



Saving Lives and Property Through Improved Interoperability

*Las Vegas, Nevada
Post-Symposium Support Report*

FINAL

December 2001

FOREWORD

The Las Vegas, Nevada, Public Safety Wireless Network (PSWN) Program Symposium began October 23, 2001, and concluded October 25, 2001. Booz Allen Hamilton fulfilled all of the general symposium and facility requirements and ensured that all attendees were registered on site, monitored sign-in, and distributed preconference materials. Booz Allen also assisted with overall presentation support, including managing each speaker's time. All PSWN Program equipment and the remaining symposium materials were transported back to the PSWN Program Technical Resource Center (TRC) after the symposium. This document describes the key themes discussed during the symposium and includes the final attendance list. The final report will be posted on the Web site. Interested parties can download the report or call 1-800-565-PSWN and request a copy of the document.

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1. INTRODUCTION

The Public Safety Wireless Network (PSWN) Program sponsored the Las Vegas, Nevada, PSWN Program Symposium from October 23, 2001, through October 25, 2001. The symposium was hosted by the Nevada Highway Patrol. Previously, the PSWN Program sponsored similar symposiums in Charlotte, North Carolina; Harrisburg, Pennsylvania; Sacramento, California; Boston, Massachusetts; Chicago, Illinois; Mesa, Arizona; Denver, Colorado; Lansing, Michigan; Orlando, Florida; St. Louis, Missouri; Honolulu, Hawaii; Boise, Idaho; and Minneapolis, Minnesota; and two mini-symposiums in Washington, DC, and Annapolis, Maryland. The purpose of these events has been to discuss issues related to the interoperability of public safety communications and public safety shared systems.

At the Las Vegas Symposium, 166 public safety officials from around the country assembled to discuss various topics relating to public safety wireless communications interoperability. Captain Chris Perry of the Nevada Highway Patrol and Sheriff Jerry Keller of the Las Vegas Metropolitan Police Department provided introductory remarks and the keynote address.

Sheriff Keller stated that one of the issues discussed at police roll call meetings was communications. He said that we were all aware that the key issue facing police departments today was communications—the criminals did not care about jurisdictions. He said that to address this issue, public safety would have to link together not only at street level but at technical levels. Key factors in achieving interoperability he saw included establishing strategic partnerships and ensuring that public safety responders are adequately prepared. The public safety community must work with land mobile radio vendors to develop equipment that could interoperate. Public safety must be innovative and strategic—he pointed out that many states were developing public/private partnerships. He stated that working together, we could make a difference.

During his comments, he acknowledged the importance of regional cooperation, national awareness, and interoperability as essential for life and safety. Additionally, the sheriff advised attendees to work together, share experiences, and take away newfound knowledge in hopes of improving interoperability in Nevada.

Following the keynote remarks, attendees were briefed on the PSWN Program and its overall goals and objectives. Attendees then discussed the key technical and policy issues critical to improving wireless interoperability and were able to question public safety state representatives about the current state of their respective systems' development.

1.1 Purpose

This report provides a detailed summary of the events of the Las Vegas, Nevada, PSWN Program Symposium. It is designed to be a historical resource for those who attended the symposium and to provide a broad overview for those who were unable to attend. In general, this symposium report highlights—

- Key themes that the presentations and panels supported during various portions of the symposium
- Interoperability challenges and success stories that were discussed throughout the symposium
- Important facts and information that were provided to the audience
- Answers to questions of interest that were asked during the symposium.

The document is organized according to the major topic areas presented at the symposium. Within each section, the key themes that emerged from consideration of a specific topic are provided and thoroughly explained using information presented during briefings and the answers to questions asked during presentations.

2. SYMPOSIUM TOPICS

The Las Vegas, Nevada, Symposium was organized into three days of topic areas. The key topic areas included presentations from various speakers, ranging from members of the public safety community to PSWN Program representatives. The topics were selected to give the symposium attendees a perspective on the PSWN Program and the state of interoperability at all levels of government. The topics covered are listed below:

- The PSWN Program Update and Public Safety Wireless Interoperability National Strategy (Public Safety WINS) Video
- Nevada Highway Patrol Statewide Trunked System
- States Are the Linchpins for Achieving Wireless Interoperability Throughout the Nation
- EMS and Interoperability Solutions in the State of Nevada
- Issues Affecting Public Safety Communications
- How Federal Initiatives Are Working to Promote Wireless Interoperability.

Over the three days, several key themes emerged. In the following sections, each topic and the related themes are presented. The themes are supported by the remarks of the presenters.

2.1 The PSWN Program Update and Public Safety Wireless Interoperability National Strategy (Public Safety WINS) Video

Over the past several years, the PSWN Program has worked with the public safety community at the local, state, and national levels to improve public safety interoperability. During the symposium, the PSWN Program representatives described the vision for the program and several of the key activities being performed by the program. Four key themes, described in detail below, emerged during the discussions in this topic area. These themes were evident in the PSWN Program update and the discussion on the technical solutions that the PSWN Program is developing. These topics were presented on the first day of the symposium.

Saving Lives and Property Through Improved Interoperability

The PSWN Program envisions seamless, coordinated, and integrated public safety communications for the safe, effective, and efficient protection of life and property. Specifically, the program focuses on improving wireless interoperability among public safety entities at all levels of government. The PSWN Program is a federally funded program, jointly sponsored by the Department of Justice (DOJ) and the Department of the Treasury (Treasury). The program works in partnership with local, state, federal, and tribal public safety agencies to improve interoperability.

The PSWN Program is divided into two phases. Phase I, PSWN Implementation Planning, takes place from fiscal year (FY) 1997 through FY 2001. During Phase I, the PSWN Program performed an integrated set of studies and evaluations of existing public safety wireless interoperability systems and developed pilot projects. These activities resulted in a knowledge base known as Public Safety WINS.

Public Safety WINS presents the program's strategy for improving interoperability throughout the Nation. Public Safety WINS will serve as an information baseline for the program as it begins to offer interoperability services to local, state, and federal public safety entities. Public Safety WINS is being developed as a multimedia package that includes video and CD-ROM. The video portion of Public Safety WINS was shown at the beginning of the Las Vegas Symposium.

Currently, Phase II, PSWN Interoperability Assistance, offers a suite of services that assist the public safety community in executing Public Safety WINS. These services include providing an information clearinghouse and offering interoperability assistance to public safety agencies with specific interoperability issues. Phase II takes place from FY 2002 through FY 2006.

Improving Interoperability Requires Comprehensive Coverage of Key Issues

The PSWN Program is active in five key issue areas that must be addressed to improve interoperability. The issue areas, and how the PSWN Program is addressing them, are highlighted below.

- **Coordination and partnerships.** Improved coordination and partnerships within the public safety community are critical to improving interoperability. In an effort to facilitate new partnerships, the PSWN Program has provided briefings at annual conferences of national public safety associations. The program also hosts regional symposiums to bring together public safety officials to share their ideas and experiences with others. The program and the National Institute of Justice co-hosted a National Interoperability Forum in October 2001, which gathered state decision makers, elected and appointed officials, and public safety executives to encourage the policy community to initiate or continue steps to improve interoperability.
- **Funding.** Limited funding for communications is a major issue faced by the public safety community. The program has developed reports and guides that highlight the issues related to upgrading and replacing public safety wireless systems and that discuss sound funding strategies for the life cycle of a communications system.
- **Spectrum.** The PSWN Program recognizes that spectrum is a limited resource. The program is supporting efforts to try to acquire more spectrum for public safety and to enact rulings that flexibly allow interoperability.

- **Standards and technology.** The development of standards and open-systems architectures is a key issue that must be addressed to make progress toward improved interoperability. The program also partnered with the Criminal Justice Information Services Division of the Federal Bureau of Investigation (FBI) to assess the integration feasibility of National Crime Information Center 2000 through its Wireless Applications Test Program of hardware and software.
- **Security.** To ensure that its communications systems are secure, the public safety community needs to incorporate both physical and system security measures so that public safety agencies can effectively and efficiently carry out their critical operations. PSWN Program staff members are developing recommended security guidelines for digital land mobile radio (LMR) systems, and are designing a security policy and security planning templates to assist radio managers in the design of their system security policies and procedures.

***Technical Solutions for Public Safety Wireless Communications Interoperability
Are Available Today***

The PSWN Program is working with local, state, and federal entities to conduct interoperability pilots throughout the Nation. These pilot projects allow the PSWN Program to demonstrate interoperability solutions on active systems. The program hopes that these pilots will help initiate future development of interoperable systems. Pilot projects are under way in Salt Lake City, Utah; along the Southwest border; along the Vermont/New Hampshire border and in Washington, DC. In addition, the program is assisting the State of Montana and has recently completed pilot projects in San Diego, California, and South Florida. These pilot projects were discussed in detail during the symposium. Brief descriptions of the pilot activities are provided below:

Southwest Border. The PSWN Program is conducting end-to-end tests of the pilot solution in Las Cruces, New Mexico, and El Paso, Texas. This pilot provides a unique solution for interoperability between proprietary trunked systems. The PSWN Program is implementing a fixed site talk-group-to-talk-group or conventional-channel-to-talk-group interoperability link that will allow subscriber units in one city to talk to subscriber units in another.

Montana. The PSWN Program is working with the State of Montana and its Public Safety Communications Council to develop a consolidated radio site that several entities (local, state, and federal) will share within the state. It is envisioned that the state can be a model for developing shared use sites, and that lessons learned from this process can be applied to similar sites statewide. Participants on the shared site include the Montana Department of Transportation, Montana Department of Justice, Montana Highway Patrol, Montana State Lands, Carbon County, Bureau of Land Management, United States Forest Service, and the FBI. Under this program, several public safety agencies' equipment will be collocated at a single site. To that end, the PSWN Program issued requests for quotation and procurement to vendors for the collocation effort and monitored the construction of the collocation tower.

Washington, DC. The PSWN Program selected a pilot technical solution for providing interoperability in the Washington, DC, area. The solution implements tri-band (i.e., very high frequency [VHF], ultra high frequency [UHF], and 800 megahertz [MHz]) repeater stacks at six traffic choke points around the DC area “Beltway” and ties these repeaters into an interconnected network of local 800 MHz systems. The pilot involves a large federal presence and addresses the challenges of bringing together many different radio networks and systems operating in different bands.

Salt Lake City. The PSWN Program is supporting the Utah Communications Agency Network (UCAN) in Salt Lake City. Specifically, the program is working to develop a software solution to connect two 800 MHz systems in the Salt Lake City area. The solution links the two systems using Motorola’s Omnilink product to provide seamless roaming over a contiguous area. The pilot is also exploring the use of shared talk groups to improve interoperability among federal agencies in the area. Additionally, the intention is to support critical, interoperable communications during the 2002 Winter Olympic Games and into the future.

VHF Trunked System Pilot. The PSWN Program met with the Integrated Program Team for the pilot and began reviewing system requirements to determine the best approaches for the VHF Trunked System Pilot. The goal of this pilot project is to evaluate a trunked VHF radio system that is fully compliant with current and emerging Telecommunication Industry Association/ Electronics Industry Association 102 (TIA/EIA-102) standards. Additionally, the pilot intends to promote a better understanding of federal wireless user needs and requirements.

Vermont/New Hampshire State Interoperability Assistance. The PSWN Program supported public safety representatives in Vermont and New Hampshire in designing and implementing a cross-border interoperability solution. The proposed solution involves installing VHF radios with microwave interconnects in Vermont to achieve interoperability with New Hampshire.

Maritime Case Study. The PSWN Program developed an action plan and pilot strategy for improving public safety communications in southeast Louisiana. The strategy and plan were based on the results of a case study of public safety communications in the area and discussions with public safety leaders in Louisiana. The program is examining several options as part of the pilot, including developing a regional maritime wireless interoperability strategy, implementing a VHF-to-800 MHz link, implementing a console-to-console link, conducting a mobile command post upgrade, and developing a regional maritime wireless data strategy.

The Native American Tribal Nations Interoperability Assessment. The PSWN Program met with representatives of the Bureau of Indian Affairs and the National Park Service to coordinate planning activities. This project will explore the unique communications and interoperability challenges facing tribal nations when interacting with local, state, federal, and other tribal public safety agencies.

South Florida Pilot. The PSWN Program performed field tests and coordinated activities associated with resolving end-to-end system test failures. This pilot demonstrates quick system implementation of a discrete, short-term interoperability solution for local, state, and federal users in different frequency bands. A fixed solution and a mobile solution are being implemented. The fixed solution uses leased circuits and a shared channel to link designated dispatch consoles and agencies together for interoperability. The mobile component uses a package designed to extend interoperability beyond current coverage areas by applying a modular interface system that can be mounted on a mobile platform.

The PSWN Program Is Seeking to Provide Direct Interoperability Support to the States

The program recognizes that the states are the linchpins for implementing interoperability throughout the Nation. Therefore, the program is seeking to provide direct support to individual states by initiating a dedicated state interoperability campaign. The objective of the campaign is to encourage the trend toward statewide systems development and to provide leadership and expertise on interoperability issues. As a part of the state campaign, the program will work to establish or participate in forums tasked with improving public safety wireless communications with their respective states.

2.2 Exploring Technical Solutions in the State of Nevada

The Nevada Statewide Radio System is an exciting communication effort now under way. During the symposium, a representative from the Nevada Highway Patrol discussed this effort. This topic was presented during the second half-day of the symposium.

The Nevada Highway Patrol Is Developing the Nevada Statewide Trunked Radio VHF High Band System

The Nevada Statewide VHF Radio System Statewide Trunked Radio System (NSTRS), a dispatched system serving public safety and local governments in Nevada, was placed in service on March 1, 2001. The trunking portion includes eight SmartZone sites serving three counties in southern Nevada. In addition, eight SmartZone sites serve seven counties in northern Nevada. Forty conventional sites provide coverage over the balance of the state. These sites consist of three channels each—primary, secondary, and multinet. The system provides 95 percent coverage of 110,561 square miles of Nevada. This VHF highband trunked system is the widest area VHF SmartZone system now in existence worldwide.

This system serves 18 states agencies and provides interoperability among state and local public safety agencies and dispatch services for federal agencies such as the FBI, Immigration and Naturalization Service (INS), Drug Enforcement Administration, and others. It provides a common platform connecting trunked systems being placed into service by the Department of Energy and Clark County, the most densely populated county in the state. The new system will provide seamless communications between VHF high band, UHF, and 800 MHz systems using one radio.

The level of participation will vary from local governments that build a portion of the system down to a single user (subscriber radio). At a minimum, agencies will be required to purchase their own mobile, portable, and console equipment. All equipment is available for purchase or lease.

The new system provides statewide coverage and improved radio spectrum resources, achieves interoperability with all state and local agencies, and represents a statewide radio system using shared resources, and offering added value for all users.

2.3 Sharing Public Safety Problems and Solutions

The Sharing Public Safety Problems and Solutions session is a new component of the PSWN symposium. It is an open discussion on public safety issues. Symposium participants have the opportunity to address questions regarding interoperability issues to subject matter experts and the PSWN Program managers. The information in this section is submitted in question-and-response format. Some questions were used to prompt discussion and may not have a response.

Question and Response Session

Question: What promise do you see in audio switches?

Response: There is a promise that audio switches will handle the needs of public safety. Also promising is the black box. The nature of software-defined radios is to allow the user to switch from one radio type to another. How this is accomplished needs to be addressed by the vendors. IP switching is OK, but...you really have to sample the protocol and squelch...identify the talk group. The audio switch is a valuable tool, but you need to talk to all the potential participating agencies regarding how they use their systems. This issue is really 60 percent understanding the needs of the user, and 40 percent technical (how to make use of the technology.) The promise is there and the technology is advancing.

Question: With all the different agencies tracking the [interoperability issues identified at the World Trade Centers and the Pentagon crashes], what entity or agency is reporting back to the states about homeland defense?

Response: The PSWN Program has reached out to Governor Ridge to let him know what we have been learning over the last five years. We have heard nothing back. Anything that results in legislation following September 11 should view every communication system through a filter of interoperability. Policy makers should look at new policies and ask themselves how their actions and decisions affect interoperability. The PSWN Program is looking at the Pentagon results and will disseminate lessons learned through the Web site.

Comment from Audience:

The PSWN Program should plug the Homeland Defense Office to share information on what the states are doing because the states have something to share.

Comment from Audience:

We are the PSWN Program. Everybody in this room has as much influence on a local or county level, wherever your position is. We as a group can act as a group. Re: the audio switch—as a satellite network, we need to tie to a lot of other networks. We find audio switching is an inexpensive way....Audio level is the KISS principle, (keep it simple, stupid) and it works. It is a simple way to join together two different systems for interoperability.

Comment from Audience:

I liked the State Interoperability Executive Committee (SIEC) guidebook. Especially the discussion about 700 MHz and the SIEC concept at a national level, relationships between the PSWN Program community and SIECs, mini-state-level public safety community organizations...etc.

Response:

The public safety community said it was not sure the regional planning committees (RPC) were the right place to address the 700 MHz issue—it needed to be separated from 800 MHz. The public safety community said the RPCs might not be able to address and license 700 MHz, so the SIECs were created to manage that issue.

Response:

The SIEC is not just for 700 MHz. It is an opportunity to take on the entire interoperability issue as a statewide issue...this is quite intriguing...how will this relate to the new five channels—one VHF, four UHF?

Question:

Why is it difficult to get manufacturers interested in VHF systems? The public safety community and vendors cannot figure out this issue.

Questions:

The vendors must understand that public safety, as a whole, is a large market. Should all federal, state, and locals [public safety agencies] be mandated to buy off one particular contract? This would certainly provide leverage. You as the community have to decide whether you need to initiate this effort and move forward. How do we leverage the broad buying power, rather than just one or two individual agencies?

Question:

SIEC came out of the Federal Communication Commission (FCC) to regulate the 700 MHz band. How are you going to use the designated interoperability channels? Even though the SIEC came out of 700 MHz, clearly, if the states go to the effort of creating these groups in the public safety community, it would behoove them to look at how they will spend

the time developing use of these new channels. Also, when are we going to hear about the report from World Trade Centers and Pentagon?

Response: November 16 is the next NCC meeting in New York, and there will be reports on the issues of September 11 and interoperability response.

Question: What are we doing about high-speed data as it relates to frequency? If you look at the requirements of amplifiers, can we go to in building?

Question: How many of you in the public safety community follow filings with the FCC? How many of you have filed comments? We [PSWN Program] are just one voice, the only way to let the FCC know how you feel is to tell them. You need to pay attention to the proceedings and the filings. This is the only way that the FCC hears that voice. A major part of the FCC staff is lawyers. It is up to you, the user community, to make them aware.

Question: In reference to standards and technology, some of the questions posed were, “Is there any single standard that public safety community wants? Should the Federal Government develop standards from recommendations from public safety? Is that the easy way out? Should the Federal Government still be dictating standards to you?”

Question: Should the Federal Government dictate standards? Yes, but should they listen to the public safety community before mandating standards?

Comment from Audience:

One of the observations in New York (NY) following September 11 was that we had a *loss* of major infrastructure, not necessarily a *lack* of infrastructure. Those relying on wireline also lost communications because the telephone connectivity was lost. Treasury was able to quickly share resources. The beauty of the public safety community is that it manages communication and trust. Unfortunately, to defeat a terrorist, you need, in some ways, to be one. When I saw the antennas coming down from the World Trade Centers, I realized that in spite of partnership within the public safety community, when you are highly integrated, you could lose the battle. The Javits Center—the state communications center—was OK. However, take telecommunications, which was hampered, out of the picture, and all you have left is RF.

**Comment from
Audience:**

We must learn to think like the saboteur. An efficient system is one that has no redundancy; we need redundancy in our system. We need to think like a terrorist. We need to build in a soft failure so that if the system gets smashed, we can keep going.

**Comment from
Audience:**

[I] favor interoperability, not necessarily Project 25 (P25). Audio-switched gateways have a place. There is no need to have an ubiquitous system. We have an opportunity to demand that land mobile radio manufacturers produce radios that interoperate. Any engineer can take two disparate systems and figure out a way to make them work. This takes time, and we don't know where the next event is going to happen. We must have a nationwide platform for interoperability for public safety community personnel. P25 is the only standard and was finally recognized. FCC said it was a digital band. Some manufacturers held out for analog mode, but this does not meet security needs (encryption). We are putting in encrypted radios. However, we must continue to focus on a goal of nationwide interoperability where public safety community people can go anywhere, at anytime, and be able to come together and not get slowed down by talk of "we can do this or that." We do not have time to do that when we are reacting in an emergency.

**Comment from
Audience:**

Hooking together systems can be an operational nightmare. You cannot have operational delays. We should use 700 MHz spectrum as a platform for nationwide interoperability. There is no need to put up with delays for audio switching.

Question:

Are redundancy and interoperability compatible?

2.4 States Are the Linchpins for Achieving Wireless Interoperability Throughout the Nation

Statewide infrastructures are quickly becoming the most efficient, cost-effective way to improve interoperability around the country. Planning statewide systems, however, is a difficult task. Many states around the country have implemented, or are implementing, shared, statewide systems. During the symposium, representatives from California, Nevada, North Carolina, and South Carolina related their experiences with statewide systems development. Several key themes, described in detail below, emerged during the discussions in this topic area.

Obtaining Funding for Large, Statewide, Wireless Communications Systems Is Possible

Obtaining funding is the critical first step in making statewide systems a reality. Acquiring the substantial funding needed to plan, build, and maintain a public safety communications system may be one of the greatest challenges of public safety agencies. In fact, this process often takes more than 10 years to complete. Another problem is that agencies do not typically consider life-cycle cost issues when planning a system; therefore, they encounter unanticipated costs during the system's life. As states have proceeded through this process, several common keys to success have emerged. During the symposium, officials who have funded statewide systems shared some of these keys to success with the audience. These included—

- Agencies must develop a core funding team. Ideally, this team would include representatives from the fields of law, finance, and accounting.
- Officials planning statewide systems should enlist consultants to help them develop business plans and validate the large dollar amounts needed for system development. Business plans must describe, in detail, what efficiencies will be gained and what services can be improved by using the new system. Consultants can also help to sell the business plan at county meetings and board meetings.
- Agencies often have a misconception that buying a radio system is a one-time purchase. As a result, they fail to realize that costs do not end when construction does. Agencies should be aware that they need to cost these systems for their entire life cycles. It was also noted that investing in upgrades is becoming an easier sell because people realize technology becomes obsolete quickly.

Federal and state grants are another mechanism states can use to fund interoperable systems. One such grant, administered by the National Telecommunications and Information Administration (NTIA), helps county and local governments to set up demonstration projects. In addition, NTIA provides matching funds for states to help them maintain their systems. This funding source also raises the level of awareness at the state and local levels that the Federal Government is interested in advancing technology in the public safety sector.

State of Illinois

The Illinois State Police (ISP) is one of many public safety agencies faced with replacing an aging communications system that is nearing obsolescence. To address this issue, the ISP is planning to replace its existing LMR system with a leased system. Rather than procuring, owning, and operating a new system, the ISP will lease time on a vendor-owned, operated, and maintained system.

Background. The ISP began developing a plan for replacement of its LMR system in 1994. An independent consultant performed a study to determine the cost of procuring a new LMR system covering a six-county area. The results of the study were presented to the governor's office for budget approval, but the project was considered cost prohibitive. The ISP then considered partnering with the local utility company, which had extensive infrastructure throughout the state but did not have adequate spectrum to support the number of proposed users. This arrangement would have required the ISP to allow non-government entities to use its frequencies. The ISP did not feel this arrangement best served its interests and rejected this solution.

Ultimately, ISP officials considered a commercial option. They recognized that commercial entities already provided most of their communications capabilities, such as paging and wireless data. As a result, a commercial LMR system was viewed as a service they could possibly pursue.

The ISP released a performance-based request for proposals (RFP) through the Illinois Central Management Service . This RFP stipulated that a vendor would build, operate, and maintain a voice communications system for use by the ISP, the Chicago Police Department, and any other government organization within the State of Illinois.

The State of Illinois possesses a number of valuable resources that make a lease arrangement favorable for the vendor and the state. First, the ISP has been granted \$25 million through the Illinois Fund for Infrastructure, Roads, Schools, and Transit (FIRST) project to fund the initial capital cost of the user equipment. Illinois FIRST funds are issued through the governor's office and are intended to revitalize critical infrastructure within the State of Illinois. This significant amount of start-up money considerably mitigates the ISP's funding challenges.

Another resource that the ISP offers to the vendor is real estate. The State of Illinois owns a considerable number of radio towers and sites throughout the state, which the vendor in turn can use for site development or infrastructure installation.

Finally, frequencies already licensed to the ISP will be reused whenever possible. The ISP realizes a significant monetary value is associated with this resource and expects the vendor to note the value in its discounted pricing for the ISP.

System Details. The ISP is seeking to lease a trunked, 800 MHz LMR voice system capable of providing interoperable communications with other public safety providers. This system should be expandable to support additional users over time, provide the required system security measures, and meet minimum performance criteria as defined by the ISP. Under the

current terms of the RFP, the ISP will purchase the user equipment, and the selected vendor will provide the network and infrastructure equipment.

As of this writing, Motorola was awarded a contract, but the ISP and Motorola are engaged in contract negotiations. Motorola's proposed solution, the Starcom 21 system (built and maintained by Motorola), will be accessible to all levels of public safety agencies (i.e., local, state, federal) throughout the State of Illinois. The ISP will lease time on the network for voice traffic only. Although Motorola owns and maintains the system, the ISP will be the primary administrator of the system (e.g., adding users and assigning talk groups).

Expansion. System expansion is a common concern for organizations, especially when they do not own the system. The ISP does not anticipate system expansion to be an issue because the RFP states that the ISP expects the system to grow in size and capacity. Furthermore, the RFP stipulates that the vendor would be responsible for accommodating additional users, at no additional cost to the ISP (except through subscriber fees).

Interoperability. The Starcom 21 system is proposed as a virtual shared system that will facilitate interoperable communications. Although owned by a vendor, the system will be available to all government organizations in the State of Illinois. The arrangement will also enable participating organizations to contribute resources (e.g., frequencies and towers), where feasible. Resource sharing promotes cost savings and interoperable communications, and prevents organizations from establishing isolated, redundant networks.

Security. The ISP fully expects the vendor to implement secure communications on an as-needed basis. The ISP is negotiating with Motorola to implement secure channels for federal agencies that have indicated they would like to join the system. The ISP is working with these federal entities and Motorola to identify the frequencies and locations where encryption will be used. The ISP requires encryption standards to comply with P25 standards (i.e., that messages are not de-encrypted during transmission, but only at the termination point).

The ISP does not perceive loss of control as an issue. Although the vendor will own, operate, and maintain the system, the ISP will administer it. The ISP will also set the performance criteria for the system and conduct its own tests of the system. System reliability will be determined entirely by the ISP. The ISP has also indicated that although the vendor will build and own the system, any upgrades to the infrastructure will belong to the ISP when the lease expires, at no cost.

Summary. The Starcom 21 system is being embraced by public safety agencies throughout the state. All agencies within the state, including federal agencies, will be able to join the lease agreement. The new system will alleviate funding challenges faced by many smaller agencies and municipalities that do not have the resources to establish their own systems. More importantly, agencies will now be able to communicate on a single system, improving interoperability and coordination during emergency incident responses.¹

¹ *Fee-for-Service Report*, page 15, PSWN Program, October 2001.

South Carolina Department of Public Safety 800 MHz Communications—Public-Private Partnership.

In 1991, Hurricane Hugo's devastating impact on the State of South Carolina created a critical need for statewide emergency radio communications. As a result, SCANA Communications and several state and local agencies jointly developed an LMR system. SCANA Communications offered an existing system to the government agencies as a foundation for the statewide system. During the initial planning phase, the original system was used by state utility organizations. Initially formed as a cost sharing "for-profit" system, the SCANA system was expanded by combining government resources, existing SCANA infrastructure, and numerous new sites and towers. In 1995, however, SCANA Communications and the State of South Carolina entered into a contract that restructured the system as "not-for-profit." With the advent of the new structure, a formal users group, consisting of representatives of various public safety agencies, was created to set policies regarding system usage and functionality. This group is committed to improving interoperability and using technology to overcome the limitations of legacy VHF and UHF systems.

System Overview/Security. SCANA Communications, a subsidiary of the SCANA Corporation, operates an 800 MHz Motorola Type II mixed mode Astro SmartZone trunked mobile radio network. Encryption is available in the digital mode for appropriately equipped users. Designed initially to support up to 20,000 users, the system currently supports approximately 9,500 users in a basic coverage area that includes the more densely populated regions of the state. A variety of organizations use the SCANA system, including public safety and public works agencies, hospitals, local power utilities, and other state agencies. The fire and law enforcement agencies of Lexington, Richland, Orangeburg, Spartanburg, and Dorchester counties are the primary public safety fee-for-service users. To become an active SCANA user, few mandates exist. To be considered eligible, the requesting agency must be a local, state, or Federal Government agency; power utility; special emergency; or special-purpose service district organization. The eligible agency must sign a system user agreement and pay the required fees. As defined in the state contract, these fees are based on the number of sites an agency is expected to access. In some cases, user fees can be negotiated if the agency contributes infrastructure to the system. Federal agencies such as the FBI and the National Guard have expressed an interest in using the SCANA system; however, the recurring monthly fee may be a barrier to federal use.

Expansion. The participating agencies and SCANA Communications share the burden of system expansion. The government agencies must identify funding streams, whereas the vendor is charged with implementation and operations and maintenance (O&M) responsibilities associated with expansion requirements. Previously, a state-level Public Safety Communications Coordination Committee recommended expanding the SCANA system to cover the full geographic area of the state. To support this system expansion, an adequate funding mechanism is needed. The state is focusing on the fees collected from private sector companies leasing airtime on state-owned wireless network towers. These fees are incurred by several major wireless carriers. To further this effort, the state Office of Information Resources issued an RFP soliciting plans for the implementation and development of a uniform asset management program for existing and future county-owned towers.

Interoperability. Many agencies choose to join the SCANA system to take advantage of the trunked, shared features that otherwise would be unaffordable if built as a privately owned and maintained system. The SCANA system is developing links to regional trunked radios systems, including those deployed in Beaufort/Hilton Head, Charleston, Myrtle Beach, and Florence. In support of interoperability with other 800 MHz systems, mutual-aid agreements and 30 preset mutual-aid talk groups have been established statewide.

Operations and Maintenance. SCANA Communications performs O&M. The vendor maintains the infrastructure and will assist with programming services for participating agencies. Furthermore, the vendor ensures that technical and support resources are available to all agencies on demand. However, the owning agency bears the responsibility for maintaining subscriber equipment. This responsibility may require retaining an internal technical repair staff or establishing a maintenance agreement with local repair shops.

Future Outlook. The SCANA Corporation sold the system to Motorola in June 2001. Motorola will be completing the system expansion and plans to refurbish or replace some of the existing infrastructure and equipment for full digital operation. Motorola has committed to a statewide build-out within 18 months. Generally, this transaction is viewed as favorable for agencies using the SCANA system. Looking forward, users statewide will realize enhanced coverage and expanded services scheduled to be paid for and implemented by Motorola.²

Public Safety Agencies Must Consider Several Key Issues When Planning Statewide Systems

Planning statewide systems can involve technical issues, political considerations, and coordination with peers in other organizations. As states nationwide have completed this process, several best practices have emerged. During the symposium, representatives from various states shared their experiences and some of these best practices, as detailed below.

- **Executive-level support.** Senior government support is critical for successful statewide systems. Political champions can give a project credibility, ensure funding for the project's survival, and defend the project in the face of opposition. These individuals also provide needed support during the legislative process and for requests for funding public safety wireless communications systems.
- **Buy-in from local entities.** Most successful statewide system groups have found ways to involve local agencies in gaining support for system development. Well-developed and consistent presentations to important existing and potential stakeholders, including the use of professional quality videos, help obtain and maintain buy-in from the government executives, legislatures, the citizenry, and other key stakeholders.
- **Memorandum of understanding (MOU).** An MOU is a detailed agreement that describes the purpose and intent of the shared system, defines the users, and defines the owner/operator responsibilities. MOUs are sometimes used to forge partnerships

² Ibid., page 17.

and are instrumental in the early stages of planning and partnering. The MOU often serves to open communication lines.

- **A shared vision.** A compelling vision, with an understanding of the urgent need to improve public safety communications, is required to achieve the needed level of support. Furthermore, the state must be willing and able to assume integration responsibilities for the system and work to overcome turf and coordination issues with local and federal partners.
- **Site acquisition.** Public safety agencies should be aware of environmental and land-use regulations as they prepare to develop their sites. Local governments often have stringent limitations on tower siting and resolving such issues can be difficult and time consuming.

States Are Developing Wireless Data Networks as a Means to Achieving Interoperability

A number of wireless data systems are being developed nationwide. These systems are providing an alternative way to address many interoperability challenges. The speaker from North Carolina highlighted their statewide data system during the symposium. The system is described below:

Criminal Justice Information Network (CJIN). The State of North Carolina is implementing an 800 MHz private data network known as the CJIN. The goal of CJIN is to make mobile data available to all public safety agencies within the state. Its stated objectives include improving officer safety, increasing officer efficiency and effectiveness (i.e., reduce paperwork, reduce errors, achieve better use of staffing), and improving interoperability. North Carolina elected to build its data system privately because cellular coverage was not available in all areas.

To date, the state has implemented the system on 114 base stations. More than 500 law enforcement agencies and a total of more than 5,000 users are now using the system. Approximately 95 percent of the state is currently covered. The cost of the project will be about \$16 million. The state was able to keep the cost low because the system was built with shared resources. The state provides the base stations, data transmitters, and access to the 800 MHz system while local agencies provide tower space, tower houses, and use of spare 800 MHz frequencies available in their area.

2.5 Issues Affecting the Public Safety Communications

A Standards Update: APCO 25

This presentation provided a comprehensive overview of the status of the full suite of P25 standards. P25 is a long-term standards development process that has drawn local, state, and federal public safety officials together with the goal of promoting compatibility through open standards. Attendees also received a brief overview of Project MESA, which is a cooperative

effort of the European Standards Institute, the Telecommunications Industry Association in the United States, and the U.S. and European public safety communities.

It was noted that several key advantages are offered by P25 Phase 1 frequency division multiple access standards as compared with other standards. For example, only P25 standards can provide coverage that approximates that provided by analog services. They are also the only written standards that address all public safety bands. Other advantages offered to public safety communities through the efforts of the P25 Steering Committee are that P25 enables a planned migration path, provides a true direct mode capability, and is scalable. Moreover, P25 improves spectrum efficiency because it enables recycling of spectrum.

Motorola is the only equipment manufacturer currently building infrastructure that meets the P25 standards, but the P25 group is trying to change that in order to promote competition in the marketplace and give users choices. With respect to encouraging competition, the P25 Steering Committee advises users to define their needs and investigate technologies and manufacturers. In other words, users should consider their options and work to influence the manufacturing process—Project 25 is not the only option.

The presentation continued with an overview of Project MESA, which is an effort to create a standard for wideband, high-speed, ubiquitous data transmission. MESA technology will enable extensive mobility for emergency and safety applications.

Project MESA is sponsored by an international partner group, but anyone can participate. In fact, the expense of the MESA project virtually dictates a public–private partnership that will allow participants to take advantage of technology convergence and leverage knowledge. It is an attempt to achieve a global standard. MESA technology will allow for movement of a magnitude of data information that is currently unattainable. Public safety providers need to be aware of opportunities to participate in this effort so that they have some control over the future of technology that will impact them daily.

Key applications for MESA technology-enabled equipment include high-speed wireless data from incident sites (i.e., with multiple transmission rates), voice command and control, airborne audio and video surveillance, electronic messaging, fingerprint and iris scanning, and the transmission of building, structural, electric, plumbing, and natural gas plans. MESA will also enable the use of Global Positioning System technology for individual and unit tracking, surveillance tracking beyond law enforcement applications, remote mapping, and medical bio-telemetry information. It will also enable use of robotics for locating victims of natural or man-made disasters. Project MESA is expected to reach a global market.

2.6 Public Safety Responses to Past Mass Casualty Incidents Highlight the Benefits and Needs of Interoperability

The main purpose of this topic area was to highlight how large-scale incidents in various states and regions reveal ongoing interoperability problems. During the symposium, public safety representatives shared their experiences and solutions to incidents with the audience.

Speakers included officials who were involved in the actual emergencies. Two key themes emerged in this topic area. These themes are described in detail below.

Various Incidents Highlight Interoperability Challenges Within States and Regions

Every day, many types of incidents occur that reveal the need for a coordinated public safety response. Interoperable communications are vital to the swift resolution of these incidents. Several of these incidents were discussed at the Las Vegas Symposium. Each of these incidents highlighted the vital role of interoperable communications.

Interoperability was critical during the response to the incident. The local police and fire departments used 800 MHz radio systems and the EMS responders used a VHF system. Unfortunately, neither of the responding agencies could interoperate.

Salt Lake City Incident. On August 11, 1999, at 12 noon, a tornado touched down in downtown Salt Lake City. It was the worst tornado in 100 years. The path of destruction was five miles long and a quarter-of-a-mile wide. The tornado was designated as F2 severity. There were 100 hundred people injured—14 seriously and one fatality. Three thousand homes and businesses were destroyed including one hotel and the Delta Center. The National Association of Retailers Convention had two of its outdoor tents completely destroyed.

A number of public safety agencies were mobilized for this incident using multiple pagers, portable telephones (e.g., cellular, personal communications services, etc.), land line phone systems, four emergency 911 dispatch centers, and mobile data systems (i.e., cellular digital packet data). Interoperability was a problem during the response to the incident. There was no common communication system among the incident responders. As a result of the incident, UCAN has constructed a nine-county 800 MHz radio system. More than 50 agencies will migrate to this radio system. Radios are programmed using a common programming scheme and common call regional channels, and offer access to multiple dispatch centers and consolidated dispatch centers.

Successful disaster management requires good communications—in one band, with prior planning and agreements, sufficient dispatch resources, common response protocols, and the willingness of agencies to set aside political boundaries and serve the citizens.

There Are Best Practices That Can Improve Interoperability During Tragic Incidents

During each of these incidents, public safety officials were forced to quickly resolve their interoperability problems. Often these solutions, while not optimal, worked. However, the presenters indicated that had longer-term solutions been employed, there might have been more effective interoperability during these incidents. Participants shared several of the following best practices that could help improve interoperability during mass casualty incidents:

- Establish regional and statewide communications and mutual-aid plans
- Develop a regionwide incident command system to help coordinate activities during an emergency

- Establish working relationships among hospitals, fire/EMS, schools, and local law enforcement
- Ensure operational readiness through deployment planning, training, drilling, and equipment acquisition.

Shared Key Management Between Government Agencies

The U.S. Customs Service (USCS) and INS collaborated to develop a means of networking together separate agency-specific over-the-air-rekeying (OTAR) key management centers to enable real-time voice privacy key sharing. INS and USCS share common border responsibilities, requiring protected interoperable communications among field officers. The agencies established a memorandum of understanding outlining operational need for cryptographically protected interoperability, manual key load of 10,000 radios, and extensive networks between USCS' OTAR network and INS' OTAR network. Solutions for both agencies are the effective exchange of any operational traffic key desired and an encrypted interoperable communications between USCS and INS personnel.

Future considerations include extending networking to the INS Master Key Management Faculty (KMF) and the USCS KMF, making the KMF client server environment operating fully automatic, promoting the idea of a Federal Interoperable Traffic Key, and promoting an effort to migrate to 256-bit key Advanced Encryption Standard.

2.7 How Federal Initiatives Are Working to Promote Wireless Interoperability

Federal agencies have been charged by Congress to consolidate communications systems, limit spending, and create interoperable solutions with other federal agencies. Where appropriate, federal agencies intend to partner and share resources with state and local public safety agencies. The main purpose of this topic area was to discuss certain large-scale federal system developments and federal initiatives related to interoperability. One key theme emerged in this topic area. The theme is described in detail below.

Federal Agencies Are Supporting and Promoting Solutions for Interoperability Throughout the Nation

Representatives from National Public Safety Telecommunications Council (NPSTC), FCC, Department of the Treasury, and NTIA were present at the Las Vegas Symposium to discuss their roles and ongoing progress in promoting interoperability.

NPSTC. NPSTC is a federation of 13 associations that promote and facilitate the implementation of recommendations from the Public Safety Wireless Advisory Committee. Their goal is to promote greater interoperability, cooperation, and information exchange among federal, state, and local public safety agencies nationwide. NPSTC also serves as a collective voice for the transmission of public safety communications and interoperability concerns to the FCC, the Congress, and elected and appointed officials. NPSTC also offers some funding for the use of newly allocated 700 MHz public safety spectrum.

FCC. The FCC, which is directly responsible to Congress, regulates the licensing and use of radio transmitters by state and local governmental and non-governmental entities engaged in public safety activities.

On February 15, 2001, the FCC released Public Notice DA 01-406. In this notice, the FCC's Wireless Telecommunications Bureau informed the states and jurisdictions that they could apply for the 2.4 MHz of spectrum in the 700 MHz band set aside for public safety state licenses. Applications must be made prior to December 31, 2001. FCC rules facilitate partnering of FCC-licensed state and local government entities with federal entities in the 700 MHz band.

NTIA. NTIA serves as the President's principal advisor on telecommunications and information issues. It formulates telecommunications policy for the administration and is the federal spectrum regulator and manager. As such, NTIA plays an integral role in allocating the 700 MHz band, as well as in governing its use by federal entities. Because federal entities cannot hold licenses nor can they develop separate 700 MHz systems, they must find ways to join state and local agencies, thus providing opportunities to create partnerships that will benefit everyone.

Treasury. Treasury is also planning to implement a nationwide wireless system to support all its components on a shared infrastructure. Because of mandates driven by the Congress and NTIA, Treasury is planning to implement a TIA/EIA-102 (P25) compliant narrowband radio system known as the Integrated Treasury Network (ITN). Treasury is working to develop partnerships to use non-Treasury-owned systems, both state and federal.

A phased regional approach is being used to implement the ITN. There are six phases for implementation, the sequence of which will be based on mission priorities. Treasury is continuing to examine several issues that will add more value to the ITN proposition. For example, Treasury is examining a detailed plan for transitioning legacy systems to the ITN and exploring centralized management and operations and detailed capacity planning for conventional versus trunking determinations, as well as researching a mix of solutions that includes commercial services, sharing with local entities, and fee-for-service.