

**Critical Requirements for
Public Safety Communications:
A First Look**

**A Briefing Paper
By**



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... The Local Government Telecommunications Alliance

EXECUTIVE SUMMARY

Public Safety is a core function for local governments. Adequate wireless communications are essential to executing the Public Safety function promptly, effectively, and cost-efficiently.

Today local governments face two major problems in public safety wireless communications. First, across the country, there is a general lack of interoperability between radio systems, between agencies, and between jurisdictions. Second, the Federal Communications Commission has allowed commercial wireless providers to interfere with essential public safety radio communications. This frequency interference causes significant geographic “dead spots” where public safety radios don’t work.

Both problems can be solved. The solutions require spectrum reallocation by the Federal Communications Commission and federal funding to assist local governments as they buy much-needed new equipment and rearrange existing equipment.

The problems are not new. September 11th has brought them into sharp focus. Local officials have spoken for years about the basic problems of lack of interoperable equipment, lack of adequate interoperable frequencies, and unnecessary interference with public safety radio transmissions. Federal, state and local law enforcement, fire and public health agents must be able to communicate reliably with each other in the field.

The good news is that these problems can be solved. This TeleCommUnity Alliance white paper identifies the problems and proposes specific solutions. TeleCommUnity encourages comments and suggestions on this document and the issues it confronts.

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TeleCommUnity Alliance

Public safety services require effective coordination and communication among many agencies. A high-profile incident — such as a bombing, plane crash or natural disaster — tests the ability of local government public safety service organizations to mount a well coordinated response. The events of September 11, 2001, and local emergency response to the terrorist attacks in New York City and Washington demonstrated that communication is a primary tool for those who protect life and property. Lower-profile, but no less life-threatening incidents – such as fires, floods, hurricanes, tornadoes, major traffic accidents, and pursuit of armed criminals – also require coordinated local government public safety response.

In the interest of maintaining our national emergency response systems, it is no longer practical for individual public safety agencies to build communications systems that do not communicate with each other. To be effective before, during and after an emergency response, public safety officials at all levels of government must be able to communicate with each other. As multiple agencies in multiple jurisdictions respond to crises, interoperability — the ability of agencies from different jurisdictions to communicate (*e.g.*, police units with fire departments, and city agencies of one state with counties agencies of a neighboring state) — is essential. Public safety agencies can no longer tolerate “dead zones” caused by private commercial radio spectrum use – areas where public safety frequencies cannot operate due to interference.

Congress and the Federal Communications Commission can solve the problems of inoperability and interference by taking steps to ensure that local public safety agencies have adequate funding to achieve interoperability and have access to additional spectrum to alleviate serious interference problems.

I. Problem: Challenges to Effective Public Safety Communications

Currently, federal, state and local public safety entities compete for limited radio spectrum. Public safety agencies have limited budgets and face challenges in keeping pace with advances in technology. Moreover, public safety officials in the same community are often forced to operate on separate public safety frequencies because of federal spectrum allocation policies.

A. Compatibility of Systems (Interoperability)

It has become apparent in recent years that the design of local public safety communications systems must permit units from different agencies to communicate with one another and to exchange vital information. Interoperability suffers when public safety units using different systems — even those using the same frequency — cannot communicate because of different radio transmission or signaling techniques, such as analog versus digital or proprietary systems provided by different manufacturers.

- Earlier this year, the National Institute of Justice (NIJ) released results of a study — *State and Local Law Enforcement Wireless Communications and Interoperability: A Quantitative Analysis* — in which it surveyed more than 1,500 law enforcement agencies of all sizes and types. It identified funding and spectrum allocation by the FCC as the two biggest obstacles to interoperability.

Fragmented spectrum and insufficient funding were identified as serious interoperability obstacles, and problems with channel congestion and outdated equipment were also mentioned. Agencies with limited funding were significantly more likely to experience problems with dead spots, outdated equipment, insufficient equipment, frequency interference and channel congestion.

The study also reveals trends related to the shift from analog to digital systems, high VHF to 800 MHz, and increasing use of spectrum for data transmissions related to the use of mobile data terminals and laptop computers. Even routine events remain a challenge for most agencies. The inability to adopt interoperability standards is linked to funding.

- The Public Safety Wireless Advisory Committee (PSWAC) recommended the use of commercial services for non-mission critical communications. However, agency controlled and operated wireless communications systems remain an integral part of both inter- and intra-agency emergency communications:

The ability of public safety agencies to communicate is vital to the safety and welfare of the citizens they represent. Whether a vehicle accident, crime, plane crash, special event or any other public safety activity, one of the major components of responding to and mitigating a disaster is wireless communications. These wireless communications systems are critical to public safety agencies' ability to protect lives and property and the welfare of public safety officials.

To improve interoperability, Congress included language in the Balanced Budget Act of 1997 that would free up additional space on the radio spectrum for law enforcement use. The language requires that by the year 2006, 24 MHz of the spectrum currently partially occupied by broadcast television channels 60 through 69 be transferred to exclusive public safety use. The NIJ survey found, however, that *more than half of the agencies surveyed did not have sufficient funds to make use of the spectrum specified by Congress.*

B. Interference

In an era when technology can bring news, current events and entertainment to the farthest reaches of the world, many police officers, firefighters and emergency medical service personnel working in the same city still cannot communicate with each other.



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In the 800 MHz band, there is a very real problem with “dead zones” — areas where public safety radio communication is impossible because of interference caused by commercial mobile radio service (CMRS). The FCC was careless when it decided to place these diametrically differing types of deployments – commercial and public safety – in close frequency proximity and left it to the parties “to work out” emissions interference. Public safety radio dead zones must be eliminated – America cannot tolerate police officers and firefighters not being able to communicate while involved in life-threatening situations.

Revenue-generating (CMRS) systems have control over blocks of frequencies; they can control their own interference environment. When they have interference, they can modify their deployment configuration slightly to eliminate it. As they add capacity to serve additional users, they create new interference scenarios but again have control over the solution. In cellular-type deployment, which services the general population in a one-to-one basis (interconnect), it is economically sound to add sites, as they will increase system capacity and, thereby, allow additional users.

However, public safety communications systems do not have the same ability to reduce interference. A public safety system provides service to a specific population of users distributed over a large service area. It is uneconomical to subdivide the service area or to use additional sites or use additional frequencies to address interference caused by adjacent commercial users. Local government public safety agencies cannot outbid CMRS operators to buy additional spectrum to prevent interference. And public safety concerns cannot afford to constantly refit their systems to overcome CMRS-created interference.

Congested and fragmented spectral resources are contributing to a critical situation which, if not addressed expeditiously, will compromise the ability of public safety officials to protect life and property. Effective, efficient wireless communications ultimately depend upon radio frequency availability and/or compatibility.

II. Solutions: Addressing Public Safety Communications Problems

As stated previously, providing public safety agencies with more spectrum or more money — or both — can help to solve both system incompatibility and spectrum interference problems.

A. Radio Spectrum

In its final report, the PSWAC concluded that “unless immediate measures are taken to alleviate spectrum shortfalls and promote interoperability, public safety agencies will not be able to adequately discharge their obligation to protect life and property in a safe, efficient and cost effective manner.”



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PSWAC has asked the FCC to allocate additional spectrum for the exclusive use of public safety agencies. The radio frequencies currently set aside for public safety use are primarily in four areas of the spectrum and range from low band VHF (25-50 MHz) to 800 MHz (806-869 MHz). As a result, no universally available or affordable radio can handle all possible combinations.

In addition, many mutual aid channels have been set up on a regional or statewide basis. There are two nationwide interoperability channels: the National Law Enforcement Emergency Channel at 155.475 MHz in high band VHF and the Interagency Tactical Channels 13 at 866-868 MHz in the 800 MHz range.

Research conducted for the PSWAC's Operational Subcommittee concluded that one of the top priorities for public safety communications is the need to operate across frequency bands (e.g., from VHF to 800 MHz). Communications across bands is possible through "patching," but the process has serious limitations and complications. PSWAC has determined that more than 100 MHz of spectrum is needed for public safety, yet public safety agencies currently have only 30 MHz of spectrum. It would be in the public interest to increase the number of nationwide interoperability channels. *To accomplish this, however, there is a need for greater allocation of radio spectrum dedicated to public safety use.*

Congress has authorized the FCC to reassign spectrum between UHF television channels 60 through 69 in the 700 MHz range for public safety use. This spectrum was to be available for licensing in the year 2000. However, at the urging of broadcasters, Congress included a provision in the legislation that may delay indefinitely, the availability of that spectrum in some regions. Some broadcasters may never relinquish the frequencies if the penetration of digital television service remains below specified levels in individual markets.

To date, the FCC has allocated 24 MHz of spectrum in the 746-806 MHz range for public safety use. *An additional 73.5 MHz is needed now to meet interoperability and capacity needs.*

B. Adequate Funding

According to the study conducted by the National Institute of Justice, limitations in funding already affect interoperability for 69 percent of all agencies surveyed. Wireless communications systems are becoming more complex and costly at a time when revenues are shrinking. Currently, only densely populated metropolitan areas are implementing new systems.

The TeleCommUnity Alliance believes *local communities should receive a portion of the federal revenues from wireless spectrum auctions to enhance interoperability and address interference through the spectrum relocation of local public safety communications systems.*



The federal government has decided to auction the 800 MHz spectrum for commercial uses. This has created interference problems within the portion of the 800 MHz spectrum previously used for local public safety communications. Not only has the FCC not remedied interference in the 800 MHz spectrum, but federal authorities also are proposing a new auction in the 700 MHz spectrum.

Unless

the mixed public safety and commercial uses are adequately separated, the 800 MHz interference problems may be replicated.

Some localities can overcome interference issues by spectrum swaps between commercial and public safety users. Other localities, alter their tower and/or antenna heights. In many areas, interference will be resolved only if public safety officials purchase entirely new systems and equipment. This is an onerous financial burden that local governments should not have to shoulder alone.

Compared to the billions generated by a federal spectrum auction, the aggregate cost of new equipment to enable public safety interoperability should be minimal. The federal government should allocate an appropriate share of the spectrum auction money to address local government efforts to protect the health, welfare, and public safety of their citizens.