation. The remainder of funds was allocated based on an analysis of risk and need. In fiscal year 2006, the UASI funds were allocated based on risk and effectiveness. DHS estimated the relative risk of successful terrorist attacks on selected urban areas, considering threat, vulnerability, and consequences for both asset-based and geographic factors. On the basis of this analysis, it ranked the UASI areas and identified 35 urban areas as eligible to apply for UASI funding. In addition, the 11 urban areas that received funding previously, but were not identified as UASI areas in 2006, have been extended eligibility for funding for one additional year. DHS also used a peer review process to assess the effectiveness of each of the 35 urban areas' proposed investments using the grant funds.

Grants and Training has also established a monitoring program in which preparedness officers validate that grant funds are being administered legally and in accordance with the guidance provided to grantees. Preparedness officers work with the states to help address areas of concern, needs, and priorities. The monitoring program is also intended to provide a general assessment of where states and localities are in protecting their citizens. In addition, in efforts to control the use of

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[9]Each year the number of urban areas designated as a UASI area changes. In 2005, DHS designated 43 UASI areas, and in 2006 DHS reduced the number of UASI areas to 35 (11 areas that had previously participated in the program but did not fall within in the top 35 urban areas in the 2006 risk analysis were eligible to apply for UASI funding for one additional grant cycle to help sustain ongoing projects). In 2007, 45 areas were designated as UASI areas.

awards, DHS officials have developed an Approved Equipment List that provides information on allowable equipment expenditures.

Further, Grants and Training established the Interoperable Communications Technical Assistance Program, which has provided guidance and technical assistance to the UASI areas. While the program focuses mostly on providing guidance and assistance to these specific areas, assistance is also provided to non-UASI areas. Table 2 provides a list of the assistance and guidance offered by Grants and Training.

Table 2: Office of Grants and Training Guidance and Technical Assistance

Guidance or technical assistance	Description
Tactical Interoperable Communications Plan (TICP) guidance	Each UASI area receiving DHS funds must develop a plan to achieve tactical interoperable communications across its separate jurisdictions. The TICP guidance provides an outline of key elements that should be covered in the plan, such as a governance structure and interoperability equipment in the region.
TICP exercise guidance	Each UASI area receiving DHS funds must validate the effectiveness of their communication plan by conducting a full-scale exercise. ICTAP provided supporting material, such as an evaluator handbook.
Interoperable Communications Technical Assistance Program (ICTAP)	An ICTAP technical assistance team works on-site with the UASI areas' communications representatives to identify gaps in existing communications infrastructure and to translate operational requirements into technical requirements that can be used to design an interoperable system.
UASI scorecard	Grants and Training, in consultation with SAFECOM and the Wireless Management Office, has developed scorecards that assess the maturity of tactical interoperable communications capabilities in the UASI areas. The goal of the scorecard effort is to provide an assessment of each urban/metropolitan area and to provide recommendations on how to best improve tactical interoperable communications. DHS released the scorecards to the UASI areas in January 2007.

Source: GAO based on DHS data.

Another grant program focused on interoperable communications is the Department of Justice's Community Oriented Policing Services (COPS) Interoperable Communications Grant program. The program awards technology grants to law enforcement agencies for interoperable communications and information sharing. While the program used to have a larger role in providing grant funding to states and localities, its scope and budget was significantly reduced in 2006 in an effort to eliminate overlap with DHS's grant program.

More recently, the 2007 DHS Appropriations Act[10] transferred many SAFECOM program responsibilities to a new Office of Emergency Communications (OEC). This new office, which is not yet operational, is to take over the Interoperable Communications Technical Assistance Program from Grants and Training and the Integrated Wireless Network project, which is intended to create a consolidated federal wireless communications service for federal public safety agencies. This new office is tasked with improving overall emergency communications for first responders, as well as improving interoperability. In addition to the OEC, the Office for Interoperability and Compatibility within the Science and Technology Directorate will continue to house the remaining elements of SAFECOM related to research, development, testing and evaluation, and standards.

Project 25 Was Established to Address First Responder Interoperability Standards

In 1989, the Association of Public Safety Communications Officials, the National Association of State Telecommunications Directors, and selected federal agencies established Project 25 to develop open standards for vendors to use when designing land mobile radio communications equipment. Project 25 has the following four primary objectives:

- enable effective inter- and intra-agency communications,

- improve radio spectrum efficiency,

- focus equipment and capabilities on public safety needs, and

- leverage an open architecture to promote competition across land mobile radio vendors.

Project 25 standards are intended to be a suite of national standards, based upon public safety user requirements, which define operable and interoperable communications equipment for first responders. When complete, this suite of standards is intended to allow for specifications to be written for interfaces between the various components of a land mobile radio system. The Association of Public Safety Communications Officials, the National Association of State Telecommunications Directors, and federal agency representatives, work with the Telecommunications

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[10]Department of Homeland Security Appropriations Act, 2007, Pub. L. No. 109-295, Title VI, Subtitle D, section 671, 120 Stat. 1355, 1433-35, Oct. 4, 2006 (enacting new section 1801 of the Homeland Security Act of 2002, 6 U.S.C. 571).

Industry Association (TIA)—an American National Standards Institute-accredited[11] standards development organization—to develop and maintain the standards.

DHS Assistance Has Helped on Specific Interoperability Projects, but a More Strategic Approach Is Needed

According to DHS, $2.15 billion in grant funding was awarded to states and localities from fiscal year 2003 through fiscal year 2005 for communications interoperability enhancements. This funding, along with technical assistance, has helped to make improvements on a variety of specific interoperability projects. However, in the states we reviewed, strategic planning has generally not been used to guide investments and provide assistance to improve communications interoperability on a broader level. Specifically, not all states had plans in place to guide their investments toward long-term interoperability gains; no national plan was in place to coordinate investments across states; and while UASI officials stated that the technical assistance offered to them had been helpful, DHS curtailed full-scale exercises, limiting their value in measuring progress. Further, although DHS has required states to implement statewide plans by the end of 2007, no process has been established for ensuring that states' grant requests are consistent with their statewide plans. Until DHS takes a more strategic approach to improving interoperable communications—such as including in its decision making an assessment of how grant requests align with statewide communications plans—and until more rigorous exercises are conducted, progress by states and localities in improving interoperability is likely to be impeded.

DHS Funding Has Helped Make Improvements on Specific Interoperability Projects in Selected States

One of the main purposes of the DHS grants program is to provide financial assistance to states and localities to help them fund projects to develop and implement interoperable communications systems. In addition, as previously mentioned, the Interoperable Communications Technical Assistance Program is intended to provide on-site assistance to UASI areas to, among other things, assist with developing tactical interoperability plans, planning exercises, assessing communication gaps, and designing interoperable systems.

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[11]The American National Standards Institute coordinates and oversees the development and use of voluntary standards in the United States and participates in accrediting programs that assess conformance to standards.

The four states we reviewed received assistance from DHS, which helped make improvements on specific interoperability projects.

- *Florida:* Florida has spent $36.5 million in DHS funds to develop a system called the Florida Interoperability Network, which establishes network connections between federal, state, and local dispatch centers across Florida and provides mutual aid channels throughout the state. As a result, the level of interoperability across the state has improved significantly. First responders in 64 of Florida's 67 counties are now able to have their communications patched to each other as needed via the network. Previously, they had no such infrastructure for achieving interoperability. However, officials from localities in Florida raised questions about the long-term sustainability of the network. Each connected jurisdiction must pay the ongoing costs of their connection to the Florida Interoperability Network, and smaller jurisdictions are likely to find this unaffordable. Further, Florida officials remarked that training across the state is still incomplete. Additionally, in the Miami UASI region, a majority of the Urban Area Security Initiative funding for interoperable communications has been used to acquire communications equipment, such as radios, and interoperability solutions, such as devices that interconnect first responders on disparate radios, to make improvements in Miami City and in Miami-Dade County. However, limited UASI funding had been dedicated to making interoperability improvements in other localities in the Miami UASI, such as Monroe and Broward Counties.

- *Kentucky:* Kentucky used a portion of its DHS funding to expand the use of mutual aid interoperability radio channels that allow agencies on different communication systems throughout Kentucky to tune to a dedicated, shared frequency to communicate. Prior to this initiative, first responders operating on different frequencies were unable to communicate. Currently, approximately 34 percent of applicable agencies have signed a memorandum of understanding to commit to using the mutual aid channels in accordance to standardized procedures. However, mutual aid channels have limited capacity, and Kentucky has yet to implement a long-term solution for a statewide voice communications system that will allow federal, state, and local first responders to communicate directly as needed. Kentucky has also used DHS funding to implement a statewide wireless data communications system. The system provides functionality such as statewide records management, real-time crime coverage and data collection, and instant messaging. First responders use mobile data terminals to communicate with each other and, in many cases, retrieve information from agency databases. Kentucky's mobile data network currently has coverage across approximately 95 percent of the state's primary and secondary road

systems. Such capabilities were not available to Kentucky's first responders prior to this initiative. In the Louisville UASI, local officials have utilized DHS funding to implement patching mechanisms to connect different communication systems throughout the region. However, according to officials, communications channels are frequently congested because of the amount of patching that needs to be done to connect responders.

- *New York:* In New York, DHS funding is generally being utilized by localities to address local interoperability issues within their counties and with neighboring counties. For example, Albany County is acquiring a new interoperable system that connects first responders on many disparate systems within Albany County and neighboring counties. Prior to this system, there was no single voice system or network that would allow incident commanders and first responders to be able to communicate directly. However, the local solutions do not always incorporate state and federal systems. For example, the state is using state funds to develop and implement a separate and incompatible statewide network called the Statewide Wireless Network, which localities are not required to join. Albany County, for example, has no immediate plans to connect their new system to the statewide system because of uncertainties about the expense and the expected benefits for the county. In the New York City UASI, local officials have used a portion of DHS funding to implement a citywide mobile wireless network. This system is intended to provide first responders throughout the city with high-speed data access to support large file transfers, including accessing federal and state anticrime and antiterrorism databases, fingerprints, mug shots, city maps, and full-motion streaming video.

- *Oregon:* Oregon, in accordance with DHS guidance, has dedicated most of its DHS funding to local projects that improve interoperability in specific regions. For example, Jackson and Josephine Counties are jointly implementing an interoperable communications system. Previously, first responders in these two neighboring counties relied on indirect means for establishing interoperable communications, such as radio channels, patching mechanisms, and a mobile command vehicle equipped with a cache of radios in different frequencies and a patching device that could be deployed as needed. However, this new system does not include federal or state first responders. In addition, limited DHS funding has been utilized for developing plans for the development of the Oregon Wireless Interoperability Network. This system is intended to replace state agencies' deteriorating systems with a new system. It is also intended to connect local agencies that continue to use their existing systems to other local agencies that they do not already have interoperability with. To date,

the development of this system has not been initiated. In the Portland UASI, DHS funding was used to install repeaters in Columbia County to enhance interoperability with the other four counties in the urban area. However, while it has improved the interoperability, not all Columbia County first responders are able to utilize this solution. Therefore, the UASI funding was also used to purchase a supply of reserve radios—referred to as a cache—that can be shared.

Table 3 shows the amount of DHS funding states and localities have received and examples of what the money has been used for.

Table 3: Examples of Uses of DHS Funding for Interoperable Communications

Location	Examples of purchases	Total DHS grants[a] for interoperable communications from fiscal years 2003 to 2005[b]
State of New York	A communication vehicle with equipment to enable interoperable communications at the scene of an incident such as extra radios and patching devices.	$74.9 million[c]
	Studies of initial interoperability projects for Onondaga County.	
	Emergency Services Interoperability Radio System project, which provides interoperability among the county and surrounding counties, as well as radios and a patching system for Albany County.	
New York City UASI	Portions of the citywide-Mobile Wireless Network, communications enhancements for the New York City Fire Department Operations Center, and local area network installation for the police department.	$70.6 million[d]
Kentucky	Installation of infrastructure across the state to facilitate the use of interoperability radio channels.	$39.5 million
	Computer-aided dispatch consolidation efforts and upgrades to dispatch infrastructure for Montgomery County.	
	Development of a mobile data system for Franklin County.	
Louisville UASI	Mobile radios, training costs, accessories for radio equipment, and equipment used for patching communications.	$10.5 million[e f]
Oregon	Development of plans for the Oregon Wireless Interoperability Network, radios, mobile data terminals, and devices that interconnect first responders on disparate systems.	$45.9 million
	Hospital communication upgrades, base station equipment, and radios.	
	Development of a system that connects Jackson County to Josephine County.	
	Developing a communications plan for Marion County.	
Portland UASI	Radios, communication equipment for emergency operations center, mobile data terminals, and repeaters.	$7.5 million

Location	Examples of purchases	Total DHS grants[a] for interoperable communications from fiscal years 2003 to 2005[b]
Florida	The Florida Interoperability Network, which establishes network connections between federal, state, and local dispatch centers across Florida and provides mutual aid channels throughout the state.	$44 million[g]
	Emergency Deployable Interoperable Communications Systems, which are mobile systems that can be deployed to a specific response area to patch multiple disparate communications systems together.	
	Mutual Aid Radio Communications units, which are stand-alone mobile interoperable communications networks and self-contain the infrastructure to set up a communications system in the absence of an operable system.	
Miami UASI	Radios, back-up radio system, cache of radios, a mobile emergency operations center, and devices that interconnect first responders on disparate radio systems.	$11.7 million

Source: GAO analysis of DHS, state, and locality data.

Note: These amounts include DHS funding from fiscal year 2003 through fiscal year 2005, as the complete 2006 figures were not available at the time of our review.

[a]Allocations of DHS grant funding to interoperable communications are determined by each state and reported by each state to DHS.

[b]DHS's grant funding figures for interoperable communications includes funding from each of the relevant grant programs within the Office of Grants and Training, including the State Homeland Security Program and the UASI program.

[c]The $74.9 million includes all other DHS funding that was awarded to New York, including the Buffalo UASI, with the exception of the $70.6 million that was awarded to the New York City UASI.

[d]For fiscal year 2003, New York did not designate separate Interoperable Communications funding for the state and urban area.

[e]From 2003 through 2005, Louisville was a designated UASI area. In 2006 DHS reduced the number of UASI areas; as a result, Louisville is no longer a designated UASI area. However, it received funding from the UASI program in 2006 to help it sustain ongoing projects.

[f]For fiscal year 2003, Kentucky did not designate separate Interoperable Communications funding for the state and urban area.

[g]The $44 million includes all other DHS funding that was awarded to Florida, including the Tampa and Jacksonville UASI areas, with the exception of the $11.7 million that was awarded to the Miami UASI.

A Lack of Statewide Plans Has Contributed to Limited Strategic Use of DHS Funding

According to SAFECOM guidance, interoperability cannot be solved by any one entity alone and, therefore, an effective and interoperable communications system requires a clear and compelling statewide strategy focused on increasing public safety effectiveness and coordination across all related organizations. A statewide interoperability plan is essential for outlining such a strategy. Such a plan should establish long-term objectives but also include short-term solutions that help incrementally achieve sustainable solutions to the long-term objectives. Thus,

establishing long-term plans helps ensure that near-term solutions are consistent with the end goal.

The narrow and specific use of DHS funding in the states we reviewed can be traced in part to the lack of statewide plans; interoperability investments by individual localities have not been coordinated toward achieving a broader goal for the state. For example, Kentucky, which has received grant funding totaling approximately $50 million since fiscal year 2003 according to DHS, has not yet developed a statewide communications plan, although in January 2007, officials stated that they had begun developing a plan. While Kentucky has recently begun working to assess how best to address statewide needs, to date, grant reviewers at the state level who are in charge of disbursing DHS grant money to localities have had limited means for determining whether funding requests for equipment and training were compatible with statewide interoperability goals. For example, evaluators were required to assess aspects of request proposals such as whether they fully addressed the measurable objectives expected for a new wireless communication system and whether they addressed how the applicant agency would communicate with other public safety and/or public service organizations at the local, state, and federal levels. However, the available criteria do not provide the evaluators with an overall statewide strategy that the evaluators could use to assess whether the localities' proposal is aligned to it. As a result, the equipment and activities that localities have purchased have tended to address short-term voice communication solutions for local interoperability problems while long-term, statewide solutions have not been addressed. However, as previously stated, Kentucky has developed a data communications network to supplement gaps in its voice communications.

Similarly, New York does not yet have a statewide communications plan and, therefore, does not utilize DHS grant funding in support of such a plan. While state officials recommend that localities invest in interoperable communications, they provide no additional guidance to localities to ensure that local investments are consistent with statewide goals. As a result, localities have generally used the funding to address local interoperability issues within their counties and neighboring counties, with little regard for state and federal systems. For example, while New York is currently in the process of deploying the Statewide Wireless Network for $2 billion, localities are not required to participate, and local interest in the statewide system has been limited. As a result, localities are continuing to develop their own interoperability solutions that do not incorporate the network. Among localities we reviewed, Onondaga County

is implementing its own $33 million interoperable communications system independently of the network, and Albany County, likewise, is currently developing a $1.7 million interoperability system that does not incorporate the Statewide Wireless Network. Officials stated that once the network's pilot period is complete they will decide whether to participate in the network.

In accordance with a previous recommendation, DHS has required grant recipients to develop and adopt a statewide communications plan by the end of 2007. Additionally, the 2007 DHS Appropriations Act states that DHS may restrict funding to a state if it does not submit a statewide interoperable communication plan.[12] However, despite our other previous recommendation that DHS should require that states certify that grant applications be consistent with statewide plans,[13] no process has yet been established for ensuring that states' grant requests are consistent with their statewide plans and long-term objectives for improving interoperability. Grants and Training officials are considering instituting such a process but they do not have specific plans to do so.

Because of the lack of coordination, state and local governments are investing significant resources, including DHS grant funds, in developing independent interoperability solutions that do not always support each others' needs. Until the DHS-mandated statewide communications plans are in place, and processes have been established for ensuring that each state's grant request is consistent with its statewide plan and longer-term interoperability goals, progress by states and localities in improving interoperability is likely to be impeded.

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[12]Department of Homeland Security Appropriations Act, 2007, Pub. L. No. 109-295, Title VI, Subtitle D, section 671, 120 Stat. 1355, 1438 Oct. 4, 2006 (enacting new section 1804 of the Homeland Security Act of 2002, 6 U.S.C. 574).

[13]GAO-04-740.

The Lack of a National Plan Has Also Contributed to Limited Strategic Use of DHS Funding

In addition to statewide plans, an overarching national plan is critical to coordinating interoperability spending, especially where federal first responders are involved. According to the Public Safety Wireless Advisory Committee,[14] improving interoperable communications across the nation will require a national plan that includes all levels of government and defines operational policies and procedures and the proper use of national communications resources. In responding to large-scale events—such as wildfires, hurricanes, or terrorist attacks—state and local government first responders require interoperable communications with federal agencies.

To date, however, interoperability investments have tended to be isolated and piecemeal, in part because they have not been guided by a comprehensive national plan. For example, officials stated that Oregon and its bordering states—Washington, California, and Idaho—are each working independently to try to implement and meet federal communication requirements and improve interoperability.

In a large-scale emergency, where first responders may need to coordinate with agencies from other states and a variety of federal agencies, the lack of national-level planning can result in substantial interoperability problems. During Hurricane Katrina, for example, Florida first responders spent half a day trying to contact their counterparts in Louisiana and Mississippi in an effort to share communications equipment. If these states coordinated prior to the catastrophe, it is likely that less time and energy would have been wasted.

The lack of a national strategy has also left state officials uncertain about whether they are taking appropriate steps to plan for interoperability. For example, Oregon officials indicated they are uncertain whether the approach they are taking is the best way to solve their interoperability problems.

The 2007 DHS Appropriations Act[15] requires DHS to develop a National Emergency Communications Plan by March 2008. Among other things, the

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[14]The committee was established by the Federal Communications Commission and the National Telecommunications and Information Administration to evaluate the wireless communications needs of federal, state, and local public safety agencies.

[15]Department of Homeland Security Appropriations Act, 2007, Pub. L. No. 109-295, Title VI, Subtitle D, section 671, 120 Stat. 1355, 1435-36, Oct. 4, 2006 (enacting new section 1802 of the Homeland Security Act of 2002, 6 U.S.C. 572).

plan is to identify necessary emergency communications capabilities for first responders and government officials, identify obstacles to interoperable communications, provide both short-term and long-term solutions to those obstacles, and establish goals and time frames for the deployment of emergency communications systems based on new and existing equipment across the United States.

Technical Assistance Has Been Helpful, but Exercises Curtailed by DHS Have Had Limited Strategic Value

According to state and local officials, the Interoperable Communications Technical Assistance Program has been beneficial to each of the four UASI areas we visited. For example, according to Miami officials, the program provided extensive support in the development of the tactical interoperable communications plan for the Miami area. Technical assistance representatives held meetings with each of the Miami area public safety agencies to compile a regional communications equipment inventory. Similarly, according to Louisville officials, the Interoperable Communications Technical Assistance Program held a 2-day workshop on developing the tactical interoperable communications plan for the Louisville area. Officials stated that this workshop represented the first time that all relevant communications officials and emergency responders were involved in a collaborative effort.

Guidance for the 2006 Homeland Security Grant Program required each of the high-risk UASI areas to plan and conduct a full-scale exercise to validate the effectiveness of their tactical interoperable communications plans. Full-scale exercises are the most complex type of exercises, involving multiple agencies and jurisdictions in testing plans, policies, and procedures. They are intended to be conducted in a real-time, stressful environment that closely mirrors real events. DHS required the exercises as a way to measure the progress each UASI has made in improving interoperability and developed "scorecards" to capture the results of the exercise.

However, while DHS provided extensive assistance to the urban areas in developing their tactical interoperability communications plans, it curtailed the exercises that were intended to validate the robustness and completeness of each plan. Due to the complexity of these exercises, the UASI areas were originally allotted 12 months to plan and execute robust, full-scale exercises; DHS subsequently reduced this to 5 months. DHS officials indicated that they accelerated the deadline so that they could use the results as inputs into the interoperability scorecards that they published in January 2007. To compensate for the reduced time frame,

DHS reduced the requirements of the full-scale exercise, advising the UASI areas to limit the scope and size of their activities.

In reducing the scope of their exercises, the UASI areas had to reduce the extent to which they tested the robustness and effectiveness of their interoperability plans. For example, of the four UASI areas we visited, Portland, Miami, and New York City each reduced the scope of their exercise so they could meet DHS's accelerated deadline. For example, Portland had to significantly reduce the number of participants from each of the counties participating in the exercise. According to Portland officials, their exercise was not realistic for responding to a real-world incident. Likewise, New York City officials stated that they would have executed a higher quality exercise if DHS had not reduced the time frame. Moreover, according to the 2007 grant guidance, the UASI areas are not required to conduct any additional exercises to further validate their plans.

Without robust exercises to validate tactical interoperability communications plans, the UASI areas can only have limited confidence in the plans' effectiveness, and thus the value of DHS's efforts may continue to be limited. Similarly, the constraints placed on the exercises means that DHS's scorecards of each of the UASI areas are based on questionable data.

SAFECOM Program Has Made Limited Progress in Assisting All Levels of Government to Achieve Interoperability

Although initiated in 2001, the SAFECOM program has made limited progress in improving communications interoperability at all levels of government. The program has not addressed state and local interoperability with federal agencies, a critical element to interoperable communications that is required by the Intelligence Reform and Terrorism Prevention Act of 2004. Further, while the program has focused on helping states and localities improve interoperable communications by developing tools and guidance for their use, SAFECOM's progress in this area has been limited in the selected states. Specifically, officials from selected states and localities often found that the tools and planning assistance provided by the program were not helpful, or they were unaware of what assistance the program had to offer. The program's limited effectiveness can be linked to poor program management practices, including the lack of a plan for improving interoperability across all levels of government and inadequate performance measures that would provide feedback to better attune tools and assistance with first responder needs. Until SAFECOM adopts these key management practices, its progress is likely to remain limited.

SAFECOM Was Established to Improve Interoperable Communications at All Levels of Government

When SAFECOM was established in 2001, as one of the Office of Management and Budget's 25 electronic government initiatives[16] under the management of the Department of the Treasury, its goals were to (1) achieve federal-to-federal interoperability throughout the nation, (2) achieve federal to state/local interoperability, and (3) achieve state/local interoperability throughout the nation. Like the other e-government initiatives, the program was expected to achieve its goals within 18 to 24 months. As we reported in 2004, these are challenging tasks that will take many years to fully accomplish, and the program had made very limited progress at the time of our review.[17]

Since 2001, the management and goals of the program have changed several times. Most recently, in 2003, the SAFECOM program was transferred to the Office of Interoperability and Compatibility within the Directorate of Science and Technology in DHS. Its goals included increasing interoperable communications capacity of local, tribal, and state public safety agencies, and increasing the number of states that have initiated or completed statewide plans.[18] Program officials now estimate that a minimum level of interoperability will not occur until 2008, and it is unknown when full interoperability will occur.

In addition, the Intelligence Reform and Terrorism Prevention Act of 2004 required DHS to establish a program to enhance public safety interoperable communications at all levels of government, including federal, as well as state and local governments.[19] SAFECOM has been designated as the program responsible for carrying out this requirement.

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[16]The 25 e-government initiatives were established by the Office of Management and Budget to simplify and unify agency work processes and information flows, provide one-stop services to citizens, and enable information to be collected on line once and reused, rather than being collected many times.

[17]GAO-04-494.

[18]The program also had a goal of increasing the development and adoption of standards. Standards development is discussed in a separate section below.

[19]Intelligence Reform and Terrorism Prevention Act of 2004, Pub. L. No. 108-458, section 7303, 118 Stat. 3638, 3843-44, Dec. 17, 2004.

SAFECOM Has Not Taken Action to Address Interoperability with Federal First Responders

While SAFECOM is required to improve interoperable communications at all levels of government, the objectives that the program has been working toward do not include improving interoperability between federal agencies and state and local agencies. For example, when conducting their baseline national survey of first responders to determine the current level of interoperability, program officials included state and local officials, but not federal officials. The survey included an extensive list of questions in which respondents were asked to rate interoperability (1) with other disciplines, (2) with other jurisdictions, and (3) between state and local governments. Respondents were also asked at the end of the survey to list federal agencies they interoperate with; however, no effort was made to gauge the level of interoperability with the federal government, as had been done for other disciplines and jurisdictions and between state and local governments.

As a result, SAFECOM has not addressed a variety of problems involving interoperability between federal and state and local agencies. According to first responders, these difficulties arise when trying to establish interoperable communication between federal and state and local agencies:

- *Uncoordinated interoperability investments.* The Departments of Justice, Homeland Security, and Treasury are developing the Integrated Wireless Network (IWN) to create a consolidated federal wireless communications service for federal public safety and law enforcement agencies. The level of interoperability that state and local first responders will have with federal first responders on this network is unknown.

- *Frequency incompatibilities.* The National Telecommunications and Information Administration, which manages frequencies used by federal agencies, and the Federal Communications Commission, which manages frequencies used by state and local governments, have established conflicting time frames for when federal agencies and state and local agencies need to implement narrowband systems.[20] Further, according to an Associate Chief of DHS's Office of Border Patrol, when federal communications networks are configured to narrowband, federal agencies could have difficulty interoperating with local wideband systems unless special radios are procured that can operate both on the wideband and narrowband systems.

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[20]Narrowband refers to the method of gaining more channels (and hence more capacity) by splitting channels into channels that are narrower in bandwidth.

- *Use of encryption.* Federal agencies, such as the Federal Bureau of Investigation (FBI), use encryption[21] to secure their radio communications. Encryption can be vitally important in preserving the safety and security of their officers. However, they have not developed procedures for sharing the keys to decrypt the communication with state or local first responders in order to be able to communicate with them.

- *Unclear coordination procedures.* There is uncertainty within the first responder community regarding the allowable level of coordination and collaboration between federal agencies and state and local agencies. For example, while the National Telecommunications and Information Administration eliminated its requirement that state and local officials obtain written permission to use federal frequencies in May 2006, FBI officials that we interviewed were unaware that they were allowed to share their frequencies without written permission.

In lieu of having communications systems that enable direct interoperability between federal first responders and state and local first responders, first responders have resorted to alternative means of communicating. For example, state or local agencies may loan radios to federal first responders or physically pair a federal first responder with a state or local responder so they can share information and relay it back to their agencies. While approaches such as these may be effective in certain situations, they reflect a general lack of planning for communications interoperability. In many cases, using "work-arounds" such as these could reduce the efficiency and effectiveness of the overall public safety response to an incident.

SAFECOM officials stated that the program's focus has been on state and local agencies because they consider them to be a higher priority. Further, while they stated that it would be possible for federal agencies to make use of some of the planning tools being developed primarily for state and local agencies, SAFECOM has not developed any tools that directly address interoperability with federal agencies. However, interoperability with federal first responders remains an important element in achieving nationwide interoperability and is part of SAFECOM's tasking under the

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[21]Encryption is the process of transforming ordinary data (commonly referred to as plaintext) into code form (ciphertext) using a special value known as a key and a mathematical process called an algorithm. Cryptographic algorithms are designed to produce ciphertext that is unintelligible to unauthorized users. Decryption of ciphertext is possible by using the proper key.

Intelligence Reform and Terrorism Prevention Act of 2004. Until a federal coordinating entity such as SAFECOM makes a concerted effort to promote federal interoperability with other governmental entities, overall progress in improving communications interoperability will remain limited.

SAFECOM Tools and Assistance Have Had Limited Impact on State and Local Agencies

In addition to supporting development of the Project 25 suite of interoperability standards (discussed in a later section of this report), SAFECOM's activities have focused primarily on providing planning tools to state and local governments. However, based on our review of four states and selected localities, SAFECOM's progress in achieving its goals of helping these states and localities improve interoperable communications has been limited.

Several state and local officials did not find the tools and guidance useful. For example, of the 10 locations[22] we visited that were aware of the tools and guidance, 6 had not used the programs' Statement of Requirements or its Public Safety Architecture Framework. Additionally, 3 of the 4 states we reviewed had not used its Statewide Communication Interoperability Planning Methodology to develop a statewide communication plan. Further, officials from 4 of the 15 jurisdictions we reviewed were unaware that the SAFECOM program existed or that it provided interoperability guidance.

SAFECOM's Interoperability Continuum was the most widely used and recognized of its tools. Seven of the 15 states and localities we visited indicated that they used the continuum to assess their interoperability status and plan improvements. Another initiative that had a significant impact was the Regional Communications Interoperability Pilot. Officials from Kentucky—one of the two states that participated in the pilot—indicated that the pilot was very helpful in facilitating communications planning by identifying relevant stakeholders and bringing those stakeholders together for extended discussions about interoperability. And in Nevada, this program resulted in documentation of suggested near-term and long-term goals for improving interoperability.

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[22]We visited 15 locations. However, Franklin County, Kentucky, did not indicate which tools they use, and 4 localities were unfamiliar with the SAFECOM's Statement of Requirements and its Public Safety Architecture Framework.

However, the SAFECOM tools that were not widely used represent a significant investment of resources by DHS. For example, program officials said that they spent $9.2 million developing the Statement of Requirements and $2.7 million developing the Public Safety Architecture Framework.

State and local officials provided the following reasons for the limited utilization of SAFECOM tools:

- The tools and guidance are too abstract and do not provide practical implementation guidance on specific issues. For instance, the Statement of Requirements focuses on functional requirements based on textbook definitions of a variety of interoperable communication subjects, such as public safety communication needs, public safety roles and functions, and the levels of operability and interoperability for each major public safety discipline. SAFECOM officials indicated that the Statement of Requirements was meant to be a forward-looking document unconstrained by the limitations of current technology. However, states and localities must work to improve interoperability with technology that is currently available, and the Statement of Requirements does not describe specific technologies, infrastructure, or business models that state and local agencies can refer to when making key decisions regarding improvements to their communication systems. Additionally, neither the Statement of Requirements nor the Public Safety Architecture Framework identifies specific actions a state or local agency can take to make improvements.

- The documents are lengthy and hard to use as reference tools. For example, the two published volumes of the Public Safety Architecture Framework are approximately 270 pages combined and contain complex information about topics such as the elements and subelements of communication systems and their relationships to each other and to the environment. Officials indicated that they do not have the time to examine and analyze long reports that they believed contained limited useful information. According to SAFECOM officials, they plan to address this concern by publishing a third volume to guide public safety agency officials through the process of developing a communications system architecture. However, even with additional guidance, the framework will remain lengthy and complex.

- Awareness of SAFECOM and its tools has not reached all state and local agencies. Program officials indicated that they take steps to try to reach out to the broad first responder community, such as by publishing articles in major police and fire periodicals, presenting at events covering communications interoperability, and publishing a quarterly newsletter on

interoperability issues called Interoperability Today. However, despite these efforts, several localities that we visited were completely unfamiliar with the program and/or the assistance it provides.

Figure 3 identifies which of SAFECOM's tools, guidance, or other assistance were used by officials at the locations we visited.

Figure 3: Use of SAFECOM Tools, Guidance, and Assistance, by Location

	Florida	Lee County, FL	Miami UASI, FL	Kentucky	Montgomery County, KY	Louisville UASI, KY	New York	Albany County, NY	Onondaga County, NY	NYC UASI, NY	Oregon	Marion County, OR	Jackson County, OR	Portland UASI, OR
Tools applicable to all regions														
Statement of Requirements			X	X			X							X
Public Safety Architecture Framework			X				X							
Interoperability Continuum	X		X			X	X		X	X				X
Statewide Communication Interoperability Planning Methodology				X										X
Tools applicable to UASI areas														
RapidCom			X							X				

Source: GAO analysis of SAFECOM data.

Note: We visited 15 locations; however, Franklin County, Kentucky, did not indicate which tools they use.

Recently, SAFECOM has focused more on specific implementation issues, creating tools such as a writing guide for developing memorandums of understanding that could be used to establish agreements on the sharing of communication systems across agencies and jurisdictions. Officials have also developed a guide for writing standard operating procedures, which could be used to prepare written guidelines for incident response. Because these tools were still new, we did not receive assessments of them from state and local officials.

Lack of Program Plan and Performance Measures Has Contributed to SAFECOM's Limited Impact

One factor contributing to the limited impact that SAFECOM has had on improving communications interoperability is that its activities have not been guided by a program plan. A program plan is a critical tool to ensure a program meets its goals and responsibilities. Such a tool is used to align planned activities with program goals and objectives, as well as define how progress in meeting the goals will be measured, compared, and validated. For example, a program plan could be a useful tool for ensuring that key program goals—such as promoting interoperability across all levels of government including federal responders—are being addressed. In addition, a program plan would provide the structure to help plan tools and guidance that would address the greatest needs. Further, a program plan could be used to delineate performance measures, which are essential to determining the effectiveness of a program and for identifying the areas of a program that need additional attention.

Rather than using a program plan to guide their activities, SAFECOM officials stated that they develop tools and guidance based on a list of suggestions obtained from first responders. The SAFECOM Executive Committee—a steering group comprised of public safety officials from across the country—prioritizes the list of suggestions, but this prioritization has not been used to develop a plan. Instead, program officials have made ad hoc decisions regarding which suggestions to implement based on executive committee input, as well as the difficulty of implementation. While this approach incorporates a degree of prioritization from first responders, it does not provide the structure and traceability of a program plan.

Program officials have established six performance measures[23] to assess progress, including the percentage of fire, emergency medical services, and law enforcement organizations that have established informal interoperability agreements with other public safety organizations; the percentage of public safety agencies that report using interoperability to some degree in their operations; the percentage of states that have completed statewide interoperability plans; the percentage of grant programs for public safety communications that include SAFECOM guidance; and the amount of reduction in the cycle time for national interoperability standards development. However, several key aspects of

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[23]SAFECOM officials have recently added a sixth performance measure that is intended to measure "percent of federal agencies aligning to the SAFECOM program," however the measure does not reflect federal agency alignment to the SAFECOM program. Instead, it attempts to measure federal agencies' compliance with Project 25 standards.

the program are not being measured. For example, one of the program's goals is to increase the development and adoption of standards. However, the only associated performance measure is reduction in the cycle time for national interoperability standards development—not the extent to which adoption of standards has increased or whether interoperability is being facilitated. Also, in assessing the growth of interoperable communications capacity at local, tribal, and state public safety agencies, SAFECOM's measures—the percentage of states that have established informal interoperability agreements with other public safety organizations and the percentage of public safety agencies that report using interoperability to some degree in their operations —addresses only two of the five areas that SAFECOM has defined as key to improving interoperability (it does not assess improvements made in governance, technology, or training). Moreover, none of the program's measures assess the extent to which the first responder community finds the tools and assistance helpful or the effectiveness of program outreach initiatives. Consequently, measures of the effectiveness of the program and areas for improvement are not being collected and are not driving improvements in the program, contributing to its limited impact. According to SAFECOM officials, by mid-2007, they plan to establish a measure to assess customer satisfaction.

Until DHS develops and implements a program plan that includes goals focusing on improving interoperability among all levels of government, establishes performances measures that determine if key aspects of the SAFECOM program are being achieved, and assesses the extent to which the first responder community finds the tools and assistance helpful, the impact of its efforts to improve interoperable communications among federal, state, and local agencies will likely remain limited.

Recent Progress Has Been Made in Developing Interoperability Standards, but Early Implementation Has Had Unsatisfactory Results

Until recently, little progress had been made in developing Project 25 standards—a suite of national standards that are intended to enable interoperability among the communications products of different vendors. Although one of the eight major subsets of standards was defined in the project's first 4 years (from 1989 to 1993), from 1993 through 2005, no additional standards were completed that could be used by a vendor to develop elements of a Project 25 compliant system. To its credit, over the past 2 years, the private-sector coordinating body responsible for Project 25 has defined specifications for three additional subsets of standards. However, ambiguities in the published standards have led to incompatibilities among products made by different vendors, and no compliance testing has been conducted to ensure vendors' products are interoperable. Nevertheless, DHS has strongly encouraged state and local

agencies to use grant funding to purchase Project 25 radios, which are substantially more expensive than non-Project 25 radios. As a result, states and local agencies have purchased fewer, more expensive radios, which still may not be interoperable and thus may provide them with minimal additional benefits. Until DHS modifies its grant guidance to provide more flexibility in purchasing communications equipment, states and localities that purchase Project 25 equipment cannot be assured that their investments are likely to result in meaningful gains in interoperability.

Until Recently, Progress in Developing Interoperability Standards Had Been Slow

Initial development of Project 25 began over 15 years ago. It took 4 years, from 1989 to 1993, to develop the standards that comprised the first of eight interfaces, known as the common air interface. The common air interface is one of the most critical elements of Project 25, and, therefore, efforts to develop standards for this interface were initiated first. However, from 1993 through 2005, no additional standards were developed that could be used by a vendor to develop additional elements of a Project 25 compliant system.

Concerned about the slow development of Project 25 standards, the conference committee on the Consolidated Appropriations Act for fiscal year 2005,[24] encouraged NIST and the Department of Justice to work with SAFECOM to consider the issuance of interim standards for interoperable communication systems. According to NIST officials, they, along with their federal partners, have established a process for developing interim standards and plan to institute it if progress in the development of Project 25 standards is not sufficiently accelerated. Industry representatives and public safety practitioners responded to these events by increasing the pace and scope of their standards development activities. As a result of their efforts, in the past 2 years, significant progress has been made in defining three additional critical interfaces: the fixed station subsystem interface, the console subsystem interface, and the inter-RF subsystem interface. NIST officials indicated that the focus has been on these interfaces because they will add significant functionality to the overall set of Project 25 standards.

Table 4 shows the progress that has been made on each of the eight Project 25 interfaces as of August 2006. Figure 4 shows the relationships among these interfaces.

[24]H.R. Rep. No. 108-792, 108th Cong., 2d Sess. (2004) at 755.

Table 4: Status of Project 25 Interfaces

Interface	Description	Status	NIST projection for product availability[a]
Common air interface	Defines the wireless access between mobile and portable radios and between the portable and mobile radios and the fixed or base station radios.	This interface is considered the most mature of the eight interfaces; however, parts of it are currently being revised to clarify ambiguities. A full set of product compliance tests is not yet available.	Currently available.
Subscriber data peripheral interface	Characterizes the signaling for data transfer that must take place between radios and the data devices connected to the radios.	The interface is being redeveloped to align with other interfaces. In addition, there are no tests currently in place for this interface to test product compliance.	Limited availability of products that contain proprietary components.
Fixed station subsystem interface	Describes the signaling and messages between the radio frequency subsystem and the fixed/base station subsystem and between the console subsystem and the fixed/base station subsystem.	The initial version of standards has been developed for this interface; however, more work remains before this interface will be completed, such as developing compliance testing standards.	2007
Console subsystem interface	Defines the signaling between the radio frequency subsystem and the console subsystem.	The initial version of the standards is in the final stages of completion and is expected to be published in early 2007. Compliance testing standards are under development.	2007-2008
Network management interface	Allows administrators to control and monitor the network fault management and network performance management.	The interface is being redeveloped to align with other interfaces. In addition, there are no standards currently in place for this interface to test products for compliance.	To be determined.
Data network interface	Describes the radio frequency subsystem's connections to computers, data networks, external data sources, etc.	The interface is being redeveloped to align with other interfaces. In addition, there are no standards currently in place for this interface to test products for Project 25 compliance.	Limited availability of products that contain proprietary components.
Telephone interconnect interface	Allows users to connect through the public switched telephone network using their radios rather than cellular phones.	Standards have been developed for the interface; however, work remains before this interface will be completed, such as developing compliance testing standards.	To be determined.
Inter-RF subsystem interface	Allows users in one system to communicate with users in another system.	The initial version of this standard was published in mid 2006. Compliance testing standards are under development.	2007

Source: GAO analysis of NIST and TIA data.

[a]This information is based on NIST's working knowledge of Project 25 product lines. NIST has not performed a worldwide inventory of Project 25 products.

Figure 4: Project 25 Interfaces
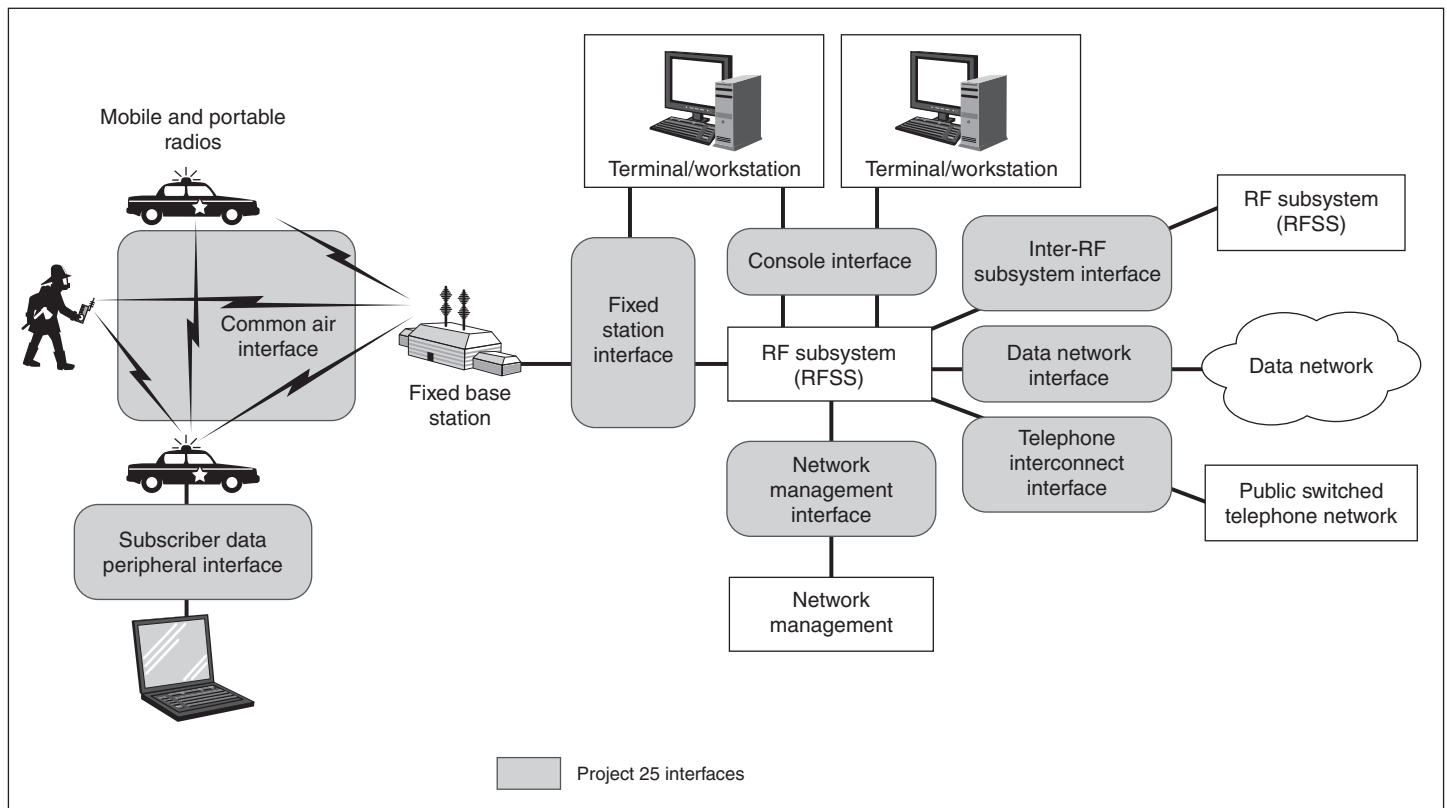
Sources: GAO analysis of TIA and NIST data.

Implementation of Systems Based on Incomplete Project 25 Standards Has Been Problematic

There are a number of obstacles hindering effective implementation of first responder communications systems based on Project 25 standards:

- *Standards are incomplete or not well-defined:* NIST officials have stated that key standards that have been defined for several of the eight interfaces have not been adequately specified, allowing vendors to develop products based on inconsistent interpretations. For example, Project 25 manufacturers have determined that the specifications for the conventional and trunked mode operations of the common air interface—which is considered to be the most mature of the eight interfaces—were vague and led to inconsistent interpretations. More specifically, between 2003 and 2005, NIST conducted interoperability tests on the conventional operations mode of six different manufacturers' radios and found that none of them passed all aspects of the tests. In addition, according to NIST officials, in 2005, a manufacturer conducted interoperability tests on the trunked operations mode of three manufacturers' radios and also found

that none of them passed the tests. More recently, in 2006, a manufacturer conducting interoperability tests found improvements in the consistency of other manufacturers' interpretations. However, according to NIST officials, ambiguities still need to be resolved in this interface. Additionally, many options available on radios are not specified in the standards, allowing vendors to address these capabilities with unique or proprietary technologies, which can cause interoperability problems. As a result, while recent tests have shown improvements, vendors have developed incompatible, proprietary products rather than interoperable, standards-based products.

- *Lack of compliance testing has limited product interoperability:* According to NIST officials, formal peer-review testing is necessary to ensure compliance with standards and interoperability among products. We have previously reported[25] that independent testing and evaluation of commercial products and accreditation of the laboratories that perform the test and evaluations can give agencies increased assurance that the products will perform as vendors claim. However, since 1995, Project 25 radios have been marketed to and purchased by federal, state, and local agencies without any formal compliance testing to validate vendors' claims of compliance with the Project 25 standards. As a result, recent testing has shown that products labeled "Project 25 compliant" do not necessarily interoperate.

- *State and local agencies do not know how to select Project 25 products:* With no formal compliance testing for Project 25 products, state and local agencies have limited means to determine if the products they purchase are compliant with the standards. Therefore, in absence of any other information, agencies have relied on information provided by vendors. Further, vendor products have many different levels of functionality, and agency officials may not understand their specific needs well enough to purchase equipment tailored to their specific requirements that does not include costly functionality that they do not need. However, comparative information about product functionality and typical first responder requirements is not currently in a centralized location, making it difficult for officials to be able to judge which products are most appropriate for their agency's needs. For example, according to one manufacturer, public works agencies and schools would likely need radios with less functionality, while firefighters would likely need a midrange radio with more features, and a command center or federal law enforcement agency

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[25]GAO, *Information Assurance: National Partnership Offers Benefits, but Faces Considerable Challenges*, GAO-06-392 (Washington, D.C.: Mar. 24, 2006).

might need the most expensive radios with the greatest number of features. Because of the complexity of product options, agencies may not always be making well-informed decisions on the purchase of radios.

- *Complete Project 25 systems can be prohibitively expensive:* Project 25 radios are significantly more expensive than conventional analog radios, and while state and local agencies are paying two to three times more for Project 25 radios, they are not always able to take advantage of the intended interoperability benefits because they cannot afford to procure complete systems. Project 25 radios for first responders can range in price from about $1,000 to about $5,000. Most Project 25 radios used by first responders cost around $2,500. According to officials, a conventional analog radio suitable for first responder work generally costs about two to three times less than Project 25 radios. Benefits of using Project 25 radios, such as interoperability among multiple vendors' equipment, cannot be fully realized until a complete Project 25 system (base stations, repeaters, and radios) is implemented. Fully replacing an existing radio system with a Project 25 system is very expensive. For example, Arlington County, Virginia—a relatively small county—is acquiring and implementing a full Project 25 environment for $16.8 million. Many localities do not have the funding to make such a large investment.

Nevertheless, since 2003, DHS has strongly encouraged state and local agencies to use grant funding from the agency to purchase Project 25 compliant equipment. DHS grant guidance—which was developed by SAFECOM—states that all new voice system purchases should be compatible with the Project 25 suite of standards to ensure that equipment or systems are capable of interoperating with other public safety land mobile equipment or systems. If a grant applicant is interested in purchasing non-Project 25 compliant equipment, the applicant must demonstrate in its application that the system or equipment being proposed will lead to enhanced interoperability.

While states and localities have purchased Project 25 radios at the direction of DHS, there is little indication that these radios have enhanced interoperability. Most jurisdictions we visited were not using the Project 25 capabilities, such as interoperating with different vendors' radios, since they had not fully replaced their existing radio communications infrastructure with a complete Project 25 system. Specifically, of the 11 localities we visited, 8 were buying Project 25 radios and, of these, 7 were not using the Project 25 capabilities of the radios. Thus, as a result of the DHS requirement to buy Project 25 equipment, agencies have purchased fewer, more expensive radios with little or no additional benefit to date.

Table 5 shows a sample of spending by localities on Project 25 radios and their use of the Project 25 capabilities.

Table 5: Sample Project 25 Radio Purchases

Locality	Number of Project 25 radios purchased	Amount spent on Project 25 radios	Average Price per radio	Using Project 25 capabilities
Lee County, Florida	2,056	$4,305,850	$2,094	No
Albany County, New York	91	$120,879	$1,328	No
Louisville, Kentucky	52	$234,099	$4,502	Yes
Jackson County, Oregon	169	$571,338	$3,380	No

Source: GAO analysis of localities' data.

Note: This table represents Project 25 radio purchases for which data was available and, therefore, may not include all Project 25 radio purchases by these localities.

Efforts Are Under Way to Mitigate Project 25 Problems

To address the lack of well-defined standards, users and manufacturers have been revising the standards for the conventional and trunked mode operations of the common air interface to clarify ambiguities. To address the issue of a lack of formal compliance testing, SAFECOM, NIST, and the Project 25 steering committee, began developing a peer compliance assessment program for Project 25 products in April 2005. This compliance assessment program is to use various vendors' approved laboratories[26] to test Project 25 systems through a set of agreed-upon tests that will validate that the systems from various vendors can successfully interoperate and meet conformance and performance requirements. According to NIST, the vendors will be expected to conduct the tests in compliance with a handbook on general testing procedures and requirements, which NIST is preparing to publish. The assessment program is to be implemented in three phases, as described in table 6.

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[26]NIST is developing a process for determining manufacturers' laboratories as being "approved."

GAO-07-301 First Responders

Table 6: Development Schedule for Project 25 Compliance Assessment Program

Stage	Description	Status
Stage I	NIST is to develop a formal laboratory approval process for manufacturers to conduct compliance testing and a process handbook. Conduct initial common air interface testing. NIST and its partners will develop an automated test software suite to facilitate Project 25 performance testing, which will be made available for use by test laboratories and manufacturers. Subscriber units and base stations will also be evaluated for performance.	NIST is working to finalize the formal laboratory approval process, and the process handbook. Parts of the trunked interoperability test standard for the common air interface are complete. Informal testing is expected to begin by March 2007. Formal testing is expected to being by mid-2007. The automated test software suite to facilitate Project 25 common air interface performance testing is expected to be available by early 2007. Other aspects of the trunked mode for the common air interface are being revised and, therefore, these aspects will not be tested until such revisions are made.
Stage II	Test procedures will be developed and executed that will demonstrate the interoperability of Project 25 radios in both trunked and conventional modes of operation.	Development and completion of remaining test procedures for the common air interface are contingent upon completion of revisions to parts of this interface. The conventional mode interoperability test standard is expected to be available in mid-2007.
Stage III	Development of test procedures for the other critical Project 25 interfaces.	Conformance test procedures are currently being developed for the inter-RF subsystem interface and the fixed station subsystem interface. Performance test procedures are currently being developed for the inter-RF subsystem interface and the console subsystem interface. In addition, the interoperability test standards for the inter-RF subsystem interface are in the initial stages of development.

Source: GAO analysis of NIST data.

Additionally, SAFECOM has issued guidance to supplement the 2007 DHS grant guidance stating that, beginning in fiscal year 2007, grant recipients purchasing Project 25 equipment must obtain documented evidence from the manufacturer that the equipment has been tested and passed all available compliance assessment test procedures for performance, conformance, and interoperability. The guidance also specifies the aspects of Project 25 equipment that are available for testing and that should be tested before a public safety agency acquires the equipment. However, as of January 2007, only limited aspects of the common air interface had been defined fully enough to conduct interoperability tests. Further, NIST's testing procedures handbook was not yet complete and thus vendors were unable to conduct testing. According to NIST officials, it has not been determined when the full set of conformance, performance, and interoperability tests for the common air interface will be available.

NIST and SAFECOM are also working on ways to help agencies make informed decisions when purchasing Project 25 radios to help them acquire features that are Project 25 compliant. Specifically, NIST and SAFECOM have developed a decision tree to help guide officials in selecting the appropriate Project 25 capabilities. NIST has also helped to develop a new process for posting test results online so that potential buyers can have ready access to this information.

While efforts are under way to address several of these issues, others remain. Specifically, DHS continues to strongly encourage state and local agencies to purchase Project 25 compliant equipment even though compliance testing is not yet available. Without flexibility to address their needs with equipment that is the most effective, economical, and meets defined interoperability requirements aligned with a statewide plan, states and localities that purchase Project 25 equipment cannot be assured that their investments are likely to result in meaningful gains in interoperability.

Conclusions

DHS grants, along with its technical assistance, have helped to make improvements on a variety of specific interoperability projects. However, in selected states, strategic planning has generally not been used to guide investments or provide assistance to improve communications interoperability across all levels of government. Specifically, not all states had plans in place to guide their investments toward long-term interoperability gains; no national plan was in place to coordinate investments across states; and while UASI officials stated that the technical assistance offered to them had been helpful, DHS curtailed full-scale exercises, limiting their value in measuring progress. Until DHS takes a more strategic approach to improving interoperable communications, such as including in its decision making an assessment of how grant requests align with statewide communications plans, and conducts a thorough assessment to identify strategies to mitigate obstacles between federal agencies and state and local agencies, states and localities are likely to make limited progress in improving interoperability. Additionally, until DHS plans another round of full-scale exercises that provide UASI areas with sufficient planning time, the robustness and effectiveness of UASI plans will be limited.

The SAFECOM program has had a limited impact on improving communications interoperability among federal, state, and local agencies. The program's limited effectiveness can be linked to poor program management practices, such as the lack of a plan for improving

interoperability across all levels of government, and inadequate performance measures to fully gauge the effectiveness of its tools and assistance. The recent establishment of the OEC creates an opportunity for DHS to improve program management practices among formerly separate component organizations, including SAFECOM. Without a program plan for SAFECOM and other OEC interoperability programs that specifically addresses improvements to interoperable communications from federal to state and local agencies, and includes measures to assess the usefulness of its efforts, the effectiveness of the program is likely to remain limited.

While development of a comprehensive suite of standards such as Project 25 is critical to achieving interoperability among different manufacturers' products, such a suite is not yet fully developed. Further, ambiguities in published standards have led to incompatibilities among products made by different vendors and, to date, no compliance testing has been conducted to ensure that vendors' products interoperate. Nevertheless, DHS has strongly encouraged state and local agencies to use grant funding to purchase Project 25 compliant equipment. Until DHS modifies its grant guidance to give states and localities the flexibility to address their communications equipment needs effectively, economically, and in a way that meets interoperability requirements as defined in their statewide plans, states and local agencies are likely to continue to purchase expensive equipment that provides them with minimal additional benefits.

Recommendations for Executive Action

To better ensure that progress is made in improving interoperable communications among federal, state, and local first responders, we recommend that the Secretary of Homeland Security take the following five actions:

- assess how states' grant requests support their statewide communications plans and include the assessment as a factor in making DHS grant allocation decisions;

- plan for new full-scale exercises for UASI areas that provides local officials with sufficient time to develop and implement exercises to validate the robustness and effectiveness of their tactical interoperable communications plans;

- develop and implement a program plan for SAFECOM and other OEC interoperability programs that includes goals focused on improving interoperability among all levels of government;

GAO-07-301 First Responders

- include in the program plan for SAFECOM and other OEC interoperability programs quantifiable performance measures that can be used to determine the extent to which each of the goals have been accomplished and that can be used to assess the effectiveness and usefulness of SAFECOM tools, assistance, and outreach, and make improvements based on the feedback; and

- modify grant guidance to provide more flexibility in purchasing communications equipment until standards for completed interfaces have been fully defined and products have been certified compliant.

Agency Comments and Our Evaluation

We received written comments from the Deputy Secretary of Commerce and the Director of the DHS liaison office for GAO and the Office of the Inspector General. Letters from these agencies are reprinted in appendixes III and IV. Commerce provided updated information and technical comments to help ensure the information in the report is accurately perceived. We have incorporated these comments as appropriate.

In its response to our five recommendations, DHS agreed with two, stated that it would defer commenting on two, and disagreed with one recommendation.

Regarding our recommendation that DHS develop and implement a program plan for SAFECOM and other Office of Emergency Communications (OEC) interoperability programs that includes goals focused on improving interoperability among all levels of government, the Director indicated that DHS agrees with the intent of the recommendation and stated that the department is currently working to develop a program plan.

However, DHS raised concern about the perceived implication that no action had been taken. It stated that SAFECOM has always had goals for improving interoperability among local, state, tribal, and federal emergency response agencies. Our review showed that while the program has had broad goals that include federal, as well as state and local agencies, its specific program goals and activities have not focused on improving interoperable communications between federal and other agencies. For example, one of the program's goals is to increase interoperable communications capacity of local, tribal, and state public safety agencies, not federal agencies. Thus, it will be important for DHS to develop and implement a program plan that includes goals focusing on improving interoperability among all levels of government.

DHS agreed with our recommendation to include quantifiable performance measures in the program plan for SAFECOM and other OEC interoperability programs. DHS indicated that it intends to establish such measures by the third quarter of 2007.

DHS stated that it is deferring comments on two recommendations: (1) assess how states' grant requests support their statewide communications plans and (2) plan for a new full-scale exercise for UASI areas to validate their interoperable communications plans.

DHS disagreed with our recommendation that it modify grant guidance to provide more flexibility in purchasing communications equipment until standards for completed interfaces have been fully defined and products have been certified compliant with all aspects of the standards. The Director stated that the recommendation would require SAFECOM to amend its interoperability grant guidance until after the entire Project 25 suite of standards is complete and could undermine remaining negotiations between the public safety community and equipment manufacturers. We agree that development of a comprehensive suite of standards such as Project 25 is critical to achieving interoperability among different manufacturers' products. We also agree that not all interfaces need to be fully defined before agencies can begin acquiring Project 25 products; thus we have clarified the recommendation to reflect this. However, we are not recommending that the public safety community be prohibited from acquiring Project 25 equipment, and thus we do not believe negotiations with equipment manufacturers would be undermined. Until critical interfaces are better defined and products have been certified compliant, DHS should allow state and local agencies the flexibility to purchase whatever products they can obtain that offer the best value and performance for their needs.

DHS also stated that it estimates that the Project 25 standards will be complete within the next 18 to 24 months, and stated that fiscal year 2007 grant funding will be spent by local public safety agencies not in fiscal year 2007 but in subsequent years. We have modified the discussion of this issue in the report to reflect this information. However, as previously stated, much additional work remains to be accomplished.

Additionally, DHS stated that our report should include other major programs that focus on interoperability among federal responders, such as the newly created Office of Emergency Communications within DHS, the Integrated Wireless Network, the Interoperable Communications Technical Assistance Program, and the Federal Partnership for

Interoperable Communications. However, our report does discuss the first three of these. The primary purpose of the Federal Partnership for Interoperable Communications is to serve as a coordinating body to address technical and operational activities within the federal wireless community; it has limited applicability to state and local interoperability.

Finally, DHS raised concern with our view that SAFECOM had mistakenly made local, tribal, and state emergency responders its highest priority. DHS stated that when SAFECOM was established as one of the electronic government initiatives, it was placed within the government-to-government portfolio. According to DHS, state and local government agencies are the primary customers of this portfolio. However, according to OMB, the goal of the government-to-government portfolio is to forge new partnerships among all levels of government, not just state and local. Additionally, as we have previously stated, when SAFECOM was initially established, one of its major goals was to achieve federal to state/local interoperability. However, it is no longer a goal for SAFECOM. DHS also stated that since 90 percent of the public safety infrastructure is owned, operated, and maintained by local jurisdictions, state and local interoperability is a higher priority. However, our review has shown that in major incidents such as a terrorist attack, a major hurricane, or wildland fire, federal, state, and local first responders will need to interoperate in order to respond effectively to the incident. Therefore, interoperability with federal first responders should be included as a key element in the department's strategy for improving interoperable communications throughout the nation.

DHS also provided technical comments, which we have incorporated as appropriate.

We are sending copies of this report to the Secretaries of Homeland Security and Commerce and other interested congressional committees and subcommittees. We also will make copies available to others upon request. In addition, the report will be available at no charge on the GAO Web site at http://www.gao.gov.

Should you or your staff have any questions on matters discussed in this report, please contact me at (202) 512-6240 or by e-mail at koontzl@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Key contributors to this report are listed in appendix V.

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Appendix I: Objectives, Scope, and Methodology

Our objectives were to determine (1) the extent to which the Department of Homeland Security (DHS) funding and technical assistance have helped to improve interoperable communications in selected states, (2) the progress the SAFECOM program has made in improving interoperable communications, and (3) the progress that has been made in the development and implementation of interoperable communications standards.

To determine the extent to which DHS funding and technical assistance helped to improve interoperable communication in these states, we reviewed documentation and interviewed state and local officials from selected states.

We selected four states as case studies, using the following criteria:

- All of the states must have received at least an average amount of funding from fiscal year 2003 through fiscal year 2005.

- One of the states must have received over $100 million of grant funding for interoperable communications from DHS.

- One of the states must have received assistance from SAFECOM in applying the Statewide Communications Interoperability Planning Methodology.

- One of the states must have had an Urban Area Security Initiative (UASI) area involved in DHS's RapidCom program.

- One of the states must border another country.

- At least one of the states must be one of the top 10 states that regularly faces wildland fires.

- At least one of the states must be one of the top states that regularly faces other large natural disasters, such as hurricanes or earthquakes.

We selected localities from each state to visit, which included (1) the UASI region which received the most funding from DHS, (2) the non-UASI county that received the largest amount of DHS funding, and (3) the county and city where the state capital is located.[1] From each of these

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[1]We were unable to meet with local officials from Florida's state capital region.

states and localities, we obtained and reviewed documentation such as
grant funding amounts, Tactical Interoperability Communication Plans,
exercise reports, and communication system documentation. We also met
with interoperability committee members and first responders.
Additionally, we obtained and analyzed documentation from, and met with
DHS officials who are responsible for monitoring the use of DHS funds in
each of these states.

To determine the progress SAFECOM has made in improving
interoperable communications, we reviewed SAFECOM documentation
such as its Statewide Communication Interoperability Planning
Methodology, Public Safety Architecture Framework, and Statement of
Requirements. We also analyzed program management documentation
(such as program goals, initiatives, and performance measures),
interviewed SAFECOM officials to discuss the progress of the program,
and interviewed state and local officials to determine their use of
SAFECOM tools and guidance. To obtain Federal Bureau of Investigation
(FBI) information, we relied on interviews conducted by another GAO
team.

To determine progress in developing and implementing interoperable
communications standards, we obtained and reviewed documentation
from National Institute of Standards and Technology (NIST) officials on
standards development such as status updates and recent testimonies.
Additionally, we reviewed documentation from states and localities to
determine the extent to which they are implementing Project 25 products
and spending on Project 25 products. We also met with officials from NIST
and representatives from communications equipment manufactures.

Because our objectives were focused on DHS efforts to improve
interoperable communications, we neither assessed programs in other
agencies, such as the Federal Communications Commission or the
National Telecommunications and Information Administration, nor
reviewed issues related to spectrum allocation.[2]

We performed our work in the Washington, D.C., metropolitan area;
Tallahassee, Fort Myer, and Miami, Florida; Louisville, Frankfort, and
Mount Sterling, Kentucky; Albany, Syracuse, and Brooklyn, New York; and

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[2]GAO-04-740.

Beaverton, Salem, and Medford, Oregon, from April 2006 to February 2007, in accordance with generally accepted government auditing standards.

Appendix II: First Responder Communications Systems within Selected States

There is wide variation in the frequencies (i.e., very high frequency (VHF) and ultra high frequency (UHF)) and radio technologies (i.e., digital, analog, conventional, and trunked) that are used among federal, state, and local agencies within each of the four states we reviewed. A summary of communications systems and interoperability initiatives in each of these four states follows.

Florida

There are over 150 radio systems in use within the state of Florida. To improve interoperability among these systems, Florida officials have developed several centralized solutions that are used throughout the state at all levels of government. Localities maintain their existing communications systems, relying on Florida's statewide systems only when they need to interoperate with another agency or jurisdiction. According to DHS, Florida has received approximately $55.7[1] million in DHS funding from fiscal year 2003 through fiscal year 2005 to improve interoperable communications.

Governance

Florida's centralized approach entails making funding decisions through a body (the Domestic Security Oversight Council) supported by a hierarchy of communications-related committees that includes local representation from each of the seven regions in the state. According to state officials, for the statewide interoperability solutions, Florida does not allocate DHS funding to local agencies; it takes on the responsibility of centrally purchasing equipment to ensure that all agencies and jurisdictions have equipment that is compatible. UASI grants are awarded directly to the UASI areas; therefore, Florida does not centrally manage those funds.

State Approach

To improve the interoperability among the 150 disparate communications systems throughout the state, Florida officials have developed the following several statewide solutions:

- In 2003, the Domestic Security Oversight Council and its supporting communication committees determined that it would not be economically feasible to replace all existing systems in the state with one new system. It therefore decided to develop a "backbone" system that could connect with

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[1]DHS's grant funding figures for interoperable communications includes funding from each of the relevant grant programs within the Office of Grants and Training, including the State Homeland Security Program and the UASI program.

each of the existing systems. This system, referred to as the Florida Interoperability Network, establishes network connections between federal, state, and local dispatch centers across the state (see fig. 5). It enables dispatchers to connect first responders on disparate radio systems and frequencies to allow them to directly communicate with one another. Existing independent systems are maintained. According to state officials, as of January 2007, first responders in 64 of Florida's 67 counties are able to have their communications patched to each other as needed via the network.

Figure 5: Illustration of Florida's Interoperability Network
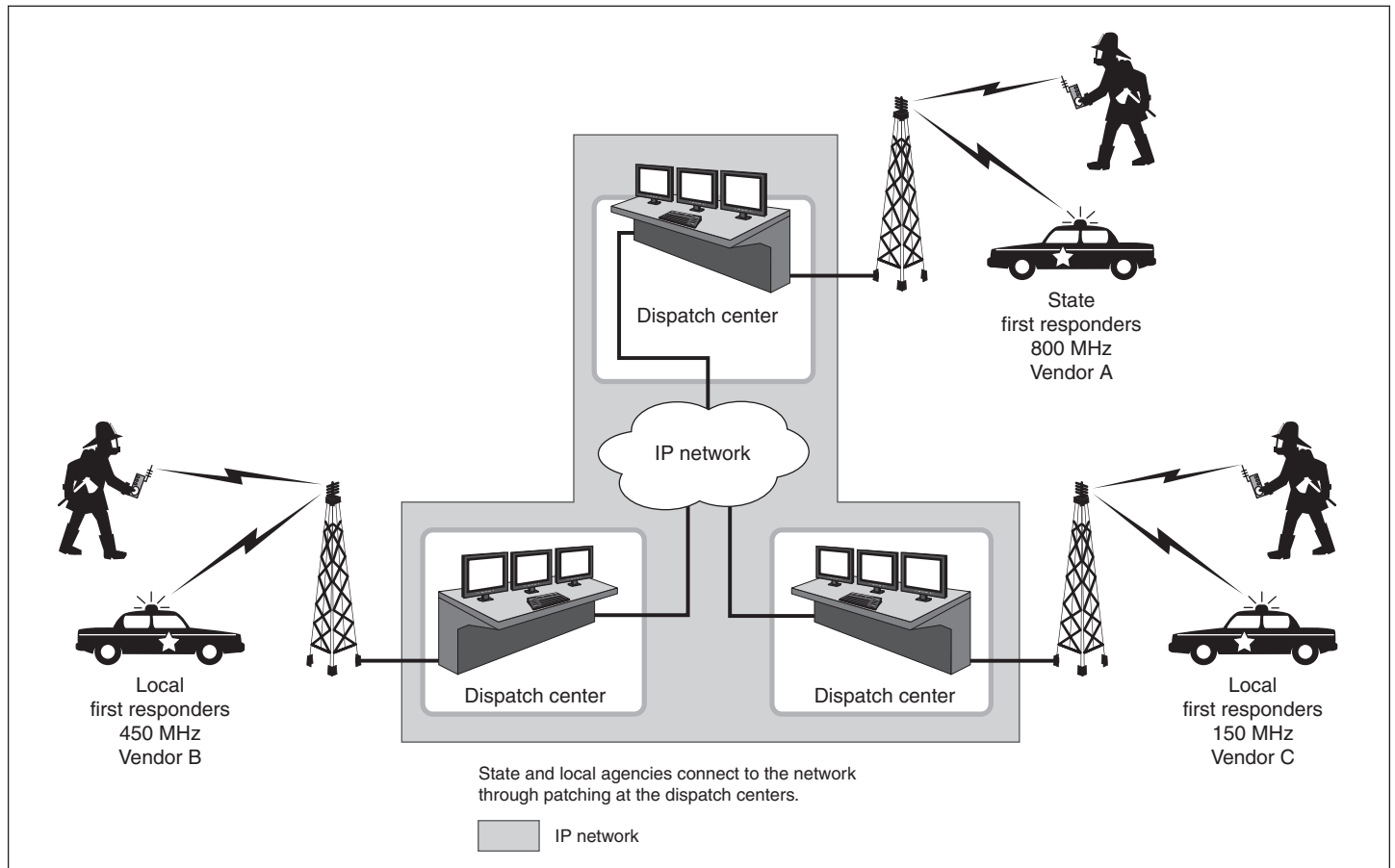
Source: GAO analysis based on Florida data.

Legend

IP=Internet Protocol

- As part of the Florida Interoperability Network, Florida officials are also working to establish additional mutual aid channels that are intended to provide radio service to first responders outside the range of their agency's local system or when they need to communicate with users not on their local systems. These channels are intended to expand geographic coverage to ensure that, wherever they go, Florida's first responders have radio communication capability. To this end, officials are adding 428 tower sites to the existing 93 sites across the state.

- Florida also acquired and implemented a radio communications system to serve law enforcement units of state agencies and to serve local public safety agencies through a mutual aid channel. The Statewide Law Enforcement Radio System provides state law enforcement officers with a shared digital, trunked radio system that serves over 6,500 users with 14,000 radios in patrol cars, boats, motorcycles, and aircraft.

- Florida's first federally funded project was the Emergency Deployable Interoperable Communications Systems. These are mobile systems that can be deployed to a specific response area to patch together disparate communications systems. According to state officials, these systems are generally used in one of the following situations: (1) to tie different radio systems together in an area that is not connected to the Florida Interoperability Network, (2) to connect different radio systems together if the network becomes inoperable, or (3) to tie disparate radios together when assisting in an out-of-state incident, such as Hurricane Katrina. Nine of these systems were purchased and deployed throughout the state.

- Florida has seven Mutual Aid Radio Communications units in the state, and officials are building an additional unit. The units are stand-alone mobile interoperable communications networks. Unlike Emergency Deployable Interoperable Communications Systems, Mutual Aid Radio Communications units include a cache of radios that can be distributed to first responders, a tower, and a mobile repeater system, so no patching needs to be done. These units are used when the local communications systems become inoperable, such as when a hurricane destroys the local communications infrastructure. The units provide temporary infrastructure for a response area to maintain communication during an incident.

Local Approach

Florida localities vary in their approaches and the level of interoperability within their regions. They utilize the statewide solutions to supplement their existing systems. For example, the 35 to 40 different radio systems throughout the Miami UASI area have limited direct interoperability. The

Miami region relies on patching mechanisms, including the Florida Interoperability Network, to provide interoperable communications when needed. In contrast, according to officials, government agencies within Lee County, with the exception of the school board, utilize the same communications systems and, therefore, are all directly interoperable. The level of interoperability with surrounding counties varies. When they need to communicate with neighboring jurisdictions or state first responders, they utilize the interoperability network.

Kentucky

While Kentucky first responders coordinate interoperability primarily by sharing frequencies and establishing patches, the state is establishing mutual aid channels to better enable responders on different frequencies to communicate through patches. According to DHS, from fiscal year 2003 through fiscal year 2005, Kentucky received $50 million from DHS for interoperable communications.

Governance

Kentucky's governance structure for interoperable communications is organized centrally at the state level through the Kentucky Wireless Interoperability Executive Committee. To ensure that the committee has an awareness of initiatives across the state, all state agencies and local government entities must present project plans for primary wireless public safety voice or data communications systems for review and recommendation by the committee, even if no state or federal funding is used for the system. While the committee only has the authority to decline or approve projects funded with state or federal dollars, a large majority of local projects are financed through state or federal funding.

State Approach

Kentucky's strategy to improve interoperable communications in the near term is to utilize statewide mutual aid channels that allow agencies on different communication systems to tune into a dedicated frequency shared among one or more public safety agencies. Kentucky also plans to implement communications bridges to patch different systems together.

The mutual aid approach requires the deployment of three channels, one for each frequency band that Kentucky public safety agencies currently use. Currently, approximately 34 percent of applicable agencies have signed a memorandum of understanding to commit to using the mutual aid channels. Other agencies that have not yet signed a memorandum are also utilizing the channels.

Kentucky officials are also in the process of implementing a
console-to-console bridge solution that will allow dispatchers to patch
users on one frequency to users on another frequency (see fig. 6). For
example, a first responder using a lower frequency who needs to talk to a
first responder using a higher frequency would contact the Kentucky State
Police dispatch center to request a patch. The dispatcher would then use a
patching mechanism to patch the two channels so that the responders
could talk directly to each other. The solution is operational in two of the
three frequency bands and is nearing completion in the third.

Figure 6: Console-to-Console Bridge Solution
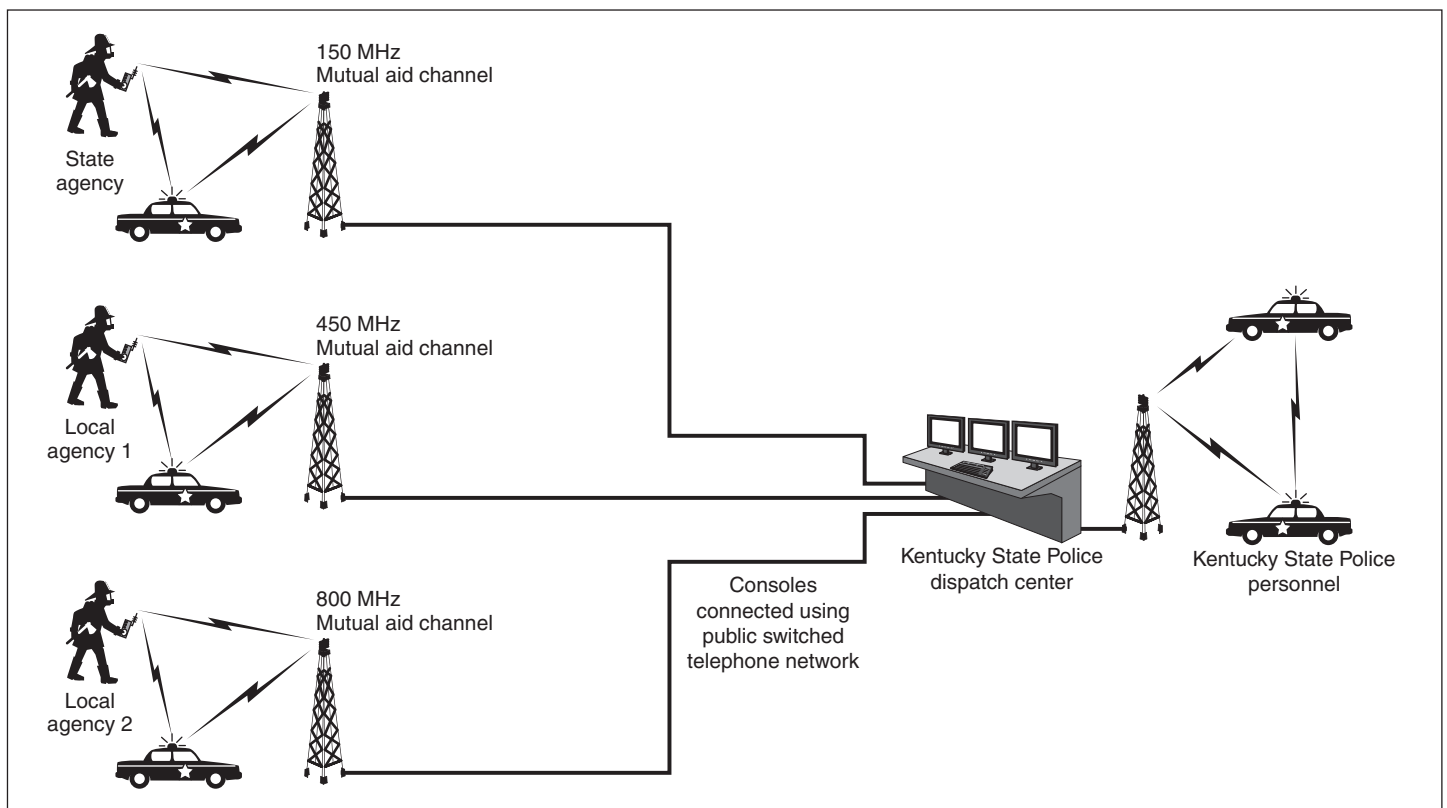
Source: GAO analysis based on Kentucky data.

To supplement voice communications interoperability, Kentucky has
implemented a wireless data communications interoperability solution as
well. This solution provides functionality such as records management,
real-time crime coverage, real-time data collection, and instant messaging.
The system consists of approximately 165 base stations throughout the

state to supply continuous wireless coverage in most regions. First responders use mobile data terminals to communicate with each other and, in many cases, retrieve information from their agency's database. Kentucky's mobile data network currently has coverage across approximately 95 percent of the state's primary and secondary road systems.

In the long term, the state officials intend to build a statewide public safety communications and interoperability infrastructure. They are in the process of completing a statewide baseline communications study as an initial step in the planning phase. No further specific initiatives and milestones have yet been identified for this project.

Local Approach

Interoperability is typically coordinated at the city and county levels. In the jurisdictions we visited, interoperability solutions included planning in advance to program other frequencies into radios, establishing patches through disparate communication systems through a dispatch center, and swapping radios.

- In Louisville, Kentucky, both UHF and VHF systems are in use and, when necessary, connected through patching mechanisms. Many responders carry both a UHF and VHF radio in their vehicles. For major incidents, a mobile vehicle with a repeater system can be deployed to connect first responders. In addition, since 2000, Louisville has been utilizing a wireless data communications interoperability solution that includes 550 first responders in the Louisville metropolitan area.

- All local agencies within Franklin County use VHF systems; first responders program each others' channels into their radios. Frankfort and Franklin County use mutual aid channels when needed. First responders have difficulty connecting to the Kentucky State Police, as that agency recently switched to a digital, trunked communications system. Currently, to connect to the state police, Frankfort and Franklin police contact a dispatch center and request a patch to Kentucky State Police.

- Montgomery County agencies use both UHF and VHF systems. First responders within the county and in neighboring counties typically program each others' channels into their radios. Communication with state agencies varies, for example, fire and EMS agencies in Montgomery County cannot communicate with their state counterparts at present, whereas local police can communicate with the state police through mutual aid channels, or in instances in which they have interoperable radios.

New York

New York is currently in the process of implementing a statewide system that will connect all state agencies and offer connection services to local agencies. This initiative is being funded by the state. Localities continue to develop and maintain their own communication systems and interoperability solutions. According to DHS, from fiscal year 2003 through fiscal year 2005, New York State has received $145.5 million in grant funding for interoperable communications.
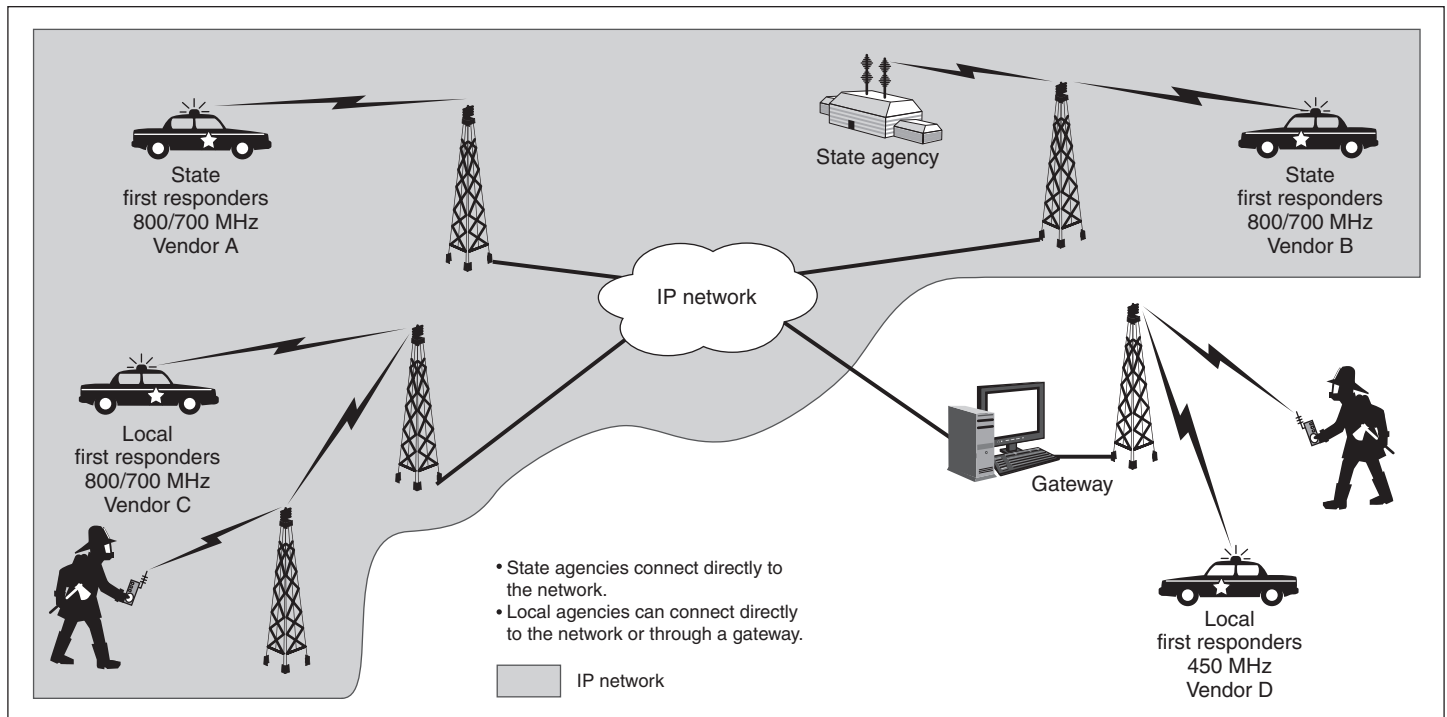
Governance

New York has established a Statewide Interoperability Executive Committee that is currently working to establish a state interoperability plan. In addition, there are several different groups throughout New York that are involved with interoperability at the state and local level. According to state officials, the governance structure limits the state's ability to mandate requirements to local governments; therefore, individual counties and cities determine their own interoperability requirements and have their own governance structure in place for interoperable communications. The state, however, determines priority investments and the localities must spend grant money on these priority investments. Interoperable communications was a priority investment for both grants for fiscal year 2006.

State Approach

The state is currently in the process of deploying a Statewide Wireless Network intended to provide an integrated mobile radio communications network that links all state agencies and would be available to connect participating local agencies (see figure 7). It will be a digital, trunked radio system with both voice and data capabilities and will be used in day-to-day operations, as well as large scale emergency situations. The network is to interconnect radio sites across the state through a "backbone network" based on Internet Protocol (IP). The network is to operate on the 700 and 800 MHz frequencies, as well as VHF frequencies in geographically challenging terrain, such as the Adirondack and Catskill Mountains. Users operating on other frequencies and with less advanced technology can be connected to the network through a gateway.

Figure 7: The New York Statewide Wireless Network

State
first responders
800/700 MHz
Vendor A

State agency

State
first responders
800/700 MHz
Vendor B

IP network

Local
first responders
800/700 MHz
Vendor C

Gateway

Local
first responders
450 MHz
Vendor D

• State agencies connect directly to
  the network.
• Local agencies can connect directly
  to the network or through a gateway.

IP network

Source: GAO analysis based on New York data.

State agencies are required to be a part of the Statewide Wireless Network, but local agencies may join on a volunteer basis. As previously mentioned, according to state officials, they are limited in their ability to require local agencies to utilize the network. Local agencies will have the following three different interoperability options:

- *Full system partnership:* the state will provide the base infrastructure such as radio towers, and the agency will purchase IP-addressable, digital, trunked radios, as well as any additional repeaters to operate on the network.

- *Interface/gateway partnership:* allows local agencies to maintain their own separate network and provides a connecting gateway between a local agency's dispatch console and the network.

- *Shared communication system infrastructure:* states and localities both use the same towers for their separate systems, but there is no mechanism

for patching communications between the state and local systems.

New York is implementing the Statewide Wireless Network in several phases and expects full implementation to be completed in September 2010.

Even though joining this state network is free, localities need to buy digital, trunked, and IP-addressable radios to participate directly, and additional infrastructure such as repeaters to get complete coverage in urban areas and buildings.

Local Approach

Throughout the state of New York, many different communications systems exist. Each area has developed its own methods aimed at improving interoperability. Additionally, localities generally do not include the Statewide Wireless Network as part of their local approach to improving interoperable communications. As of December 2006, one agency in New York City and only 7 of the 62 counties in New York have partnered with the network to be full system users. Twenty-five counties have agreed to connect through a gateway.

- In the New York City UASI area, the police department maintains six channels for citywide interoperability. Any agency can use these channels by signing a memorandum of understanding and ensuring that they meet the necessary technical requirements. Additional interoperability strategies used by the New York City UASI include using a federal interoperability channel and utilizing and deploying mobile patching devices to connect disparate systems at an incident site. In addition, New York City is working to develop the City-wide Mobile Wireless Network, which is intended to provide police and fire first responders with high-speed data access to support large file transfers, including federal and state anticrime and antiterrorism databases, fingerprints, and maps. Further, the city has implemented a regional wide-area interoperability system that is New York City's primary interoperability network for first responders in the city. It is currently being expanded to include first responders in Nassau, Suffolk, and Westchester Counties, and parts of New Jersey.

- Agencies in Albany County typically interoperate by programming the frequencies of other agencies into their radios, including agencies in neighboring counties. The county also has a patching mechanism that can connect different radio networks during an emergency. To improve its interoperability and connect the county to neighboring counties, Albany County is currently in the process of developing a countywide system.

This system will use gateways to connect existing systems that operate on different frequency bands and allow all public safety responders within the county to communicate with any other responder in Albany County regardless of the radio system or technology used. Albany is also currently developing a fiber optic system that will connect all 12 Public Safety Access Points in the county.

- Onondaga County relies on dispatchers to connect first responders. All dispatching for Onondaga County is centralized at the county's 911 call center. To improve its interoperability, Onondaga County is currently working to implement a countywide digital system that will connect all county agencies.

Oregon

Oregon is currently in the process of planning a statewide system to connect all state agencies and provide a means for local agencies to be patched to users on the statewide system. Localities continue to develop and maintain their own communication systems and interoperability solutions. According to DHS, Oregon has received $53.4 million from fiscal year 2003 through fiscal year 2005 in grant funding to improve interoperable communications.

Governance

Oregon has a State Interoperability Executive Council to centrally manage Oregon's interoperable communications. This body is composed of state and local representatives. This committee requires that each county prepare a communications plan. Additionally, the committee is in the process of developing a statewide interoperable communications plan that incorporates all the county plans.

State Approach

Most state agencies are currently using VHF and UHF analog, conventional radio systems, which are in some cases 30 years old and in need of major repairs and upgrades. Oregon state agencies experience significant coverage gaps in their existing communications systems due to a lack of transmission towers. Additionally, these state systems are not always interoperable with federal or local systems.
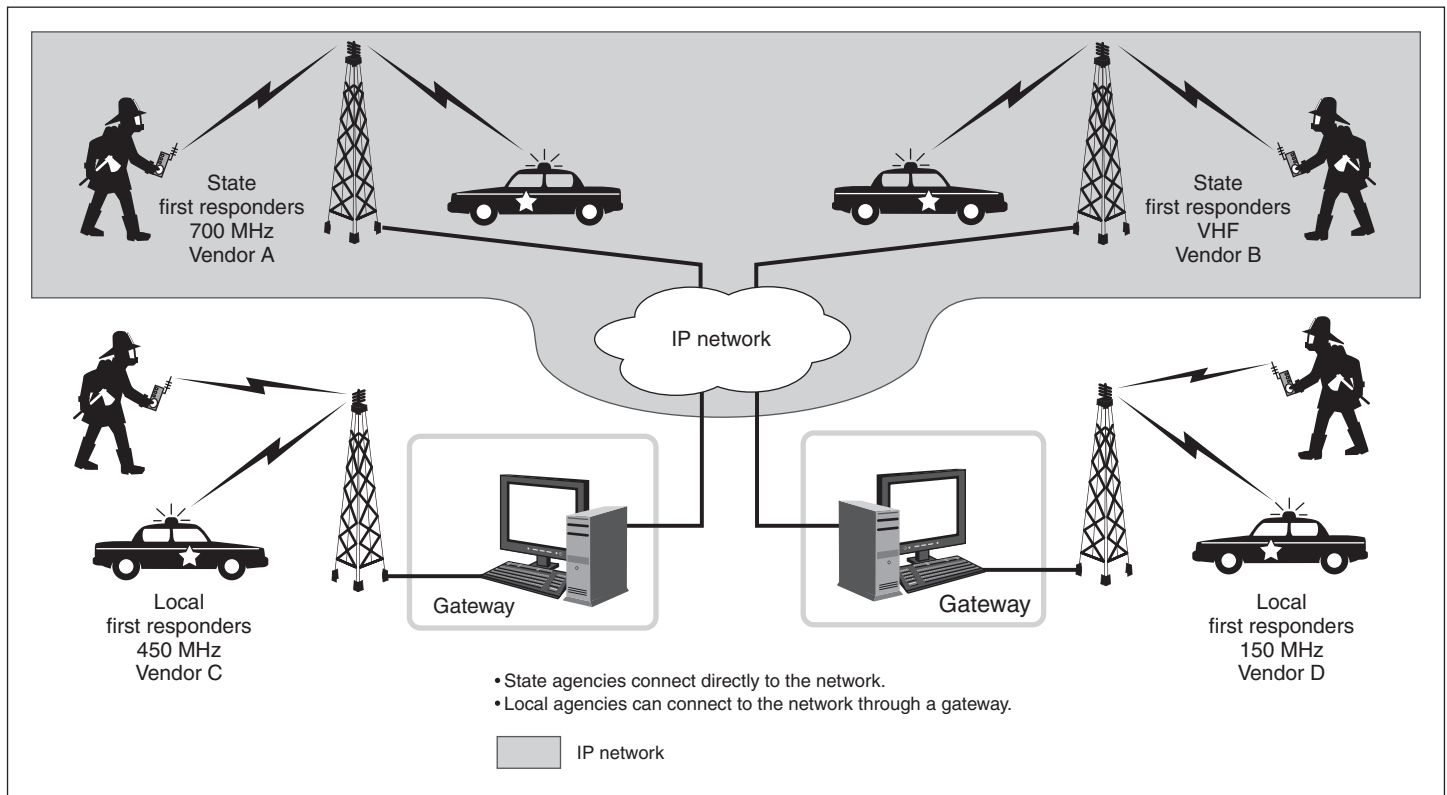
In the absence of shared radio systems among federal, state, and local first responder agencies, Oregon's state agencies use various alternative approaches to establish interoperable communications with agencies they work with on a regular basis, such as using a dispatcher or patching

devices to establish connections between disparate radio systems, and lending radios to first responders from other agencies.

Due to the deteriorating status of the Oregon's state agencies' communication systems, State Interoperability Executive Council officials have been working with contractors to develop a concept for a new state system. The Oregon Wireless Interoperability Network is to be a Project 25, trunked, digital radio network that will rely on an IP interface to interoperate with state agencies' subsystems. Plans for the interoperability network are to allow the majority of state agencies to operate on a unified trunked system while supporting conventional operations where and when required. These officials plan to issue a contract to a vendor by October 2007 and implement the first phase of the network by October 2009.

The Oregon Wireless Interoperability Network is intended to be the primary system for state agencies; local agencies will be expected to maintain their existing systems as their primary systems and use the network as their secondary system. A patching mechanism would be established to allow local agencies to be connected to state agencies, as well as allow them to be connected to other local agencies that they do not already have interoperability. Figure 8 is a depiction of the interoperability network concept as currently envisioned.

Figure 8: Oregon Wireless Interoperability Network System Overview

State
first responders
700 MHz
Vendor A

State
first responders
VHF
Vendor B

IP network

Local
first responders
450 MHz
Vendor C

Gateway

Gateway

Local
first responders
150 MHz
Vendor D

• State agencies connect directly to the network.
• Local agencies can connect to the network through a gateway.

IP network

Source: GAO analysis based on Oregon data.

Local Approach

Local agencies use a wide range of radio frequencies and communication technologies and have various strategies and solutions to improving interoperability. In particular, Marion County uses analog UHF and VHF systems; and trunked, as well as conventional radios. Officials stated that they have limited interoperability with state and federal agencies and that they, therefore, maintain a cache of 30 radios available to share, when needed. Additionally, they can use a mobile command unit that can be deployed to any area and contains another cache of radios.

In the Portland UASI, four of the five counties use 800 MHz, analog, trunked radio systems that provide direct interoperability among those four counties. The fifth county is on a separate VHF system. They have installed equipment to improve the interoperability with this fifth county. Additionally, to provide interoperability with the fifth county and other agencies outside the UASI area, the officials use mechanisms such as a mobile trailer to patch calls and loan radios from its cache of radios.

Jackson County agencies generally use conventional, VHF, analog radio systems. Officials indicated that although two of the cities within the county are digitally capable, their first responders use the analog mode due to the fact that many of their neighboring jurisdictions do not have digital radios. In order to interoperate with jurisdictions on different systems, they use common radio channels, patching mechanisms, as well as a mobile command vehicle that is equipped with a cache of radios in different frequencies and a patching device. In addition, Jackson County and Josephine County are developing a communications system that connects the two counties.

Appendix III: Comments from the Department of Commerce

THE DEPUTY SECRETARY OF COMMERCE
Washington, D.C. 20230

March 15, 2007

Ms. Linda Koontz
Director
Information Management Issues
U.S. Government Accountability Office
Washington, D.C. 20548

Dear Ms. Koontz:

Thank you for providing a copy of the GAO's draft report entitled "FIRST RESPONDERS: Much Work Remains to Improve Communications Interoperability" (GAO-07-301).

I commend you on the comprehensive nature of your report. The Department of Commerce takes its role in improving the technology that supports all first responders very seriously. In light of this, I enclose comments that will assist you in clearly interpreting the information provided by the National Institute of Standards and Technology and the National Telecommunication and Information Administration. These comments include specific concerns that could lead to an inaccurate perception of the current state of interoperability.

Again, thank you for the opportunity to review the draft report. I applaud your efforts to improve programs supporting our Nation's first responders.

Sincerely,

David A. Sampson

Enclosure

Appendix IV: Comments from the Department of Homeland Security

Homeland
Security

March 22, 2007

Ms. Linda D. Koontz
Director, Information Management Issues
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Dear Ms. Koontz:

RE: Draft Report GAO-07-301, First Responders: Much Work Remains to Improve Communications Interoperability (GAO Job Code 310756)

The Department of Homeland Security (DHS) appreciates the opportunity to review and comment on the draft report referenced above. The Government Accountability Office (GAO) makes five recommendations. We agree with two recommendations, disagree with one recommendation, and will take two others under advisement.

We agree that a great deal of work remains before our Nation's emergency responders have seamless communications interoperability. However, there are several areas in the report that need to be corrected in order to provide an accurate picture of the current state of efforts to improve interoperability. We have provided specific lengthy comments with examples about inaccurate statements in the draft report as technical comments under separate cover and they are incorporated by reference. We highlight some of the comments herein.

GAO recommends that the Secretary of Homeland Security (1) assess how states' grant requests support their statewide communications plans and include the assessment as a factor in making DHS grant allocation decisions and (2) plan for a new full-scale exercise for UASI [Urban Area Security Initiative] areas that provides local officials with sufficient time to develop and implement exercises to validate the robustness and effectiveness of their tactical interoperable communications plans.

We will take these recommendations under advisement. Officials in what is now known as our Preparedness Directorate will comment on these recommendations when we provide a sixty day response to the recommendations following issuance of your report. Aspects of communications interoperability will transfer at the end of the month to the National Protection and Programs Directorate (NPPD) [now called the Preparedness Directorate]. Other changes at the Department include standing up the Office of Emergency Communication within NPPD's Cyber Security and Telecommunications. Programmatic elements of SAFECOM will be included in the Office of Emergency Communications.

GAO also recommends that DHS develop and implement a program plan for SAFECOM and other Office of Emergency Communications (OEC) interoperability programs that include goals focused on improving interoperability among all levels of government. We agree with the intent of the recommendation and have been addressing it. We disagree with the implication that action has not been taken. The program plan for SAFECOM is in development as the program transitions from Science and Technology's Office for Interoperability and Compatibility to the Office of Emergency Communications.

SAFECOM has always had goals for improving interoperability among local, state, tribal, and Federal emergency response agencies. SAFECOM, with support from OMB, adopted a strategy based on user needs and driven from the bottom-up to meet its mission as an E-Government project. Our technical comments include a list of SAFECOM metrics/goals.

SAFECOM heavily relies on input from local, state, and Federal emergency response practitioners. It has developed forums where practitioners can define and implement interoperable solutions, including its Executive Committee and Emergency Response Council. Among the Federal participants on these working groups are representatives from the Department of Justice, the Department of Agriculture, the Department of Energy, the Department of Interior, the Department of Defense, the Department of Commerce, the Department of Health and Human Services, the Environmental Protection Agency, the Federal Communications Commission, as well as multiple other offices within DHS. In addition, the Federal Partnership for Interoperable Communications (FPIC) seeks to improve interoperability at the Federal level. All FPIC member agencies have aligned to the SAFECOM program. Alignment is defined as being in compliance with the P25 standards, a suite of eight standards for the manufacturing of interoperable, digital, two-way wireless communications products.

In your fourth recommendation, you state that the DHS include in the program plan for SAFECOM and other OEC interoperability programs quantifiable performance measures that can be used to determine the extent to which each of the goals have been accomplished, and that can be used to assess the effectiveness and usefulness of SAFECOM tools, assistance, and outreach, and make improvements based on the feedback.

We agree with the recommendation. In addition to the current performance measures that SAFECOM reports to OMB, DHS agrees that it is important to establish performance measures that can be used to determine the extent to which each of the SAFECOM goals have been accomplished. To this end, DHS officials intend to establish quantifiable performance measures that can be used to determine the extent of accomplishment. The goals should be established by the third quarter of 2007.

We agree that it is important to not only produce tools that aid the emergency response community in achieving greater interoperability, but also to evaluate the efficacy of those tools. Once finalized and implemented, the performance measures will provide feedback that will influence the development of future tools in order to better serve the program's mission and accomplish its goals. Performance measures and methods of collecting data

will be consistent with DHS and Federal regulations. Further, they will be based on best practices from the public and private sectors on measuring the efficacy of free publications.

Fifth, and finally, GAO recommends that the Secretary modify grant guidance to provide more flexibility in purchasing communications equipment until standards for completed interfaces have been fully defined and products have been certified compliant with all aspects of the standards. The recommendation suggests that grant guidance requirements related to Project 25 (P25) standards be diluted or expunged until P25 standards are complete. We disagree with the recommendation as it would require that SAFECOM amend its interoperability grant guidance by removing language that encourages grant recipients to purchase P25-compliant equipment until after the entire P25 suite of standards is complete. P25 represents the foundation for near-term communications interoperability and can be completed in the next 18 months if all parties are committed.

The recommendation discounts tremendous recent progress with P25, and could undermine the final remaining negotiations between the public safety community and equipment manufacturers. Our Science and Technology Directorate's Command, Control and Interoperability Division officials know from the National Interoperability Baseline Survey that 40 percent of agencies intend to procure new systems within the next five years. Muting the P25 language would remove all incentives for manufacturers to participate in completing the P25 standards. It would also ensure that tens of thousands of communities would invest Federal "interoperability" funds in proprietary systems that will never be interoperable. Indeed, one of the most frequent requests by public safety officials is for standards and comprehensive guidance.

The GAO draft report also implies that FY 2007 Homeland Security grant dollars received by applicants will be spent by local public safety agencies in FY 2007, but that is unlikely. States typically receive grant funds by the end of the fiscal year for which funding has been appropriated. This means these funds will be allocated to localities and drive requests for proposals through FY 2009. Therefore, the grant guidance serves as additional pressure on the P25 standard stakeholders to complete the standard in the next 18 to 24 months. However, even if the P25 committee fails to reach its final goal in the 18-to-24 month timeframe, new P25 features are being manufactured as they are ratified, which continually increases the capacity for interoperability among users.

GAO maintains that compliance assessment cannot begin until P25 standards development is complete. However, fully completed standards are not required for initial compliance assessments. In fact, the existing compliance assessment criteria was modeled after a highly successful compliance assessment effort conducted by the Army which resulted in manufacturers re-tooling their equipment to be as interoperable as promised. Standards development and compliance assessment have been successfully moving in parallel with each other, each influencing and refining the other for the benefit of all parties involved. More importantly, technology will continue to evolve, requiring continuous updating of the standards. Waiting for a "final" standard would prohibit any standards from ever being applied.

In addition, there are two particular areas of concern in the draft report that we urge GAO
to address before the report is finalized and submitted to Congress:

1. The need to include information on several additional agencies and programs
   charged with improving Federal interoperability.

2. The need to clarify SAFECOM's strategy of addressing the interoperable
   communications needs of local, tribal, and state interoperability ahead of Federal
   responders.

The GAO report examined some communications interoperability programs, omitting
critical activities being conducted by other major programs, particularly other programs
focused on interoperability among Federal responders. These agencies include the newly
created Office of Emergency Communications within DHS; the Integrated Wireless
Network; the Interoperable Communications Technical Assistance Program; and the
Federal Partnership for Interoperable Communications. A complete list of agencies
involved with interoperable communications is included in our technical comments.

Under law, SAFECOM has a role in Federal interoperable communications and is
meeting its requirement in three ways:

1. SAFECOM guidance to states requires the integration of Federal responders into
   their statewide interoperable communications plans.

2. SAFECOM's Executive Committee and Emergency Response Council includes
   representatives from the Department of Justice, the Department of Agriculture,
   the Department of Energy, the Department of Interior, the Department of Defense,
   the Department of Commerce, the Department of Health and Human Services, the
   Environmental Protection Agency, the Federal Communications Commission, as
   well as multiple offices within the Department of Homeland Security.

3. SAFECOM is a member and a regular participant in the FPIC. The FPIC consists
   of 44 Federal entities representing more than 200 participants. The report appears
   to recommend that SAFECOM should create or maintain a redundant
   functionality to compete with FPIC activities. SAFECOM does not believe that
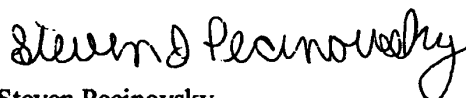   creating more interoperability programs will result in more interoperability.

By examining these other entities and the significant work they have accomplished, your
report could offer a more complete picture of Federal efforts to improve interoperability.

The second major issue is GAO's view that SAFECOM has mistakenly made local,
tribal, and state emergency responders its highest priority. In 2001 the President created
the SAFECOM program under the Government to Government (G2G) customer segment
as part of the Presidential E-Government strategy. State and local governments were the
primary customer of the G2G customer segment, and are therefore SAFECOM's primary
focus. SAFECOM also maintains that since ninety percent of the public safety
infrastructure is owned, operated, and maintained by local jurisdictions, the Federal
Government can have the greatest impact working with local, tribal, and state emergency

responders, and by integrating those efforts with Federal plans—not by making local and state interoperability secondary to Federal requirements.

In every incident, it is a virtual certainty that a local, tribal, or state emergency responder will be the first to arrive on the scene. If interoperability does not occur at that level, then no amount of Federal interoperability will be able to compensate. Federal responders will be there to act primarily as support when possible. For this reason, SAFECOM continues to maintain that its prioritization of local, tribal, and state emergency responders is the most appropriate course of action. The draft report gives the impression that SAFECOM is targeting the wrong population despite its Presidential E-government mandate.

Sincerely,

Steven Pecinovsky
Director
Departmental GAO/OIG Liaison Office

Appendix V: GAO Contact and Staff Acknowledgments

GAO Contact

Linda Koontz, (202) 512-6240, koontzl@gao.gov

Staff Acknowledgments

In addition to the individual named above, John de Ferrari, Assistant Director; Neil Doherty; Richard Hung; Tom Mills; Shannin O'Neill; Karen Talley; Amos Tevelow; and Jayne Wilson made major contributions to this report.