SUMMARY OF PUBLIC OUTREACH EFFORTS CONCERNING STATE AND LOCAL PUBLIC SAFETY SPECTRUM MANAGEMENT POLICIES & PROCEDURES

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LIST OF ACRONYMS

CAPRAD	Computer Assisted Pre- Coordination Resource and Database System
DHS	Department of Homeland Security
DOC	Department of Commerce
FCC	Federal Communications Commission
GHz	Gigahertz
IT	Information Technology
LMR	Land Mobile Radio
MHz	Megahertz
NPSPAC	National Public Safety Planning Advisory Committee
NPSTC	National Public Safety Telecommunications Council
NTIA	National Telecommunications and Information Administration
PSWAC	Public Safety Wireless Advisory Committee
RF	Radio Frequency
RFW	Request for Waiver
RPC	Regional Planning Committee
ULS	Universal Licensing Service
VHF	Very High Frequency

EXECUTIVE SUMMARY

On May 29, 2003, President George W. Bush signed an Executive Memorandum announcing the Administration's commitment to develop and implement a comprehensive United States Spectrum Policy for the 21st Century. The President's Memorandum created a Spectrum Policy Initiative that requires the Department of Commerce to prepare legislative and other recommendations to:

1. Develop means to address the critical spectrum needs of national security, homeland security, and public safety
2. Facilitate a modernized and improved spectrum management system
3. Create incentives for more efficient and beneficial use of spectrum and to provide a higher degree of predictability and certainty for incumbent users
4. Develop tools to streamline the deployment of new services and technologies, while preserving national security, homeland security, and public safety, and encouraging scientific research

As required by the President's Executive Memorandum on the Spectrum Policy Initiative, the Department of Commerce, through NTIA, conducted outreach in the form of public meetings to help in the development of recommendations to improve the public safety spectrum management process. Two separate events were held to solicit input. The first meeting, a Roundtable discussion with State and local public safety frequency coordinators, national public safety organizations, and public safety agencies, was held on November 12, 2003. The second meeting, held on February 10-11, 2004, included a much broader participation from the public safety community, academia, manufacturers, and the general public.

From these meetings, a comprehensive set of findings was extracted and are represented below. Specific supporting findings are detailed in Section 3. The combined findings of these two outreach efforts should be considered as broad in scope based on a limited investigation into the spectrum management issues of State and local public safety as they related to the four objectives in the memorandum. They are generally representative of the public safety community, but are not intended to be a finite and limiting set. Throughout the United States, there are reportedly as many as 55,000 public safety agencies of varying size, mission, and structure. Each has unique problems and solutions regarding its own communications requirements, issues and solutions. It may be unfair and unrealistic to assume that these findings are completely representative of this extraordinarily large base of users. It should be noted, however, that a number of National organizations representing much of the public safety community were involved in these proceedings and have made clear statements regarding the four objectives in the Presidential Memorandum.

Key Public Outreach Findings	
Objective 1: Develop a means to address critical public safety needs	
Key Findings	**Agencies require universal guidelines, models, expertise, and financial resources in the short term to benefit and participate in long-term planning and requirements analysis**
	Public safety communications planning and requirements gathering must be guided by a national, representative body
	The national planning body should contain similar characteristics to the successful PSWAC model
Objective 2: Facilitate a modernized and improved spectrum management process	
Key Findings	**The FCC's license application and RFW processes must be reviewed, revised, and revamped to ensure that the associated rules and processes conform to realities in the field, are completed in a timely fashion, and are understandable and navigable for public safety agencies of all sizes**
	Submission of accurate and complete communications system information should be mandatory
	The benefits and drawbacks of combining public safety spectrum authority should be thoroughly examined, clearly identified, and contrasted with other methods of increased coordination and cooperation among multiple levels of government
Objective 3: Create incentives for efficient and beneficial use	
Key Findings	**Efficiency metrics should be defined and developed to measure performance levels across multiple public safety services and frequency bands**
	Public safety spectrum needs a long-term, comprehensive vision to maximize efficient and beneficial use
	Opportunities exist to leverage commercial services to complement existing public safety communications and increase efficiency, but differing reliability requirements must be taken into account
Objective 4: Develop the tools to streamline new technologies	
Key Findings	**Public safety requires equipment to meet specific standards, thorough testing of that equipment, and its timely deployment, as well as innovative planning to maximize the markets and cost savings associated with new technologies**
	Commercial services serve, and will continue to serve, as an important asset to public safety communications; however, most services do not meet public safety requirements

The findings of the two events, the November 12, 2003 Roundtable, the February 10-11, 2004 National Forum, plus additional input received from the public, and NTIA analysis of this information will form the basis of recommendations included in the report to the President.

SECTION 1
INTRODUCTION

BACKGROUND

One of the most critical public safety needs before, during, and immediately after a homeland security threat, or any life-threatening incident, is reliable communications. After the first World Trade Center bombing and the Oklahoma City bombing, the public safety community learned, through a number of efforts, of the problems, issues, and barriers involved in effective communications interoperability. Since the events of September 11, 2001, it has become quite clear that reliable public safety communications is the cornerstone of an effective first response to a homeland security threat, other life-threatening emergencies, or normal, day-to-day public safety activities.

The September 11th attacks demonstrated, in a very public way, how critically important communications capabilities are for our nation's first responders. Since then, more attention has been focused on ensuring that first responders are better equipped to prevent or minimize the effects of any future domestic attacks. A good deal of the debate has centered on how to improve the ability of first responders to communicate with one another by the radio communications.

U.S. spectrum management authority within the United States is divided between the Federal Communications Commission (FCC) and the President. The Communications Act of 1934 established the FCC and gave it the authority to assign frequencies to all non-federal government radio stations in the United States, including the public safety radio services. Under Section 305 of the Act, the President retains the authority to assign frequencies to federal government radio stations. The President has delegated this authority to the Secretary of Commerce, who has delegated it in turn to the Administrator of the National Telecommunications and Information Administration (NTIA). NTIA also serves as the President's principal advisor on telecommunications policy.

An increased emphasis on effective public safety communications, coupled with the dramatic growth in consumer use of wireless communications services, has strained the outdated spectrum management process within the United States. New wireless technologies, new services, and increased demand for these products and applications reveal that improvements are needed in a spectrum management system created more than 70 years ago. As the 21st century unfolds, it has become increasingly obvious that the system must be reviewed, revamped, and revitalized.

On May 29, 2003, President George W. Bush signed an Executive Memorandum announcing the Administration's commitment to develop and implement a comprehensive United States Spectrum Policy for the 21st Century.[1] The President's Memorandum (see Appendix A) created a Spectrum Policy Initiative that requires the Department of Commerce to prepare legislative and other recommendations to—

- Develop means to address the critical spectrum needs of national security, homeland security, and public safety (hereinafter referred to as Objective 1)
- Facilitate a modernized and improved spectrum management system (hereinafter referred to as Objective 2)
- Create incentives for more efficient and beneficial use of spectrum and to provide a higher degree of predictability and certainty for incumbent users (hereinafter referred to as Objective 3)
- Develop tools to streamline the deployment of new services and technologies, while preserving national security, homeland security, and public safety, and encouraging scientific research (hereinafter referred to as Objective 4)

The Executive Memorandum also requires that, among other things, a report on recommendations to address State, local, and private spectrum use be developed and submitted to the President. The Executive Memorandum states that:

> "Consistent with the objectives above, the Department of Commerce shall, in accordance with applicable law, conduct public meetings that will assist with that Departments development of a detailed set of recommendations for improving policies and procedures for use of spectrum by State and local governments and the private sector, as well as the spectrum management process as a whole. The meetings will involve public events to provide an opportunity for the input of the communications industry and other interested parties."

The Administration is committed to satisfying vital public safety needs and ensuring our national and homeland security while promoting economic growth, spectrum efficiency, and global leadership in telecommunications. Throughout the process of addressing the four objectives in the Memorandum, a primary goal remains clear to any change or improvement to the spectrum management system: *the safety and protection of life and property.* Economic development is certainly important, since the introduction and deployment of new technology is essential to the well being of our nation as a whole, but the basic premise of safety of life and property, as well as our national defense cannot be overlooked or downplayed. It forms the basis of why we exist as a nation; "to establish justice, insure domestic tranquility, provide for the common defense, promote the general welfare, and secure the blessings of liberty"[2]. Arguably, an effective spectrum management system should place primary importance and attention on public safety and secondary, but also important, attention to commercial and consumer applications.

"My Administration is committed to promoting the development and implementation of a U.S. spectrum policy for the 21st century….."

George W. Bush

Consistent with the Executive Memorandum and in order to effectively discuss the issues surrounding public safety spectrum management, NTIA planned several events to reach the public safety community and the general public to garner their views and opinions concerning the objectives in the President's Memorandum. These meetings were not only a requirement, but a necessity, since State and local public safety spectrum management falls under the jurisdiction of the FCC, and not NTIA.

On November 12, 2003, NTIA held a Public Safety Roundtable discussion at the U.S. Department of Commerce in Washington, D.C. Participants included federal officials from NTIA and the Department of Homeland Security (DHS), representatives from public safety organizations, and public safety frequency coordinators. The purpose of the roundtable was to introduce the President's Memorandum, discuss issues related to the first two objectives, and gauge the depth of interest in these issues within the public safety community. Additionally, the roundtable was designed to help NTIA develop an effective approach for future public meetings, later held on February 10-11, 2004. The report of the roundtable, including an analysis of the findings, is included as Section 2.

The second event consisted of a series of public meetings held on February 10-11, 2004 in Washington, D.C. These meetings were designed to gather public opinion and input concerning all four of the objectives in the President's Memorandum. These public meetings included a combination of presentations and group discussions on managerial and regulatory aspects of the radio frequency spectrum. Attendees discussed and provided suggested improvements related to the President's objectives from the State and local public safety point of view. Moderators from the Federal Government, subject matter experts, and knowledgeable and respected public safety leaders helped spurn discussions on the issues related to the four objectives. The report and analysis of those public meetings is included as Section 3.

The Appendices contain supplemental and supporting information, such as letters, positions, meeting notes, and other documents important to the public outreach that further support key findings.

These public safety events provided the quickest, most effective means to gauge the views and opinions of the public on the issues related to the President's objectives. The participants provided a representative cross-section of the public safety user community, major public safety organizations, industry and service providers. In general, interest in improving spectrum management for public safety communications was sincere, intense, and forward-thinking, enabling NTIA to develop recommendations based on an accurate, detailed public view of the issues.

ENDNOTES

1. Presidential Memorandum on Spectrum Policy, Memorandum for the Heads of the Executive Departments and Agencies, Spectrum Policy for the 21st Century, June 5, 2003.

2. Preamble to the Constitution of the United States

SECTION 2
SUMMARY AND ANALYSIS OF PUBLIC OUTREACH MEETING #1 (November 12, 2003)

INTRODUCTION

On November 12, 2003, NTIA met with leaders from the public safety communications community to lend their expertise to provide input into the development of a landmark spectrum policy review as outlined by the President's Spectrum Reform Initiative. The attendees were from a broadly-based cross section of subject matter experts (see Appendix B) within the public safety community: organizations, associations, frequency coordinators and users. This diverse group afforded NTIA the opportunity to gathering a more comprehensive set of data from different view points, thereby making a more complete and comprehensive set of recommendations.

Initially, the November 12 roundtable meeting was intended to gather information on only two objectives (Objective 1: develop means to address critical spectrum needs; and Objective 2: facilitate a modernized and improved spectrum management system) of the President's Spectrum Policy Initiative. However, during the meeting, the focus broadened to include general public safety concerns and additional targeted issues peripheral to the intended discussions. This section of the report is a summary of those discussions, as expressed by the meeting participants.

At the outset of the meeting, the participants raised a valid concern that they required additional time to vet the meeting discussion points with their constituencies. To address this concern, a request for further input was issued to the participants to submit comments from their associations on the two objectives and the other topics brought up during the November 12 meeting. The input resulting from that request is provided in Appendix C. Each topic discussed or raised during that meeting is included into this section as either an independent issue or grouped with a related one.

The findings within this section of the report are based upon the views expressed by meeting participants. These findings do not represent a consensus of the opinions of participants, although in most cases the participants themselves agreed on most of the issues that needed to be addressed. NTIA did not seek consensus views. NTIA sought information from each of the individual participants as they represent their constituents or organizations. The findings included in this section are based solely on information either gathered during the November 12 meeting or submitted by participants in response to follow-up questions and issues raised during that meeting.

GENERAL STATE AND LOCAL PUBLIC SAFETY TOPICS

This section covers topics pertaining to general issues that the participants felt were important to be discussed with NTIA. Although these issues are not directly related to any of the four objectives, their resolution is crucial to the overall success of public safety communications across the nation. The following subsections address the topics and discussions related to these issues.

State and Local Public Safety Participation

In the President's Executive Memorandum on Spectrum Management, he requested that the Department of Commerce respond with two reports: one regarding federal improvements, and the second to address State and local improvements. In response to the memorandum, the DOC formed two committees, the Task Force to address federal wireless users and an NTIA working Group to report on the State and local public safety interests. On the Task Force, the Department of Homeland Security's SAFECOM Program represents State and local public safety interests.[1] On the NTIA working Group, State and local public safety's participation is limited to meetings designed to gather their thoughts, concerns, suggestions, and recommended improvements for use in drafting the report. The Presidential Memorandum outlined the method for which data was to be collected. The meeting participants expressed reservations about this approach. During the discussions, NTIA asked that each representative thoroughly outline their concerns and suggestions for making the information gathering process more inclusive. While several issues were raised, a few of them were repeatedly expressed. The group appeared to show relatively universal support for stronger State and local participation in the President's Spectrum Policy Initiative and other national communications issues. Table 2-1 identifies the findings associated with this topic.

Table 2-1
State and Local Public Safety Participation

Key Finding	**The Task Force and NTIA processes should include knowledgeable local and State public safety stakeholders who would actively participate and provide direct and consistent input on behalf of the State and local public safety users and associations.**
Additional Findings	When investigating processes that impact State and local public safety users, the Task Force and NTIA should rely on the inherent knowledge base present in the users and their representatives.
	Two processes exist to provide a voice for local and State public safety users on spectrum issues—the NTIA working Group and the SAFECOM Executive Committee. The efforts of these two groups should be coordinated to create a unified voice and develop a single set of issues and stances.
	The process is fundamentally flawed if it is a federal-only process without direct State and local participation.

The Local, State, and Federal Relationship

Local, State, and federal public safety agencies work together in many situations and share many resources, including spectrum and communications infrastructure. Coordination, interoperability, and spectrum sharing are three issues about which these agencies must be

mindful in any sharing situation. A stronger emphasis should be placed on navigating these issues to better streamline the currently bifurcated spectrum management process of the FCC and NTIA. NTIA requested specific information on how the processes behind spectrum sharing and interoperability could be improved. Table 2-2 identifies the findings associated with this topic.

Table 2-2
The Local, State, and Federal Relationship

Key Finding	Significant sharing of State and local assets with federal users currently exists, but there is an imbalance in the sharing of federal assets with State and local users.
Additional Findings	The current process for State and local users to obtain access to federal channels for use in a sharing environment is complex and difficult to complete in a timely manner.
	Infrastructure sharing should be considered in parallel with frequency and channel sharing.
	There should be a national strategy for fulfilling the spectrum needs of public safety agencies, particularly those needs associated with meeting the requirements identified by the Public Safety Wireless Advisory Committee (PSWAC).
	State and local public safety agencies and organizations should participate within the planning and coordination processes of federal radio system development.
	Existing emergency planning structures (e.g., the National Response Plan) could be explored to help interoperability planning and response.
	Each State could serve as the single point of contact for all State and local public safety agencies within that State when requesting use of federal interoperability channels. Furthermore, direct access to the National Telecommunications and Information Administration (NTIA) for that single State entity, rather than working through the Federal Communications Commission (FCC), might better facilitate frequency authorization.
	The FCC and the NTIA do not always consider spectral efficiency or standards issues with respect to each other's jurisdictions, presenting problems when federal users routinely and consistently share channels with State and local users.

Strong support for coordinated and interactive communications and efforts on all levels of government involved in public safety communications was discussed. Several relatively innovative changes were proposed for facilitating sharing or cooperative communications among public safety. Generally, there was room for improvement on these issues, and the findings reflect the proposed improvements.

Continuation of the Public Safety Wireless Advisory Committee (PSAWC) or a Similar Mechanism

The PSWAC consisted of local, State, and federal public safety agencies, communications equipment providers, and other stakeholders who evaluated the wireless communications needs of public safety agencies through the year 2010.[2] In 1996, the *PSWAC Final Report* delivered recommendations for possible solutions to the communications and interoperability problems faced by all levels of public safety agencies.[3] It has been widely recognized by the public safety community that the PSWAC process was highly successful and beneficial. Discussions pointed to the fact that no similar mechanism currently exists for all public safety agencies and users to work together and to solve ongoing problems. NTIA sought information on possible mechanisms that would enable better coordination between local, State, and federal public safety agencies. Table 2-3 identifies the findings associated with this topic.

Table 2-3
Continuation of the PSWAC

Key Finding	**An intergovernmental joint committee, co-chaired by the FCC and the NTIA and with participation by State and local public safety representatives, should be created to facilitate ongoing cooperation and coordination between various public safety stakeholders.**
Additional Findings	State and local participants would need federal subsidies to participate in a process or committee similar to the PSWAC
	The Federal Government should play a role in standards development for public safety telecommunications.
	The DOC could play an important and involved role in standards development through its relationship with the National Institute of Standards and Technology and the communications industry.

Throughout the day's meeting it was observed that there was no body like the PSWAC to continuously and consistently represent the needs of public safety communications and simultaneously serve as a national intermediary between the different levels of government. Generally, during these discussions there was an expressed desire for more formal and regular cooperation to help different levels of government leverage each other's unique resources in roles that cut across the types of government.

Improvement in Interference Protection

Protection of radio signals from interference is of paramount importance to the success of public safety communications systems. These systems cannot tolerate interference because a disruption in communications could mean the difference between life and death. Advances in technology, and an ever-increasing array of new wireless services have contributed to the difficulty in assessing and predicting the interference environment of public safety communications. NTIA requested clarification on what types of technical information were necessary for effective and efficient spectrum planning and what roles regulators should play in requiring or storing that information. Table 2-4 identifies the findings associated with this topic.

Table 2-4
Improvements in Interference Protection

Key Finding	New technologies operating on nearby radio channels may negatively affect public safety communications, even when the providers and users of those technologies are complying with existing FCC Rules.
Additional Findings	Technological development has made it increasingly difficult to assess channel usage and availability.
	Existing interference rules are not compatible between services that often have conflicting missions (e.g., providing public safety services versus for-profit services).
	Consistent, standardized signal interference to noise ratios should be developed and enforced for public safety radio receivers.
	System reliability measurements should be developed and standardized.
	Equipment vendors do not readily volunteer information on emissions and technical characteristics of radios. Vendors should be required to disclose that information to enable better system planning and design.
	Storing antenna pattern information in the FCC's Universal Licensing System (ULS) database would assist in efficient spectrum management by facilitating better system planning and design.
	Frequency coordinators are an integral part of the frequency assignment process and, given complete information about the existing radio environment, should be able to provide efficient and effective frequency assignments.
	Frequency coordinators should be trained to use the appropriate universal tools (e.g., signal contour modeling software).

Both the importance of resolving harmful interference to public safety communications and the inherent complexities in executing such a task were discussed. Specifically, inconsistencies in the availability of technology and system information and characteristics prevented spectrum planners and frequency coordinators from accurately assessing the radio environment and any potential interference scenarios.

SPECTRUM NEEDS IDENTIFICATION—OBJECTIVE 1 TOPICS

One of the four objectives that the President charged the DOC with examining was to "Develop means to address critical spectrum needs of national and homeland security, public safety, federal transportation infrastructure, and science." The following subsections address the topics and discussions related to this objective.

Identification of Individual Public Safety Agency Spectrum Needs

To accurately identify communications requirements, an agency usually first identifies and prioritizes its essential mission requirements, detailing its responsibilities and functions. Once identified, these requirements help the agency frame and assess key operational, functional, and technical considerations. An agency then typically conducts critical needs assessments that analyze its system constraints and requirements. This process involves examining the present system parameters and accounting for anticipated growth and future requirements, which, in turn, should aid in developing an efficient, cost-effective system that meets the end users' needs and satisfies the agency's critical requirements. Figure 2-1 outlines the theoretical process, however, it was mentioned that real-world requirements identification was often based on available spectral resources, equipment and technology information, and knowledge of the

planning process. NTIA asked panelists to elaborate on specific functions and capabilities that were not available to all public safety agencies.

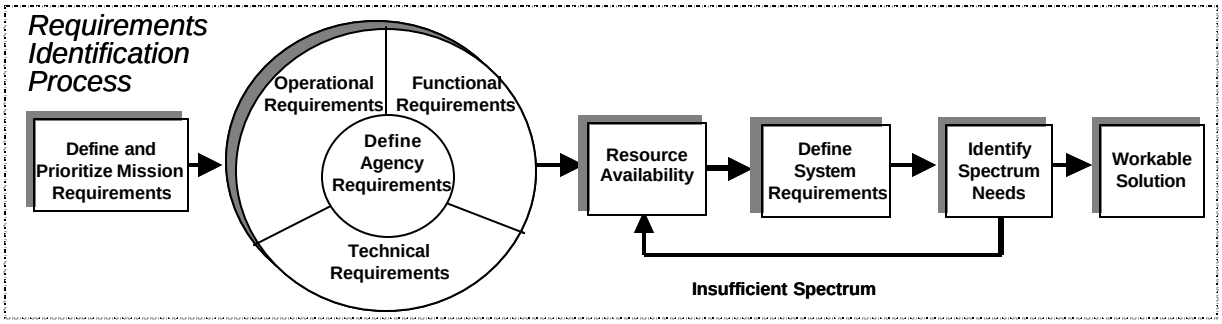


Figure 2-1
Requirements Identification Process

The input provided by the participants demonstrated the diversity of agencies' capabilities and approaches implemented when performing a requirements analysis. As the findings derived from the participants' comments indicate, the thoroughness of the analysis often depends on the funding available. In addition, the ongoing identification of public safety communications needs and a means to address them did not seem to be a consistent priority within agencies, especially those with limited funding. Table 2-5 identifies the findings associated with this topic.

Table 2-5
Spectrum Requirements

Key Finding	**Frequency and channel availability drives system requirements and identifies which technologies can meet those needs.**
Additional Findings	Large public safety agencies, as well as mid-sized agencies to some degree, are able to undertake some system and frequency planning by addressing agency requirements.
	Vendors or consultants usually drive the requirements of some mid-sized agencies and most small agencies.
	Knowledge of the spectrum planning processes and needs in the user community is lacking, especially within small public safety agencies.
	Equipment vendors have vested interests in selling their technology and may unduly influence small public safety agencies that are not completely aware of their needs.
	Frequency coordinators do not have the legal authority to alert frequency applicants of inefficient frequency requests. Use of standard efficiency measurement criteria (e.g., system loading rates, frequency reuse patterns) should be required to limit unnecessary or erroneous frequency requests.

Identification of Nationwide Spectrum Requirements for Public Safety Agencies

Identifying overall public safety spectrum needs must reflect an aggregate articulation from the local level to the national level. An individual public safety agency's spectrum needs must be translated into a notion of what spectral resources would be required throughout a geographic region, which then must be characterized on a national basis. From the discussions,

NTIA noted that following a regional characterization of needs, considerations on a State level must be accounted for before a wholly accurate national picture can be developed. NTIA asked participants to describe the current processes (as shown in Figure 2-2) behind regional, State, and national requirements development and how those processes could be improved to facilitate better planning and organization.

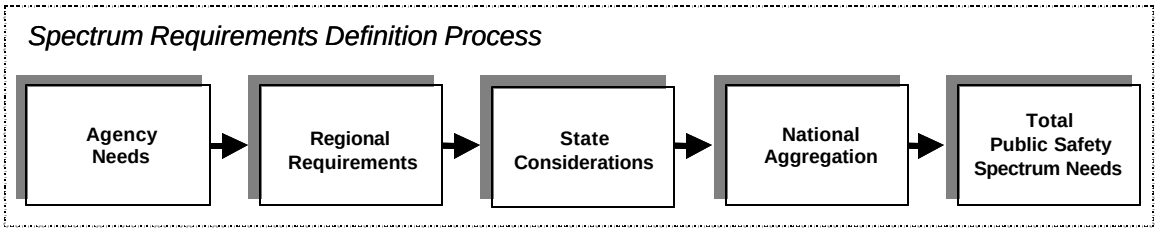


Figure 2-2
Spectrum Requirements Definition

From the discussion, NTIA noted that a requirements process for public safety did not exist and a greater degree of organization between the different levels of government, including extensive coordination should exist. The discussions identified a need for more guidance for the planning process and for achieving greater uniformity, which would make requirements identification more useful and effective. With simple guidance and requirements, the public safety community would be more willing to follow through with a regular requirements process. Table 2-6 identifies the findings associated with this topic.

Table 2-6
Spectrum Requirements Definition

Key Findings	**All stakeholders on every level of government need to be involved in the requirements definition process.**
Additional Findings	The FCC provides very little guidance or organizational aid to regional planning groups and State Interoperability Executive Committees.
	Even though the FCC requires the existence of regional planning groups, they have no real motivation to plan and coordinate in areas that have little or no need for the 700 megahertz (MHz) band frequencies.
	Local public safety agencies need to be included in the State and regional planning phases, especially regarding all interoperability channels.
	No formal or detailed national strategy for spectrum requirements identification or cooperation exists, other than the identified need for interoperability.

The Need for a National Spectrum Policy

The current split in regulatory authority between the NTIA and the FCC places different priorities on different services not only between the two agencies, but within them as well. No national policy presently exists defining how the various services should be prioritized in terms of importance. NTIA sought information on the aspects of a national spectrum policy that included a prioritization of public safety needs.

It was observed from discussions that the lack of a national-level policy outlining the U.S. stance on spectrum use and wireless technology development prohibited a focus on ensuring the stability of public safety communications. In addition, a national set of policy guidelines on spectrum usage, planning, and priorities would help create uniform and expedited spectrum policy, while providing a permanent level of protection to public safety systems. Table 2-7 identifies the findings associated with this topic.

Table 2-7
National Spectrum Policy

Key Finding	**A top-level policy-based decision document should prioritize public safety spectrum use and mandate zero tolerance for interference to public safety communications.**
Additional Findings	The European Union has developed a top-level document that prioritizes and manages spectrum-based services and issues. The United States has no similar high-level organization or plan.
	A long-term migration strategy should be developed that would ultimately direct the technological transition of public safety systems.
	Public safety agencies should be able to use commercial technology and standards when appropriate.
	Public safety issues should be in the forefront of the FCC's spectrum policy priorities.
	Any national spectrum policy must address public safety issues.

THE SPECTRUM MANAGEMENT PROCESS—OBJECTIVE 2 TOPICS

The second of the four objectives that the President charged the DOC with examining was to "Facilitate a modernized and improved spectrum management system." The current public safety spectrum management process involves three main components: the user, the frequency coordinator, and the FCC. All three are important links that must be considered before a license is issued. The following subsections address the topics and discussions related to this objective.

User Activities in the Spectrum Management Process

When discussing the spectrum management process, it is necessary to consider the activities that an agency must complete to initiate the frequency assignment process that will ultimately lead to the assignment of the channels to be used in that agency's planned communications system. For success, users must accurately define their needs, understand the assignment process, correctly complete the required forms, and work cooperatively with the appropriate certified frequency coordinator. Although the process depicted below in Figure 2-3 was not discussed in detail during the November 12 roundtable meeting, NTIA sought input on this process and how it works within the overall framework in the frequency assignment process. Other discussions on November 12 roundtable indicated the difficulty agencies faced in understanding this process and determining the best way to address their spectral needs.

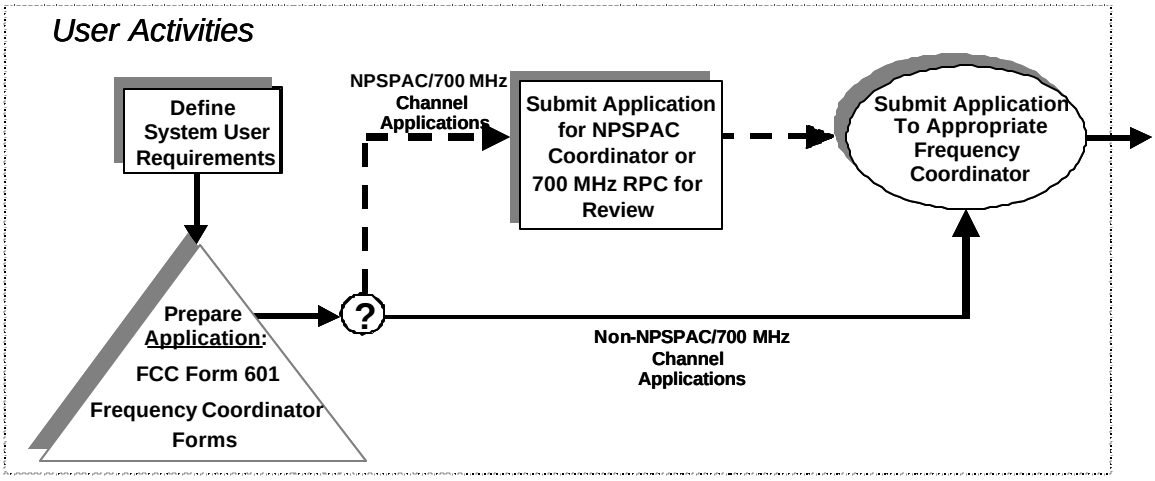


Figure 2-3
User Activities in the Spectrum Management Process

The participants largely agreed that Figure 2-3 accurately represented the activities an agency undertook when initiating the frequency assignment process. No significant improvements were suggested other than a simpler, clearer, and more universal process. Table 2-8 identifies the finding associated with this topic.

Table 2-8
User Activities in the Spectrum Management Process

Key Finding	Regional Planning Coordinators and users should employ an iterative process when planning the use of 700 MHz channels and the 800 MHz National Public Safety Planning Advisory Committee (NPSPAC) channels.

Frequency Coordinator Activities in the Spectrum Management Process

The frequency coordinator process varies among the different coordinating bodies. The diagram in Figure 2-4 identifies a general overview of the frequency coordinator process. As the bridge between the user and the FCC, the coordinators must ensure that the applications are completed correctly, appropriate frequencies are selected, and a clear line of communication is maintained between the user community and the FCC. The coordinating bodies are crucial in helping to speed up the application process; however they are often limited by their lack of authority. To gain a better understanding of this process and how to improve it, NTIA asked the participants to comment on it.

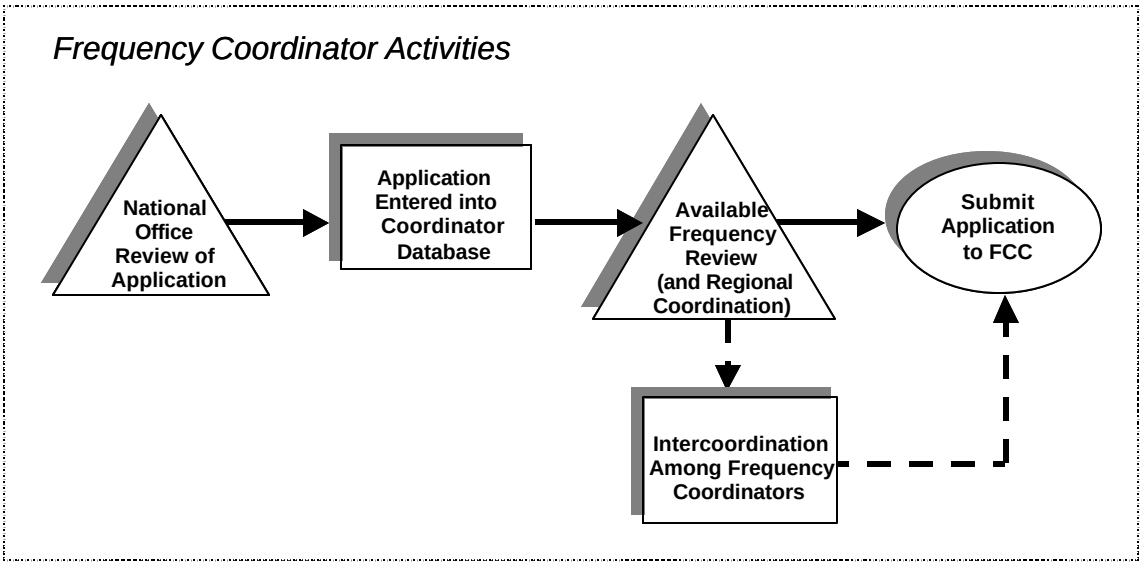


Figure 2-4
Coordinator Activities

From the discussions, it was noted by NTIA that Figure 2-4 accurately represented the activities of public safety frequency coordinators. It was learned that the problems tended to occur in the part of the frequency coordinators' process that occurred when transitioning between the FCC and the coordinating bodies. NTIA noted that coordination is not a simple and timely process and that there should be more reliance on qualified bodies in the field. Table 2-9 identifies the findings associated with this topic.

Table 2-9
Coordinator Activities

Key Finding	**The current FCC Rules do not always reflect the reality of the coordination process in the field. Geography, in particular, requires different decision models and considerations than are delineated in the Rules.**
Additional Findings	The coordination process can also involve regional review of the application, and this step should be reflected in the diagram above.
	Pre-coordination is not currently possible for international border frequencies, although a new joint process is being discussed with Canadian frequency coordinators.
	The authority to grant waivers has been shifted away from the FCC's license-processing staff in the field and moved into the bureaucratic processes of the FCC. Approximately 90 percent of that waiver granting authority should rest with the field staff.
	The engineering, field-testing, and detailed coordination needed to address the characteristics particular to a region could only occur at the local or agency level, not at a national level.
	Currently, it is unnecessarily difficult to obtain a waiver of the FCC's Rules. Obvious exceptions should be incorporated within the FCC's Rules, and a formal process for acquiring waivers based on those exceptions should be established.

FCC Activities in the Spectrum Management Process

The FCC plays an important role in the spectrum management process because it is here where a license is ultimately issued to the applicant. Figure 2-5 is a flow chart that depicts the

FCC's review and approval process. NTIA learned that the FCC's role might not be transparent to users and that this lack of understanding may hinder the user's ability to appropriately prepare an application for frequencies. The FCC process has built into it a series of checks to help prevent any harmful interference or other threats to reliable communications for all services. A significant concern for applicants is the length of time required for a request for a license to be acted upon by the FCC versus the expedited process that typically occurs for federal applicants.

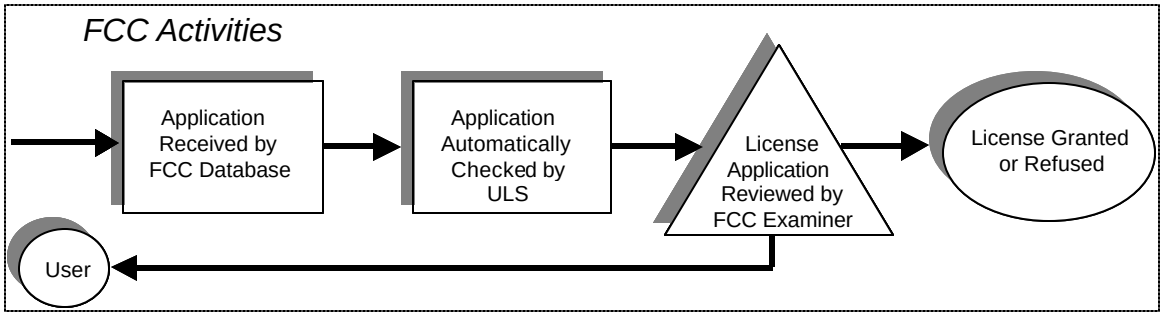


Figure 2-5
FCC Activities

NTIA observed discussions that pointed out the laborious nature of the waiver process. Although participants were asked to address this process description, the process's positive and negative features, and suggested improvements, detailed discussions never occurred. Table 2-10 identifies the findings associated with this topic.

Table 2-10
FCC Activities

Key Finding	**The FCC should ensure a complete understanding of the process by the users and coordinators. In addition, the FCC may want to delegate more responsibility to the coordinators.**

The Speed of the FCC's Rulemaking Process

The FCC's spectrum rulemaking process can vary from band to band and from region to region; however, the rules that guide each band's use, assignments, and operation have been derived from the rulemaking process. It was noted by NTIA from discussions that the *PSWAC Final Report* established the dire need for additional spectrum for this community, yet the rules to release or guide the allocation of some of these bands can take up to several years to complete. Deliberations drag on over every detail, and spectrum lies fallow when desperately needed to assist life-saving operations.

NTIA observed a sense of frustration with the drawn-out rulemaking process, it was recognized that the rulemaking process was somewhat necessary. In the end it was observed that the participants advocated forcing action through time limits even at the cost of making a correctable error in judgment within the resulting policy. Table 2-11 identifies the findings associated with this topic.

Table 2-11
Rulemaking Process

Key Finding	The internal FCC rulemaking process seems to be unnecessarily protracted.
Additional Findings	Existing problems with internal FCC rulemaking procedures are both bureaucratic and political in nature.
	Statutory time limits should be imposed on the FCC's rulemaking procedures to ensure a timely response to the initiation of rulemaking requests.
	Public safety issues should be prioritized where practical within the FCC's regulatory proceedings, and decisions should be made in a timely manner.
	The Congress should provide better oversight on the operations and practices of the FCC.
	Public safety agencies support the open, public rulemaking process and recognize it as being necessary for the development of public safety spectrum policy.

A Single Spectrum Management Agency

The current spectrum management process splits authority between the NTIA, which is responsible for managing the use of spectrum for the Federal Government, and the FCC, which licenses spectrum for commercial, State, and local government uses. Combining the two entities under a single spectrum management agency has been discussed as a way to potentially improve the coordination and cooperation among the various levels and groups of spectrum users. Concerns regarding the impact of a single spectrum management agency were expressed; however, a full discussion of both benefits and drawbacks did not occur. A paper authored jointly by many of the associations, which provided some reasoning behind their stated opposition, was distributed to the attendees, and is contained in Appendix D.

Even though this issue was not discussed in a formal manner, there was strong opposition to the introduction of a single entity to manage all public safety spectrum. It should be noted that one participating entity to the roundtable, in its formal comments submitted after the meeting, supported the notion of spectrum management by a single entity. Those comments are contained in Appendix C. NTIA observed that the majority of participants felt that a single entity would result in the State and local public safety interests becoming secondary to federal interests. Table 2-12 identifies the findings associated with this topic.

Table 2-12
One Single Spectrum Authority

Key Finding	State and local public safety agency representatives acknowledged that the current spectrum management system could be improved but stated that combining the authority of the NTIA and the FCC was not a viable solution.

PERIPHERAL TOPICS FOR FURTHER CONSIDERATION

During the November 12 Roundtable, the participants also raised several issues that were peripheral to the objectives outlined in the President's Memorandum; however, the participants raised them as issues that should be discussed within NTIA. The following subsections address the topics and discussions related to these issues.

The Proper Role of Information Technology in Spectrum Management

The use of information technology (IT) in the spectrum management process has gradually increased over time. License applications were at one point solely paper based; now the vast majority are submitted electronically. Technical data was once available only in hard copy; now virtually all license information is available through online databases. Advanced IT systems and software are continually being developed to provide more accurate signal propagation and contour models. IT has become an integral part of the spectrum management process, and as technology continues to develop, opportunities will arise to automate other portions of the process, improve efficiency, and disseminate more information.

Recognizing this, several questions remain regarding the future role of IT in the spectrum management process. In what areas can technology increase efficiency or certainty? What portions of the spectrum management process can be increasingly automated to boost the speed of the process? Conversely, the use of IT poses questions related to control. What aspects of the spectrum management process must remain under the scrutiny of communications personnel, be they radio managers or FCC staff? Which areas should not be automated or computerized?

Solutions to Interstate, Interregional, and International Coordination Issues

While significant coordination occurs in and among States, regions, and border countries, many issues are difficult to mitigate in advance and are dealt with on a case by case basis. Pre-coordination issues, spectrum sharing considerations, and differing spectrum management processes are a few factors that affect frequency coordination and spectrum management between States, regions, and countries. Technologies and radio systems, and their associated capabilities, vary across States and regions and are often unknown to public safety agencies that are geographically proximate but that report to different coordinating authorities. Conversely, wide area systems operating on shared spectrum across State or regional boundaries have special coordination and interference protection requirements. Also, Canada and Mexico govern and coordinate their spectrum differently than the United States. Thus, the United States negotiates differently with each country in efforts to coordinate and share border spectrum for public safety missions.

These issues and others warrant attention because they affect the efficient and effective use of spectrum for public safety agencies in and around the United States. The processes behind interstate and interregional coordination should be examined for possible methods of improvement and increased information sharing and coordination across various jurisdictions and geographic areas. The United States should also work closely with Canada and Mexico to develop effective, efficient, and consistent sharing and coordination procedures for managing border spectrum. Many of these considerations should be examined in the context of a national spectrum policy.

Use of Technology and Politics to Address Radio System Costs and Limited Public Safety Agency Funding

Funding issues and equipment costs have long been the most difficult obstacles for public safety agencies to overcome in developing an effective communications system. When combined with the limited availability of spectrum, funding issues usually determine which equipment or system an agency is able to purchase or maintain. Technological developments may present new opportunities for public safety agencies to more efficiently share spectrum and system costs. These development may also lead to increased, dedicated funding for system purchases or upgrades.

Advances in technology have progressively enabled wireless users to carry more traffic and provide more services on the same amount of spectrum. While this technological development is not a solution to limited public safety spectrum availability, it may provide a means to spread the cost of radio equipment across multiple public safety agencies. Trunking technology, narrowbanding technology, and various commercial technologies offer opportunities for more efficient and effective spectrum use, as well as increased spectrum-sharing capabilities.

Even though advances in technology can help public safety agencies, the United States' focus on homeland security and public safety issues presents an invaluable opportunity for public safety agencies to address long-standing funding needs. Larger portions of the U.S. budget have been dedicated to improving capabilities in these areas, and public safety agencies have the opportunity to capitalize on those increases in spending.

SUMMARY OF KEY FINDINGS

The purpose of the November 12 roundtable meeting was to discuss two objectives of the Presidential Memorandum—developing a means to address critical spectrum needs and improving the spectrum management process. During the discussion, general State and local public safety topics arose, as did peripheral topics for NTIA to further consider as recommendations are developed. Table 2-13 lists the key findings extracted from attendee's participation and concerns.

Table 2-13
Summary of Key Findings

Topic Area	Key Findings
General Public Safety Topics	• Significant sharing of State and local resources with federal users currently exists, but there is an imbalance in the sharing of similar federal assets with State and local users. • An intergovernmental joint committee, co-chaired by the Federal Communications Commission (FCC) and the National Telecommunications and Information Administration (NTIA), and with participation by State and local public safety representatives, should be created to facilitate ongoing cooperation and coordination between various public safety stakeholders during the frequency application, licensing, and border region coordination processes. • New technologies operating on nearby radio channels may negatively affect public safety communications, even when the providers and users of those technologies are complying with existing NTIA or FCC Rules.
Objective 1 Topics	• Frequency and channel availability drives public safety communications system requirements and identifies which technologies can meet those needs. • All stakeholders on every level of government need to be involved in the critical spectrum requirements definition process. • A national spectrum policy should prioritize public safety spectrum use and mandate zero tolerance for interference to public safety communications. • The majority of small to mid-sized agencies do not undertake long-range spectrum planning or formal system requirements derivation. • The United States should work closely with Canada and Mexico to develop effective, efficient, and consistent sharing and coordination procedures for managing border spectrum, particularly with respect to 700 MHz band frequencies.
Objective 2 Topics	• Regional Planning Coordinators and users should employ an iterative process when planning the use of 700 megahertz (MHz) channels and 800 MHz National Public Safety Planning Advisory Committee channels. • The current FCC Rules do not always reflect the reality of the coordination process in the field. Geography, in particular, requires different decision models and considerations than those delineated in the Rules. • The FCC should ensure a complete understanding of the licensing process by the users and coordinators. The FCC may also want to delegate more responsibility to the coordinators. • The FCC rulemaking process seems to be unnecessarily protracted. The FCC may be too concerned with perfecting a rule, often missing the effective window of opportunity. • State and local public safety agency representatives acknowledged that the current spectrum management system could be improved but that combining the authority of the NTIA and the FCC was not a viable solution.
Peripheral Topics	• The proper role of information technology in spectrum management • Methods to improve interstate, interregional, and international coordination • The technological, political, and funding influences on public safety communications.

ENDNOTES

1. The SAFECOM Program represents one of the critical Federal E-Gov initiatives of the Administration. The primary goal of the SAFECOM Program is to develop solutions for communications interoperability among the Nation's Federal, State, and local public safety and first responder community. The Department of Homeland Security is the managing partner of the program. Additional information can be found at www.safecomprogram.gov.

2. The Public Safety Advisory Committee (PSWAC) was a Federal Advisory Committee (jointly established by the FCC and NTIA to address the telecommunications needs of the Federal, State, and local public safety community through the year 2010. It was established in 1995 and met on a regular basis until it published its final report in 1996. Membership of this committee, more than 500, included a cross section of the public safety community from government, public safety organizations, industry, academia, and the general public.

3. The Final Report of the Public Safety Wireless Advisory Committee, September 1996, Philip L. Verveer, Chairman. Available online at the NTIA website, http://ntiacsd.ntia.doc.gov/pubsafe/alternativespectrum.htm.

SECTION 3

SUMMARY AND ANALYSIS OF PUBLIC OUTREACH MEETING #2

(February 10-11, 2004)

INTRODUCTION

On February 10 and 11, 2004, NTIA held a two day National Forum on Public Safety Spectrum Management (National Forum) in Washington, DC. The National Forum was an open public meeting and attracted a diverse group of attendees, including public safety agencies and association representatives; equipment vendors; consultants and Federal, State and local users; and legislative and regulatory staff members. The purpose of the National Forum was to discuss the issues raised during the November 12 meeting and to identify other issues that needed to be addressed in meeting the objectives of the President's Memorandum as they relate to public safety. During the course of the 2-day forum, participants validated the findings from the November 12 meeting, raised many new issues and concerns pertaining to all four of the President's objectives, suggested methods of improving identified problems, and completed a survey containing questions related to public safety spectrum management.

The National Forum included a variety of events to gather information from participants. The first day was split into two parts. During the morning, a plenary meeting was held with keynote speakers and other public safety experts who helped to explain the President's Initiative and the importance of the group's participation. The afternoon sessions provided an opportunity for the participants to voice their opinions regarding the objectives in their respective breakout sessions.

The bulk of the findings gathered at the National Forum were developed from the discussions in the breakout sessions. Each sessions had two facilitators and a federal moderator who led discussions based on certain relevant processes or examples regarding each objective. Prior to the meeting, the facilitators also received a basic facilitator's guide to create a universal set of operational protocols to run the sessions. To prepare them to actively provide relevant input, participants could sign up to receive information prior to the event through a public safety related Web site. Within the packet of information they received was a set of one-page fact sheets on each objective that introduced the topics, issues, and focal areas to be discussed within the breakout sessions.

The second day's morning session was much like the first day's afternoon session; a pair of objectives was discussed in each breakout session. The afternoon of that day involved a town hall discussion with leaders from both the NTIA and the FCC. Following the lively town hall discussion, the attendees answered a series of targeted questions related to the objectives through a wireless polling system called OptionFinder.

In preparation for the February National Forum, a questionnaire to be administered on the final afternoon to participants via a wireless polling system was created. The questionnaire, provided in Appendix F, consisted of 2 practice questions, 7 demographic questions, and 65 questions related to discussion topics at the February forum.

For the objective-related questions, a preparatory analytical exercise was conducted—looking at the questions of interest created by NTIA, findings from the November meeting, outside input from the stakeholders, and a general examination of the objectives from a historical public safety stance as noted on the public record. The analysis allowed the generation of a series of questions to expose the expected findings, if there were any of consequence. The questions were structured to rely primarily on a Lickert scale—the questionnaire gathers the participant's attitude to the topic in question by gauging his or her response on a five-point horizon from "strongly disagree" to "strongly agree." Assigning a numeric value to each response allows easy manipulation and analysis of the corresponding output. Other questions required direct answers through a traditional multiple-choice question.

It should be pointed out that this is not a scientific questionnaire, but one based on simple analysis and familiarity with the issues crucial to public safety. It was observed that a large majority of the questions posed in the questionnaire did align with the discussions that took place in the breakout sessions, providing a numeric representation of that input. It is important to point out, however, that the number of participants, 47 in total, was far below the anticipated level of participation and led to a sample not numerically nor statistically representative of the larger public safety communications population. However, it should be noted that those that did participate represented the leadership and most senior experts with tremendous amount of knowledge in the public safety spectrum management community.

All of the data gathered through the two meetings and the survey were compiled and analyzed to drive the body of this section. The findings were carefully extracted from the November 12 meeting and subsequent analysis, notes and audio recordings of the February breakout sessions, and breakdowns of the survey's output. These findings were then aligned within the appropriate objective under key groupings as determined by the discussion tracks at the February forum. From these groupings, *key* findings were selected and then the related *supporting* findings were identified below each of the key findings. The findings summarized in this section do not represent a consensus of the opinions of participants. The information collected and analyzed will be used, in part, as the basis for NTIA's overall recommendations regarding the President's Executive Memorandum on Spectrum Management.

KEY FINDINGS

Throughout the course of the NTIA's information gathering, participants in the process provided valuable input and perspectives on the public safety spectrum

management process. Their contributions highlighted various areas or stages within the overall spectrum management process that are easily navigable and function smoothly, areas where bottlenecks or obstacles occur, functions that are outdated or technologically behind the times, and portions of the process where improvements may dramatically increase the fluidity of spectrum management. Discussion and comments associated with those contributions resulted in the identification of key findings and supporting findings of the information-gathering sessions. These findings are the result of NTIA's analysis of the information gathered from the meetings on public safety and are used to form the basis for which NTIA makes recommendations on improvements to public safety spectrum management.

Key Findings for Objective 1: Develop Means to Address the Critical Spectrum Needs of National Security, Homeland Security, and Public Safety

Objective 1 focuses on the spectrum requirements of the State and local public safety community. Within this objective, participants explored the ways in which the public safety community determines, and addresses its spectrum requirements to ensure reliable, effective, and, when needed, interoperable communications.

Within the breakout sessions, facilitators guided the participants through a series of slides that identifies the key findings related to Objective 1 from the November meeting. Succeeding slides focused the participants on the related processes that best represent the activities in which an agency should employ while performing a requirements analysis. The participants identified flaws in the spectrum management processes as presented, attributes that worked well and those that did not, and suggested improvements to the process. This led to a more general discussion on State and local public safety communications spectrum requirements.

During the discussions in both November and February, it was clear to NTIA that the public safety community needed a fully-funded organized body to lead a requirements determination or analysis. Although there were several bodies, such as the National Public Safety Telecommunications Council (NPSTC) already in place, none fulfilled this responsibility in a national or comprehensive manner[1]. However, participants on several occasions noted that the Public Safety Wireless Advisory Committee (PSWAC) might serve as a good model on which to base this proposed body.

Findings related to Objective 1 can be summarized and explained through three key findings:

- Agencies require universal guidelines, models, expertise, and financial resources in the short term to benefit and participate in long-term planning and requirements analysis.

- Public safety communications planning and requirements gathering must be guided by a national, representative body.

- The national planning body should contain similar characteristics to the successful PSWAC.

These key findings focus the topic areas of discussion and provide the context in which supporting findings can be related and reported.

Key Finding #1 for Objective 1

Public safety agencies of all sizes struggle with planning their communications systems, including generating their spectrum requirements. Across the nation, there is no universally prescribed formula to drive the identification of an agency, city, county, or State's spectrum requirements, particularly considering the diversity of systems, bands, and users. Consequently, a disjointed, complicated process is used that is difficult for any agency to navigate, especially those already strapped for financial and labor resources. There is a distinct need for a national body to help unify this fragmented system. Table 3-1 illustrates seven findings from the February forum that support this initial key finding for Objective 1.

Table 3-1
Objective 1, Key Finding 1 and Supporting Findings

Key Finding	**Agencies require universal guidelines, models, expertise, and financial resources in the short term to benefit and participate in long-term planning and requirements analysis**
Supporting Findings	Functional and technical requirements are relatively universal, but operational requirements remain variable; however, all requirements should be reexamined as planning proceeds
	Agencies lack the funding or resources for planning; small agencies often cannot even keep up with their channel licensing
	There is a need to establish usable loading criteria to evaluate agency requirements
	Increased public safety communications coordination between levels of government is important
	Public safety lacks a prioritization of services and a long-term strategic vision to guide its spectrum needs
	The 4.9 gigahertz (GHz) band serves as a good model for planning other frequency bands—users and technologies should be planned for the spectrum while anticipating the public need and future technology—not the reverse
	When looking at an aggregated approach, there are almost too many variations to consider, making such an approach unwieldy; using the worst case scenario as the baseline could be an alternative

The first supporting findings states, *"Functional and technical requirements are relatively universal, but operational requirements remain variable; however, all requirements should be reexamined as planning proceeds."* Agencies must examine their functional, technical, and operational requirements; however, as a participant pointed out, most agencies' functional and technical requirements were the same. This assumption could be made because the technical requirements could be based on a predetermined formula that accounted for band, number of users, system characteristics, and other standard measures. As for functional requirements, all public safety agencies had similar requirements because they had similar agency objectives—safety of life and property.

Participants supported the idea that the users needed to be involved so that the requirements accurately reflect the needs of the users on the street. Without this involvement, users' needs might not be addressed in the requirements planning. At that point, an agency might be forced to rely on frequency and channel availability to drive its system requirements, as noted in the November meeting, and then it would have to identify its technological options based on its channels and not its needs. It was observed by NTIA that agencies often did not concentrate enough effort on the planning and requirements portion of their communications development; specifically, communications systems designers and developers should ensure that they examined all resources and alternatives as planning proceeded. This view was derived from the discussion concerning whether spectrum availability drove resources. It was asserted by participants that if those in control of a system's development or upgrades constantly evaluated both technological resources and spectral alternatives against financial restrictions, they would discover more creative, cost-effective, and operationally sound solutions regardless of spectrum availability. In November, it was mentioned that knowledge of the spectrum planning processes and needs in the user community was lacking, especially within small agencies. Without comprehensive knowledge, communications system managers would find it difficult to create and evaluate their solutions.

"We need to look at how the agencies use their spectrum."

The second supporting finding concerns the lack of resources at the local level, stating, *"Agencies lack the funding or resources for planning; small agencies often cannot even keep up with their channel licensing."* Many participants, some national spectrum managers and some local users, stated that a critical shortage of resources existed at the local level, which could not adequately keep pace with their current communications needs. If agencies do not have the staff to minimally address keeping their system operational, then they may spend little or no time planning for future needs. The severity of this resource shortfall was underscored when it was mentioned that over 75 percent of the nation's law enforcement agencies employ fewer than 20 full-time employees. NTIA used the OptionFinder to survey the participants regarding the issue of limited resources. Figure 3-1 below indicates the results of the group.

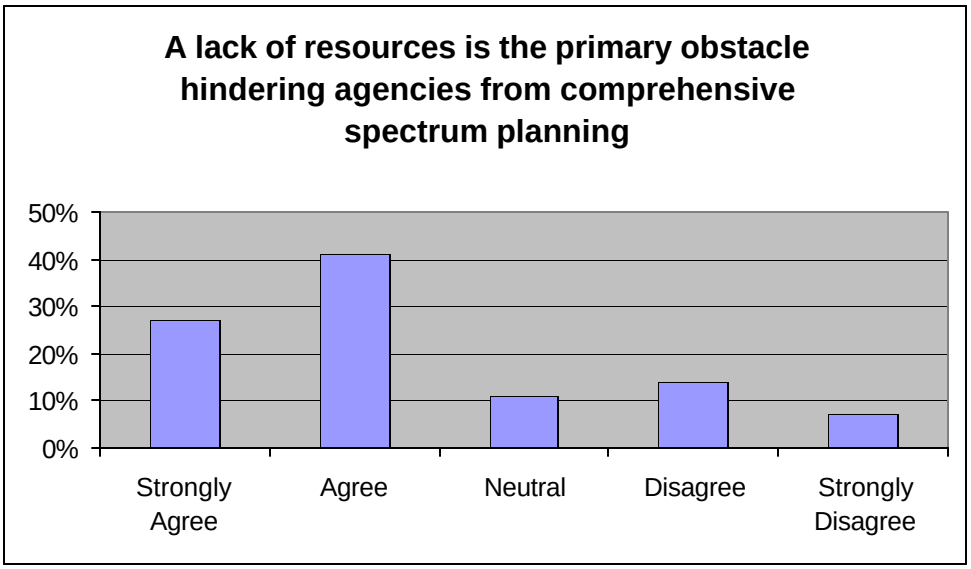


Figure 3-1
Lack of Public Safety Agency Resources

In addition to staffing shortages, agencies also face budget shortages and need funding for public safety systems planning. Agencies tend to prioritize their limited spending on their top priorities -- "guns and hoses". Radios and communications tend to be lower priorities. During the November meeting, attendees specifically pointed out that vendors usually drove the requirements of some mid-sized agencies and most small agencies because of the lack of resources in-house or funds to hire impartial outside contractors. The participants, on several occasions, noted that communications planning was critical, but that the responsibility could not be left to the agencies alone to ensure that it occurred or became a budget priority. It was also noted that the agency resource shortage with regard to planning did not exist at all agencies. In the November meeting, it was observed that large public safety agencies, as well as some mid-sized agencies, were able to undertake some system and frequency planning by addressing agency requirements.

In determining requirements, representatives spoke of a lack of uniformity and a lack of measurements for making such determinations. The third finding states, "*There is a need to establish a usable loading criteria to evaluate agency requirements.*" Providing a standard of measurement would make both the evaluation of individual agencies and comparison between agencies easier. Using a measurement mechanism or alternative techniques may make examining, aggregating, and rating requirements simple and universal. For example, in November, attendees noted that public safety frequency coordinators did not have the legal authority to alert frequency applicants of inefficient frequency requests. Use of standard efficiency measurement criteria (e.g., system loading rates and frequency reuse patterns) should be required to limit unnecessary or erroneous frequency requests based on an agency's sometimes imprecise or unrealistic requirement calculations.

Interoperability and sharing among different government groups have been crucial to the success of public safety. The fourth supporting finding specifically states, *"Increased public safety communications coordination between levels of government is important."* Ensuring that all stakeholders on every level of government were involved in the requirements definition process is of critical importance. Participants at the February meeting noted that during the planning and requirements identification process, agencies should ask, "With whom do I need to communicate or with whom can I combine my system?" Trying to find combined or shared resources for better coverage and site sharing is also important. Alaska and South Dakota's successful experiences developing joint systems between State and local and federal agencies were provided as examples.

The fifth supporting finding focuses on the long-term implications of planning. The finding states, *"Public safety lacks a prioritization of services and a long-term strategic vision to guide its spectrum needs."* In November, it was pointed out, as a comparison, that the European Union had developed a top-level document that prioritized and managed spectrum-based services and issues, while the United States had no similar high-level organization or plan. Participants noted that a gap analysis had been begun by a Federal program to identify the gap between public safety needs and the current technological offerings that meet public safety's requirements. Public safety is diverse group, and that such a common vision would help to unify its voice and needs for the vendors. At the same time, public safety asked for support from the regulators through a prioritization of services based on the community's safety of life responsibility.

Public safety stakeholders at the meeting recognized that the new technology and rapidly changing spectrum environment required innovative approaches to regulations and provided some ideas. The sixth supporting finding notes *"The 4.9 GHz band serves as a good model for planning other frequency bands—users and technologies should be planned for the spectrum while anticipating the public need and future technology—not the reverse."* More generally, in November, it was noted that any national spectrum policy must address public safety issues. In the 4.9 GHz band, the approach was favored because the participants felt that it maximized the capabilities of that spectrum while also meeting the related public safety need of wideband data. The 4.9 GHz band plan has some drawbacks because it did not plan for interoperability between the agencies. This new management ideal has support in theory but with the caveat that it had not been implemented on a large scale and it was a particularly suitable regulatory approach for this spectrum and its intended use. Participants particularly approved of the flexibility built into both the regulatory process and the spectrum management process applicable to the band.

The final supporting finding speaks directly to the key finding—the need for a national entity to lead the requirements process. Specifically, the seventh finding states, *"When looking at an aggregated approach, there are almost too many variations to consider, making such an approach unwieldy; using the worst case scenario as the baseline could be an alternative."* The discussion points initially provided to the facilitators suggested an aggregated method to gather national requirements. Participants

strongly opposed such as approach because of the complexities of managing such a process combined with the difficulties of rolling up more than 50,000 agencies' requirements into a national model. As an alternative, attendees at both events proposed that a model be created loosely on the PSWAC model that examined the worst-case scenarios from a spectrum management perspective and applied a formula based on those results to different situations as applicable.

Key Finding #2 for Objective 1

The breadth and diversity within the State and local public safety communities make it quite difficult to easily capture their requirements information. There exists a lack of leadership in public safety requirements definition that was last filled by the PSWAC in 1996. Participants clearly noted in both events that it was time to begin to address this issue once again. Table 3-2 describes nine findings that support the second key finding within Objective 1.

Table 3-2
Objective 1, Key Finding 2 and Supporting Findings

Key Finding	Public safety communications planning and requirements gathering must be guided by a national, representative body
Supporting Findings	Requirements definition are not clear, and it is an enormous part of the spectrum management process and should be given considerable weight within the process
	Best practices documents should be developed and disseminated to assist smaller agencies with spectrum planning
	Three types of need should be considered as agencies look at requirements: critical, current, and future needs plus Department of Homeland Security (DHS) related requirements
	Agency and regional needs should be considered in parallel
	Planning, especially on a national level, should be an ongoing process
	As spectrum requirements flow up from the small local agencies to a national perspective, information on the process and other relevant items should flow down from the top
	Spectrum requirements should be defined clearly and prioritized
	The differences between public safety and critical infrastructure should be more clearly delineated, and first responders should have higher priority with regard to spectrum
	A certain level of flexibility should be built into the channels

There is a need for a national, representative communications planning and requirements body and this is the second key finding under the first objective. In fact, during the February event, NTIA polled the participants on this question and found that 81percent agreed that such a body would be beneficial, as shown in Figure 3-2 below.

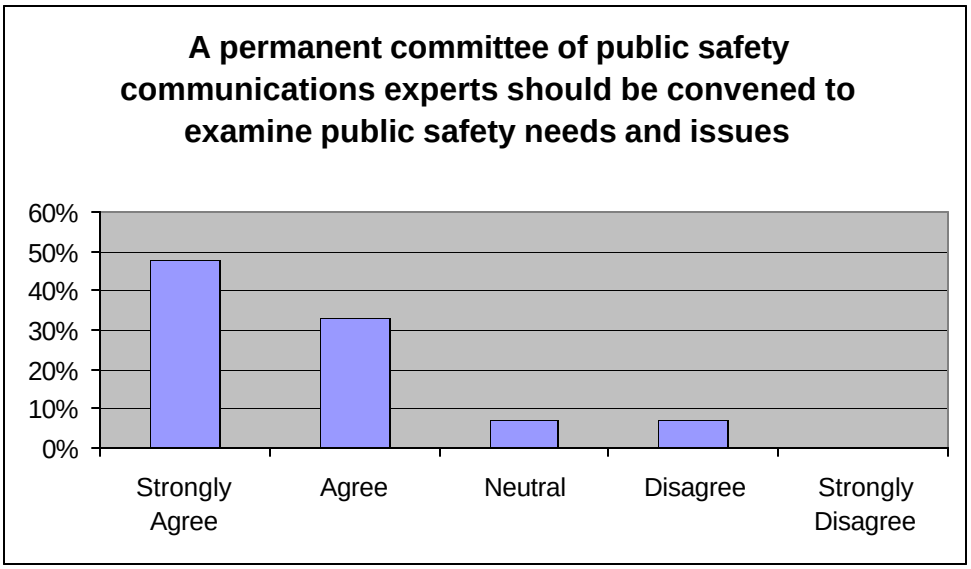


Figure 3-2
A Permanent Public Safety Communications Committee

Nine findings from the February event supported this second key finding for Objective 1. Spectrum requirements identification is a broad topic and it is important to have a clear understanding of both its definition and reach. The first supporting finding specifically states, *"Requirements definition should be clear, and it is an enormous part of the spectrum management process and should be given considerable weight within the process."* Similar to the need for universal measurement techniques to guide requirements, it is also important to set a universal definition of spectrum requirements. Participants also noted that performing the requirements definition step was often the most overlooked part of the spectrum management process, leading to future difficulties for that agency. To verify this, the OptionFinder survey asked whether it was important to gather comprehensive and consistent spectrum requirements. The particularly strong support by respondents in attendance should be noted, as illustrated in Figure 3-3 below.

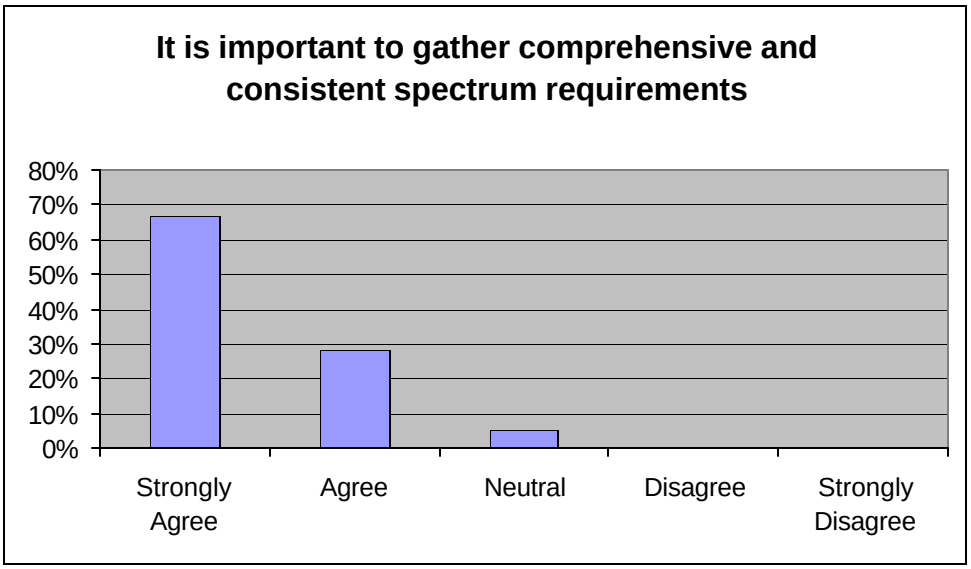


Figure 3-3
Gathering Spectrum Requirements

The second supporting finding notes, *"Best practices documents should be developed and disseminated to assist smaller agencies with spectrum planning."* Smaller agencies often lack the resources to adequately address the necessary spectrum requirements and planning process. On many occasions, participants mentioned or alluded that a document or series of documents be created to help guide the agencies through this process. The logic was that with better planning, the agencies could create more effective and efficient systems to both save lives and maximize spectrum use. Another attendee proposed that a best practices guide for navigating the political processes would be helpful in securing funding and locking in an agency's plans, but also concluded that the diversity between regions would make such a project unrealistic.

During the November roundtable event, some participants noted that the FCC provided very little guidance or organizational aid to regional planning groups and State interoperability executive committees. Furthermore, they asserted that these groups were effective channels to flow information to and from State and local public safety agencies concerning their communications. Although a best practices approach was mentioned specifically in the meetings, the OptionFinder survey results do not fully support the finding as shown below in Figure 3-4. When asked who should provide such assistance, 63 percent of respondents selected the Regional Planning Committees (RPC) over the public safety frequency coordinators (20 percent) and the FCC (17 percent).[2]

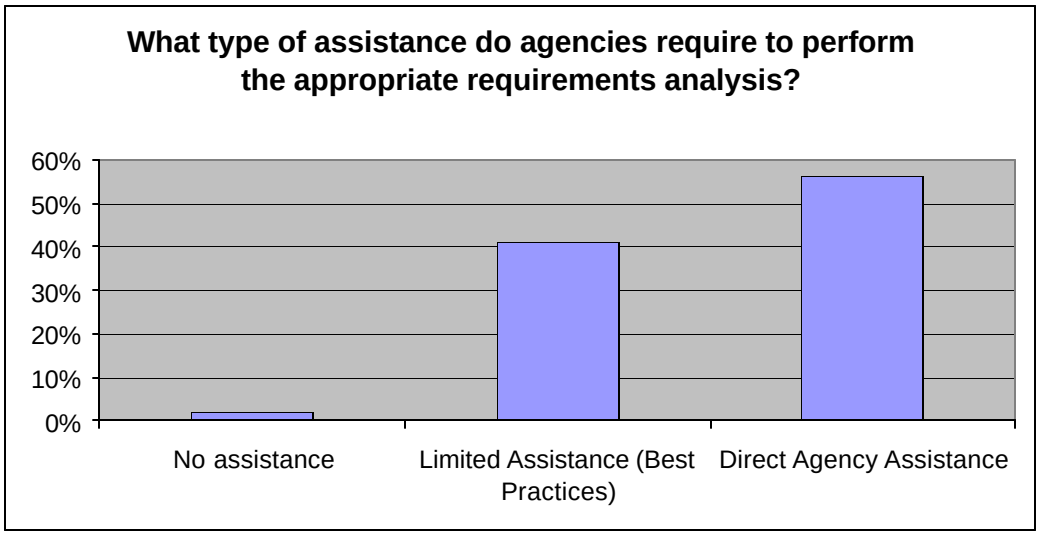


Figure 3-4
Requirements Analysis Assistance

Assessing an agencies future needs is important. The third supporting finding states, *"Three types of need should be considered as agencies look at requirements: critical, current, and future needs plus DHS-related requirements."* On several occasions, participants alluded to the importance of an agency examining its needs categorically. Often public safety overlooks long term, simple requirements because they are too focused on the critical needs facing them that day. It was noted that by constantly reviewing and reevaluating both immediate and longer term requirements, agencies could craft solutions that were cost effective while addressing more of their needs. At the same time, an attendee reminded the group that the risk and threat assessments should be a contributing factor during a region's or agency's assessment of its requirement; this was particularly important to limit any avoidable costs in the future.

The participants in both events noted that it was important to take a comprehensive view of a region and its needs. The fourth supporting finding states, *"Agency and regional needs should be considered in parallel."* More specifically, the November roundtable participants pointed out that local public safety agencies needed to be included in the State and regional planning phases, especially regarding all interoperability channels. Many stated that within public safety, there had historically been strong benefits from working within regions, whether it was sharing systems to increase coverage and reduce costs or better coordinating the frequency assignments. On the other hand, November attendees noted that even though the FCC required the existence of RPCs, there might be no real motivation to plan and coordinate in areas that had little or no need for the 700 MHz band frequencies.

An outcome of the February event was that the requirements process should not occur only at intervals when it became a dire necessity. The fifth supporting finding specifically states, *"Planning, especially on a national level, should be an ongoing process."* The public safety spectrum environment is constantly evolving, and it may be necessary for a permanent committee should be in place to keep abreast of the changes

and identify public safety needs in parallel. At the November roundtable meeting, it was mentioned that no formal or detailed national strategy for spectrum requirements identification or cooperation existed, other than the identified need for interoperability. The ongoing process should be comprehensive, similar to the PSWAC; however, meetings could be on a periodic basis. NTIA used the OptionFinder survey to poll the participants. According to the results, there appears to be showing strong support for a "national effort to regularly collect public safety spectrum requirements." The results of this poll are illustrated in Figure 3-5 below.

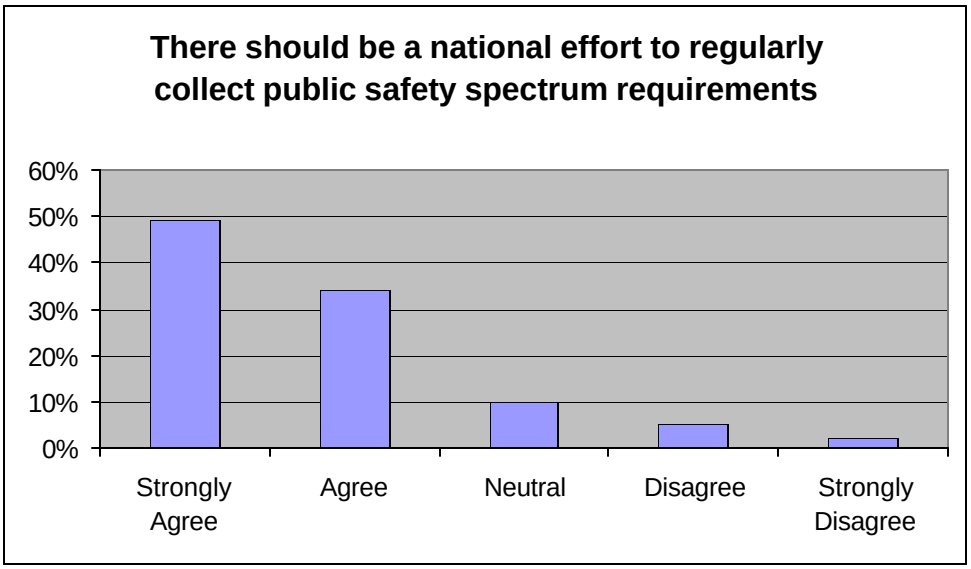


Figure 3-5
Public Safety Spectrum Requirements Collection

Communications must remain open in order for a requirements process to be developed on a national level. Specifically the sixth supporting finding suggests, *"As spectrum requirements flow up from the small local agencies to a national perspective, information on the process and other relevant items should flow down from the top."* The attendees added to their prior conclusion that stakeholder inclusiveness was key, by stating that two-way communications would be crucial to that inclusiveness. By two-way communications, the speakers were referring to top-down and bottom-up communications that would confirm that all involved parties were operating similarly. The nature of the requirements process would feed information up to the national level; however, there would have to be a conscious effort to feed the information at the national level down through the States and regions to the local agencies.

Through the prioritization of spectrum uses, public safety should be considered a priority, and related requirements must be made clear and universal. The seventh supporting finding notes, *"Spectrum requirements should be defined clearly and prioritized."* Throughout the forum, attendees noted that commercial services consistently did not meet the stringent requirements of the State and local public safety community, most likely because public safety requirements were not based on the financial objectives that drive commercial services. Attendees asserted that the larger the

market appeared and the more universal the requirements, the greater the chance for more attention from technology developers and commercial services in general. Participants further suggested that within the definition of these requirements, that the requirements be appropriately prioritized to better align equipment design with needs.

The FCC has formally recognized the similarity in mission between public safety and critical infrastructure by forming the new joint division within the Wireless Telecommunications Bureau. There has been a larger desire by the public safety community to clarify the differences between the two services. The eighth requirement specifically notes, *"The definition between public safety and critical infrastructure should be more clearly delineated, and first responders should have higher priority with regard to spectrum."* Participants noted that there was indeed a common thread in mission and requirements between the two services. It was also stated that critical infrastructure should have a stake or consideration in public safety communications (i.e., public safety should consider additional partnerships during communications system planning). This is particularly true because critical infrastructure often worked hand-in-hand with public safety to secure locations and in other emergency situations. However, the participants clearly remarked that first responders required top priority in the hierarchy of services because they were directly responsible for the immediate safety of life and property.

Another consistent theme across the two days of breakout sessions was the need for additional regulatory flexibility, especially in terms of maximizing efficiency and use. The final supporting finding notes, *"A certain level of flexibility should be built into the channels."* Participants asserted that with additional flexibility built into channel plans and general regulations, the public safety community could be using their assignments and systems in a more beneficial manner. For example, a new "master" long-term plan would help to increase the effectiveness of the "cluttered" public safety very high frequency (VHF) band. Another participant noted that public safety and the regulators should take advantage of narrowbanding to improve the spectrum management in such bands. One person observed that the flexibility could also lead to increased interoperability and sharing.

Key Finding #3 for Objective 1

There was a significant support for a national body to lead the requirements gathering process for State and local public safety, and that body should be modeled loosely after the PSWAC. The PSWAC was a short-term committee that held several meetings with hundreds of members contributing, and on September 11, 1996, released its Final Report on the spectrum requirements of public safety through the year 2010. Although PSWAC was a good baseline to start discussions, there were several proposed adjustments. Five findings support the third key finding within Objective 1 as outlined in Table 3-3.

Table 3-3
Objective 1, Key Finding 3 and Supporting Findings

Key Finding	The national planning body should contain similar characteristics to the successful PSWAC model
Supporting Findings	The requirements effort must be collaborative; PSWAC worked well because it was a "grass roots" effort with all stakeholders involved
	The requirements model needs to be well defined, yet flexible so that the technology will be the variable
	PSWAC was also unwieldy due to the size of the participating body so it could not meet too frequently
	There is a need to implement regulations to increase the coordination abilities among various levels of government
	Funding will be necessary for the selected participants or representatives on the requirements committee

This third key finding for Objective 1 was supported by five other findings from the February forum. The supporting findings focused on the specific characteristics of the proposed entity. The first supporting finding states, *"The requirements effort must be collaborative; PSWAC worked well because it was a "grass roots" effort with all stakeholders involved."* In nearly every objective discussed during both events the representatives mentioned how important it was that all stakeholders be involved in the process so their needs, issues, or concerns were addressed. In particular, multiple participants suggested that the 700 MHz band and 800 MHz band RPCs, plus the State interoperability executive committees,[3] should be directly involved in the examination of public safety communications requirements. It was pointed out that the public safety community could not afford to either do it twice or do it incorrectly because budgets were tight and lives were at stake. Commenters repeatedly noted the success of the PSWAC and that many of models and recommendations created by the committee were still accurate and relevant today. Although vocal participants displayed strong support for the PSWAC model to be applied, the survey results were supportive, but not as strong as expected. The results from the survey are illustrated in the bar graph below. The variation might be due to some of the negative aspects that the PSWAC model possesses, such as the large number of participants. However, it should be noted that the public safety association members fully supported the PSWAC as the appropriate model for the proposed committee.

"The PSWAC looked at all user communities, populations, penetrations, then made projections and balanced those against technological improvements"

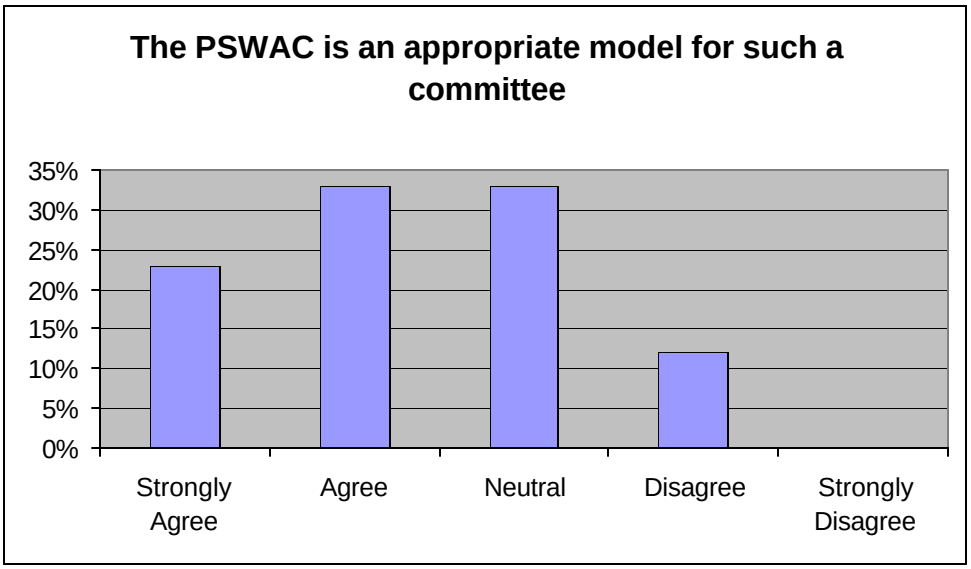


Figure 3-6
The PSWAC Model

One of the biggest hurdles the proposed committee or entity must overcome is the designation of a model to guide the determination of public safety spectrum requirements. The second supporting finding specifically notes, *"The requirements model needs to be well defined, yet flexible so that the technology will be the variable."* The entity should focus on creating a standard set of requirements measurements so that the needs of agencies, regions, and States can be more easily compared and compiled when necessary. With this clear definition, it could also lead to better agency participation because, as the participants pointed out, the agencies know what they have to do and where they need to go with their requirements and planning. Finally, technology and associated regulations within the requirements model should be flexible to allow agencies the ability to adjust and easily adapt as their situation or operations dictate. These discussions were then verified by the results of the OptionFinder survey question as illustrated in Figure 3-7 below.

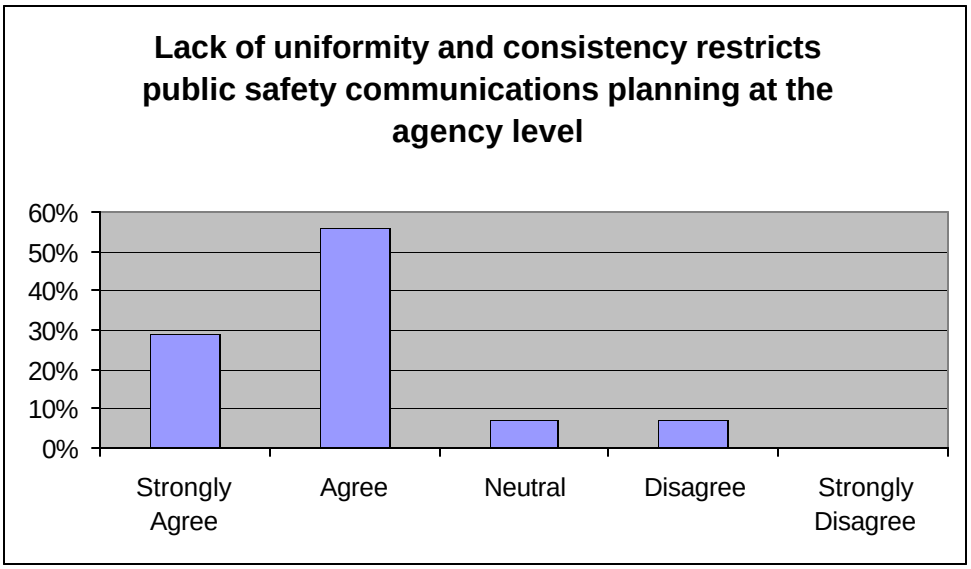


Figure 3-7
Lack of Planning Uniformity and Consistency

Other, more specific, characteristics of the PSWAC were, in retrospect, both positive and negative. The third supporting finding states, *"PSWAC was unwieldy due to the size of the participating body so it could not meet too frequently."* The PSWAC concentrated on involving as many parties as possible, which required traveling around the country. Participants mentioned it involved nearly 500 individuals, which made it difficult to manage. Logistically, it was suggested that there be a smaller permanent committee to meet regularly, but the larger, open meetings should occur less frequently to help control the process. It was also mentioned that if the committee were to host traveling meetings that there should be a day for preparing participants before the actual meeting so that the regular members need not endure a barrage of questions and concerns previously addressed in a meeting within another region. Overall, participants supported regular, periodic meetings when addressing a major issue; however, the committee could be idle if there was no immediate work for it.

The proposed entity represents an opportunity to help bolster interoperability and more general coordination between different public safety groups. The fourth supporting finding states, *"There is a need to implement regulations to increase the coordination abilities among various levels of government."* At several points during the two forums, the participants commented on the need for additional coordination and specifically noted that the proposed committee could serve as a body to encourage it. More importantly, the entity could influence the appropriate parties or help to draft the regulations necessary to allow and motivate the increased sharing to improve public safety's responses during cooperative events.

As with any activity, there are costs. The final supporting finding states, *"Funding will be necessary for the selected participants or representatives on the requirements committee."* For a committee that carries such an enormous amount of responsibility, it is critical that the correct, experienced individuals be present

consistently. The time these busy professionals spend on these activities is usually sacrificed by their organization or out of their personal vacation. For the "core" members, there should be a travel budget established to offset their costs borne to attend the events on a regular basis. Participants also suggested that a national entity sponsor the committee to ensure its continuance and the necessary support to keep running.

Key Findings for Objective 2: Facilitate a Modernized and Improved Spectrum Management System

The second objective of the President's Memorandum directs the Commerce Department to facilitate a modernized and improved spectrum management system. Therefore, NTIA focused attention on the current spectrum management system and identification of ways to update the methods of governing State and local public safety agencies use of spectral resources. This objective focuses on the systems and processes that regulate spectrum allocations, license applications, frequency management, and regulatory enforcement issues.

The slides for Objective 2 presented graphical representations of the current spectrum management process from multiple perspectives, including user responsibilities within the process, responsibilities of public safety frequency coordinators, and internal FCC spectrum and frequency management activities. Participants examined the diagrams for accuracy, commented on the various processes that worked well, identified areas within the processes where breakdowns occurred, and generated discussions on what procedures or methods could be altered and improved.

Discussion covered many aspects of the spectrum management process, with particular scrutiny focused on those processes within which public safety agencies were actively engaged. Even with the trends toward electronic application filing and increased use of computer-aided planning and engineering models, participants focused significant energy on discussions related to time. In general, the spectrum management processes is considered unnecessarily lengthy. Decision making, application review, and public comment periods were noted as areas for improvement.

Findings related to this objective can be summarized and explained through three key findings:

- The FCC's license application and Request for Waiver (RFW) processes must be reviewed, revised, and revamped to ensure that the associated rules and processes conform to realities in the field, are completed in a timely fashion, and are understandable and navigable for public safety agencies of all sizes.

- Submission of accurate and complete communications system information should be mandatory.

- The benefits and drawbacks of combining spectrum management authority under the auspices of a single entity should be thoroughly examined, clearly identified, and contrasted with other methods of increased coordination and cooperation among and between multiple levels of government.

These key findings focus the topic areas of discussion and provide the context in which supporting findings can be related and reported.

Key Finding #1 for Objective 2

The first key finding for Objective 2 characterizes points made by participants regarding spectrum management processes and procedures. The finding states that, "*The FCC's license application and RFW processes need to be reevaluated to ensure that the associated rules and processes conform to realities in the field, are completed in a timely fashion, and are understandable and navigable for public safety agencies of all sizes*." OptionFinder survey results echo statements made in the breakout sessions by forum participants with respect to the difficulty of understanding and participating in the processes. Figure 3-8 below shows that more than 90 percent of respondents believed that the spectrum management processes should be made simpler for public safety agencies to navigate.

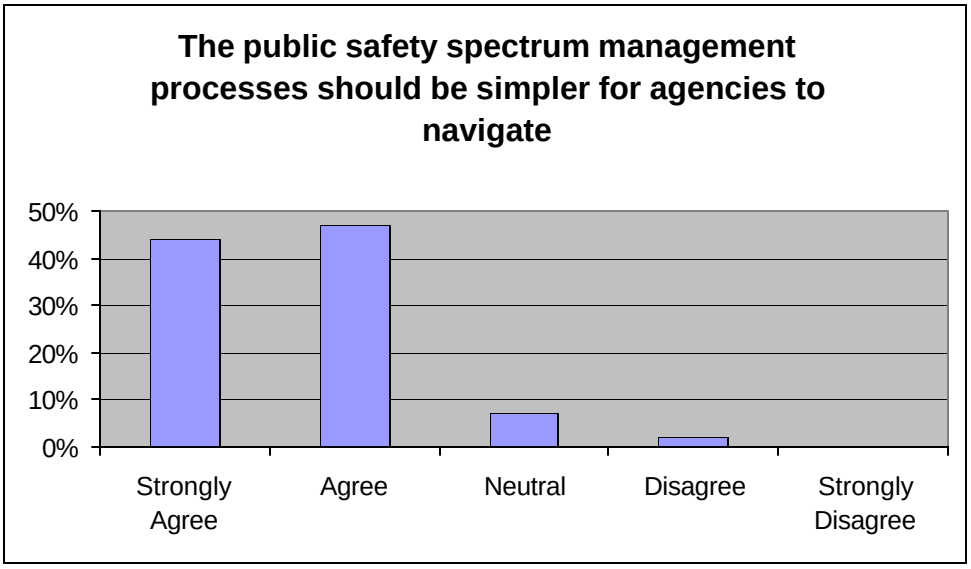


Figure 3-8
The Public Safety Spectrum Management Process

The 10 supporting findings fall under the scope of the key finding, as described in Table 3-4 below, because they are related to frequency licensing, the timeliness of system processes, and the distribution of decision-making authority within various functions of the spectrum management process.

Table 3-4
Objective 2, Key Finding 1 and Supporting Findings

Key Finding	**The FCC's license application and RFW processes must be reviewed, revised, and revamped to ensure that the associated rules and processes conform to realities in the field, are completed in a timely fashion, and are understandable and navigable for public safety agencies of all sizes**
Supporting Findings	Completing the FCC's license application process is extremely difficult for small to medium-sized agencies
	The FCC's Universal Licensing System (ULS) is not very flexible when rule exceptions are encountered[4]
	The license application review process takes too long
	FCC staffing levels affect the length of review time for a license application
	The FCC spends more time reviewing the legalities of a regulation than the underlying issues
	The RFW process is unnecessarily lengthy
	The Public Comment period of the RFW process is unnecessarily lengthy
	Decision-making authority has been unnecessarily shifted from FCC licensing staff in Gettysburg, Pennsylvania, to FCC legal staff in Washington, DC
	The Conditional Authority of public safety frequency coordinators should be increased
	Public safety frequency coordinators could perform more engineering functions and license application analyses (perhaps meeting a pre-approved FCC checklist) to minimize lengthy, duplicative FCC analysis

The first supporting finding relates the complexity of applying for a radio license, stating, *"Completing the FCC's license application process is extremely difficult for small to medium-sized agencies."* Small agencies, in particular, often lack the experienced personnel necessary to accurately complete the license application or they lack the resources to hire an independent entity to perform the task. Participants in the November meeting commented that it was the FCC's responsibility to ensure a complete understanding of the process by the users. The FCC has a 116 page license application that must be completed. This poses a problem for many agencies because of a lack of technical staff to complete the form. Other participants noted that the application had steadily increased in technical complexity and that even some counties and cities lacked the resources necessary to complete the application.

With respect to the movement toward online license application or modification filing, participants remarked positively on the speed of electronic filing but pointed out some limitations that they had encountered. As express in the second supporting finding, participants commented that, *"The FCC's ULS is not very flexible when rule exceptions are encountered."* The Web-based, license application filing database is a relatively static tool that is not always able to adjust to exceptions to the FCC's Rules. One participant at the National Forum specifically mentioned that the ULS had limitations in terms of the number of geographic locations for which a frequency could be requested. In addition, subjecting public safety licensees to adjacent region coordination requirements was not always necessary, yet the Rules and the ULS required proof of coordination prior to submitting an application.

Participants also expressed frustrations over how long they had to wait to receive a decision regarding their license application. The third supporting finding states that, "*The license application review process takes too long*." Federal government staff had

commented at both the November roundtable and February meetings that many federal public safety agency license applications could be reviewed and frequencies could be assigned by the NTIA in as few as 14 days. Participants at the National Forum pointed out that, by comparison, license application reviews of State or local public safety agencies by the FCC took no less than 30 days and regularly more than 90 days to complete.

Conversation centered on possible explanations for the lengthier review times and, along with larger numbers of applications to review, participants noted at the National Forum that, *"FCC staffing levels affect the length of review time for a license application*." Not every step could be automated, therefore human involvement must be considered as an element within the license application review process. Should an agency's reviewing personnel be understaffed, the length of time necessary to manually review applications would naturally increase.

As technology develops and becomes increasingly complex and convergent rules and regulations governing that technology become exceedingly complicated. The fifth supporting finding points out that, *"The FCC spends more time reviewing the legalities of a regulation than focusing on the underlying issues.*" In general, participants related their perception that the FCC spent an inordinate amount of time ensuring that regulations were well insulated from any legal challenges. They remarked that the public interest would be better served by a timely, less legally airtight decision that was focused on correcting a problem or promoting a new service or technology.

The next three supporting findings reflect several inefficiencies within the process of requesting a waiver of the FCC's Rules. One finding reveals a participant's assertion that *"The RFW review process is unnecessarily lengthy*." Several participants at the November meeting remarked that public safety agencies found it unnecessarily difficult to obtain a waiver of the FCC's Rules, even in cases where the issues associated with the RFW demonstrated an obvious exception to the Rules. Participants at the National Forum echoed that finding and were unsure why the FCC delayed decisions on those clear exceptions.

Participants repeatedly pointed out the importance of the democratic process with respect to decision making within the spectrum management process; however, they noted that in some circumstances, the process was unnecessarily drawn out. Participants found, in particular, that, *"The Public Comment period of the RFW process is unnecessarily lengthy*." Under the Administrative Procedures Act, any waiver of the FCC's Rules must be opened to the public, allowing interested parties to support, object, or offer comments on the proposal. Participants at the National Forum remarked that in many instances, the public comment period was unnecessary and served only to delay adoption of the order granting the RFW to the applicant.

The human factor was again discussed as impacting the timeframe for decision making, when participants noted that, *"Decision-making authority has been unnecessarily shifted from FCC licensing staff in Gettysburg, Pennsylvania, to*

Washington, DC." Particularly with respect to RFWs, licensing personnel in Gettysburg were noted as being relatively quick in analysis and review of the request. Comparatively, it was noted at the National Forum, license processing staff in Washington, DC, who were removed from the day-to-day "in-the-field" operations, unnecessarily scrutinized the RFW from a legal point of view, as opposed to a more applicable technical review with respect to the context of the situation. Participants at the November meeting stated that approximately 90 percent of the RFW decision-making authority should rest with the experienced field personnel stationed in Gettysburg.

Certain other decision-making authority considerations could also be shifted outside of the FCC's purview, placing more reliance on independent, trusted, experts such as the public safety frequency coordinators. Participants at the National Forum also noted that, *"The Conditional Authority of frequency coordinators should be increased*." Given certain circumstances, and completed license applications, public safety frequency coordinators can validate the routine granting of licenses to applicants without the application being subject to thorough FCC review. Participants at both the November meeting and the National Forum pointed out that the conditional authority circumstances could be expanded to give greater authority to public safety frequency coordinators. The current set of circumstances is relatively narrow, and frequency coordinators routinely submit license applications involving situations that fall outside that scope, but that are no less susceptible to causing interference or violating FCC Rules, and yet must still navigate the extensive FCC review process. NTIA used the OptionFinder to poll the participants on whether coordinators should have additional; authority to make planning recommendations. The poll indicated that 70 percent of respondents agreed with this conclusion, as illustrated in Figure 3-9.

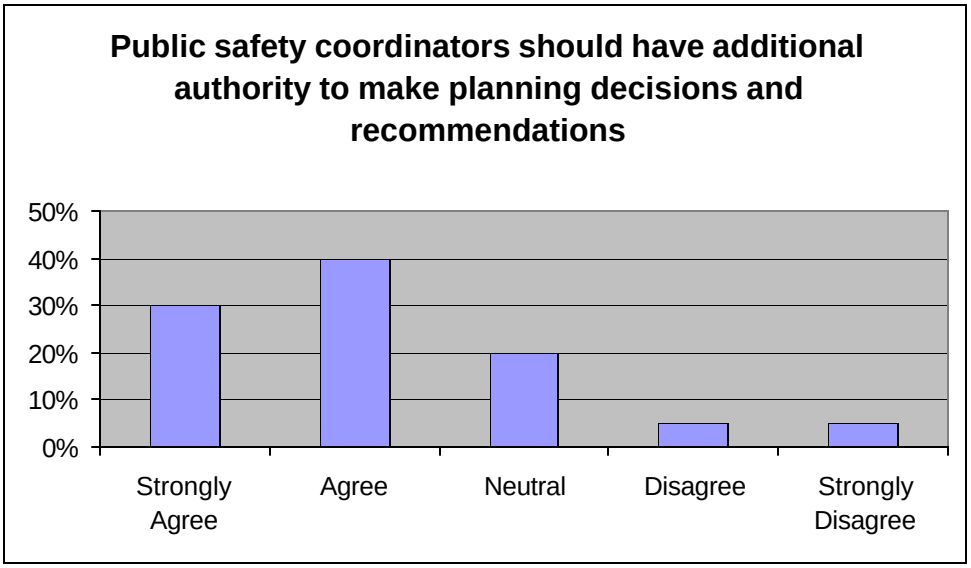


Figure 3-9
Public Safety Frequency Coordinator Authority

Participants also commented on other areas where frequency coordinators could be given increased responsibility within the licensing process. The final supporting

finding notes that *"Public safety frequency coordinators could perform more engineering functions and license application analyses (perhaps meeting a pre-approved FCC checklist) to minimize lengthy, duplicative FCC analysis*." Participants at the National Forum noted that redundant analyses lengthened the application review process and that frequency coordinators might be able to address many of the FCC's concerns prior to submitting an application for review. A finding from the November meeting presented the view that the engineering, field-testing, and detailed coordination necessary for a particular geographic region could not be done on a standard, national level, but was more practically accomplished at a local or agency level.

Key Finding #2 for Objective 2

The second key finding maintains that in order for effective communications system design, development, and coordination, information regarding those systems must be regularly updated and easily accessible to planners. Participants at the National Forum maintained that, *"Submission of accurate and complete communications system information should be mandatory*." Especially in light of the rapid pace of technological development, it is imperative that system planners, frequency coordinators, and spectrum managers have the information they need at their disposal, particularly when making frequency coordination decisions that could disrupt critical public safety communications. As illustrated in Table 3-5 below, three supporting findings validate that key finding and identify key areas for improvement.

Table 3-5
Objective 2, Key Finding 2 and Supporting Findings

Key Finding	**Submission of accurate and complete communications system information should be mandatory**
Supporting Findings	It is currently difficult to identify and access up-to-date regional plans for spectrum use in the 800 MHz band
	The effectiveness of the FCC's Computer Assisted Pre-Coordination Resource and Database System (CAPRAD) is hindered because its use is not mandated
	The available pool of knowledgeable spectrum managers and radio frequency engineers has dwindled in the past decade

The first supporting finding that eludes to requiring accurate information is: "*It is currently difficult to identify and access up-to-date regional plans for public safety use in the 800 MHz band*." One participant at the National Forum recommended that the 800 MHz RPC process should be reexamined altogether, particularly with respect to the disclosure requirements for each region's plan and any subsequent modifications. Many comments pointed out difficulties in finding the most current version of regional plans and monitoring updates to the plans. Spectrum managers and system designers use much of the information within those plans.

The second supporting finding relates to the utility of the FCC's CAPRAD stating, *"The effectiveness of the FCC's CAPRAD is hindered because its use is not mandated*." At the National Forum, the concept of the CAPRAD was generally acknowledged; however, its usefulness was questioned because there is no mandate

supporting the submission of data to the database. Frequency coordination, interference prevention, and presentation of technical data within the CAPRAD would aid planners, designers, and system managers on a nationwide basis.

> "*My nephew is studying RF engineering in graduate school….He's the only student in his program."*

Referring to the availability of qualified personnel, the third supporting finding notes that, *"The available pool of knowledgeable spectrum managers and radio frequency engineers has dwindled within the past decade*." Experienced public safety communications officials and participants repeatedly pointed out that as more and more engineers, spectrum managers, and competent personnel retire from public and private service, the resource pool was correspondingly shrinking. Personal anecdotes by participants related the fact that the radio frequency (RF) engineering student population was also shrinking. This diminishing population of qualified personnel strains the remaining resources available to regulatory agencies, public safety agencies, and the engineering community.

Key Finding #3 for Objective 2

A major spectrum management discussion concerned the current bifurcated system of authority within the United States. NTIA governs the Federal Government's use of spectrum, while the FCC manages State, local, and commercial spectrum use. The need for all levels of government to coordinate and cooperate is imperative, particularly within the public safety community. One possibility for increasing that coordination and cooperation is the consolidation of spectrum management authority under a single entity. Discussion at both the November Roundtable Meeting and the National Forum weighed several positive and negative aspects to consolidation. Overall, participants generally concluded that, *"The benefits and drawbacks of combining public safety spectrum management authority should be thoroughly examined, clearly identified, and contrasted with other methods of increased coordination and cooperation among multiple levels of government*." The prospect of a single spectrum management authority was recognized as a possibility, but other methods of increasing coordination among various levels of government were also pointed out and referred for further discussion. When asked whether one entity should manage all public safety spectrum, survey results yielded a fairly distributed range of answers as noted in Figure 3-10 below, which supports the need for further study.

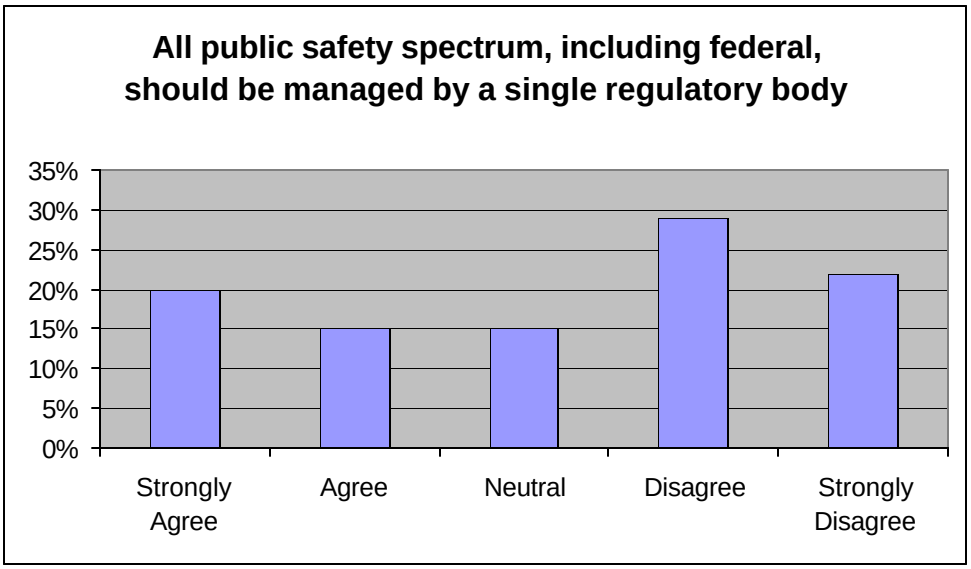


Figure 3-10
A Single Public Safety Regulatory Body

National Forum participants also highlighted five findings supporting the key finding. These findings are described in Table 3-6 below.

Table 3-6
Objective 2, Key Finding 3 and Supporting Findings

Key Finding	**The benefits and drawbacks of combining public safety spectrum authority should be thoroughly examined, clearly identified, and contrasted with other methods of increased coordination and cooperation among multiple levels of government**
Supporting Findings	Interaction between levels of government might be improved through the creation of a single spectrum management agency
	A single spectrum management agency under the control of the Executive Branch would favor federal users, while a single agency under the Legislative Branch would reduce federal users' standing in spectrum matters
	National security issues and access to classified information would be a factor in combining spectrum management authority
	The current public comment process under the Administrative Procedures Act would be affected by the combining of spectrum management authority
	The process of combining the spectrum management authority of the NTIA and the FCC would be extremely complex, lengthy, and costly

Coordination between public safety agencies across levels of government is extremely important and should be promoted whenever possible. As an alternative to the current two-pronged spectrum management authority system, participants noted that, "*Interaction between levels of government might be improved through the creation of a single spectrum management agency*." While participants in the November meeting did not explicitly acknowledge this finding, they did note that State and local public safety agencies should participate within the planning and coordination process of federal radio system development. One participant at the National Forum expressed unequivocal support for the combination of spectrum management authority, commenting that, under

such a scenario, cooperation would be immediately improved among all levels of government.

Other participants at the National Forum pointed out the possibility of favoritism under such a scenario, noting that, *"A single spectrum management agency under the control of the Executive Branch would favor federal users, while a single agency under the Legislative Branch would reduce federal users' standing in spectrum matters*." Discussions focused on how a particular level of government would be beholden to a regulator that was controlled by a different level of government with inherently different interests and priorities. One survey question demonstrated a slightly higher disagreement with this finding, as shown in the bar graph in Figure 3-11.

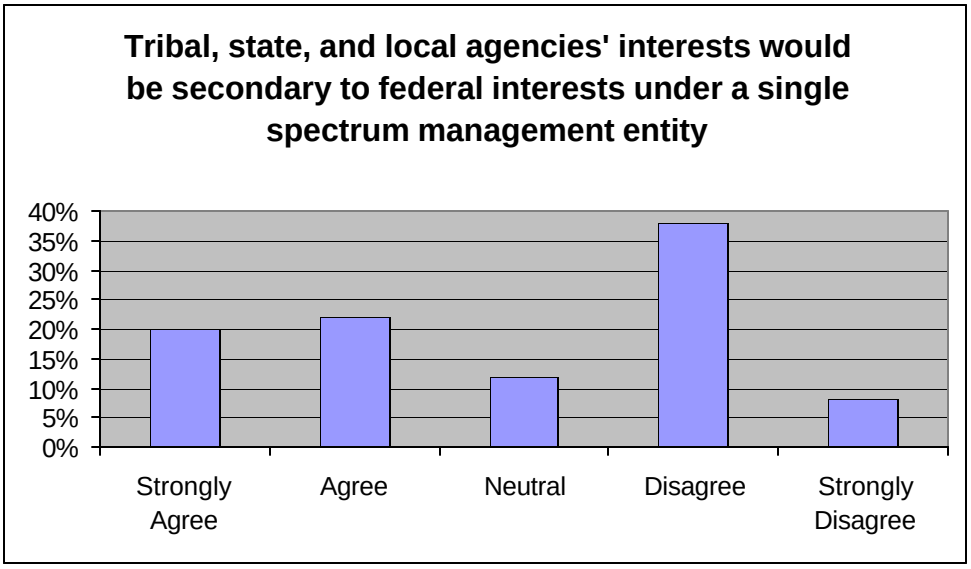


Figure 3-11
Public Safety Agencies Interest Priorities

Several differences in operational procedures were discussed at the National Forum, leading to a supporting finding that notes, *"National security issues and access to classified information would be a factor in combining spectrum management authority.*" Participants pointed out that characteristics of many federal radio systems, in whole or in part, were subject to federal security classification procedures. It was also noted that not all State and local communications personnel held security clearances, making it difficult to access required system design and planning information. This issue would prevent many of the potential coordination and cooperation improvements of combining spectrum management authority.

Also identified as a significant issue associated with combining spectrum management authority into a single agency is that, *"The current public comment process under the Administrative Procedures Act would be affected by the combining of spectrum management authority.*" Participants in the November meeting recognized the open, public rulemaking and comment process of the FCC as necessary and democratic. Therefore, decisions affecting State and local public safety agencies should be discussed

publicly, and all available information should be gathered to arrive at the most educated and informed conclusions possible. Because Federal public safety agencies are not subject to Administrative Procedures Act provisions, but are often subject to information classification. As a result, difficulties could arise in addressing the public comment rights of parties affected by public safety communications decisions.

The last supporting finding identifies the actual combination issues, pointing out that, *"The process of combining the spectrum management authority of the NTIA and the FCC would be extremely complex, lengthy, and costly."* Participants pointed out that, in addition to the issues identified in previous supporting findings, many complex legal obstacles would be presented, both prior to such a merger and during the merging of authority. Also discussed were the tremendous organizational difficulties, migration issues, and redundancy factors that would require careful examination and planning. Participants at the National Forum remarked on the extraordinary length of time that would be necessary to accomplish such a consolidation.

Key Findings for Objective 3: Facilitate Policy Changes to Create Incentives for Efficient and Beneficial Spectrum Use and to Provide a Higher Degree of Predictability and Certainty in the Spectrum Management Process as it Applies Incumbent Spectrum Users

Objective 3 focuses on maximizing spectrum use and ensuring that incumbent spectrum users are afforded the proper protections and considerations for their operations.

Throughout the sessions, participants repeatedly questioned the best way to define efficiency, often pointing out that variances in the definition might occur across multiple frequency bands and when applied to various applications and technologies. There was also discussion on the need for a strategic vision, which was attributed to the lack of a cohesive plan to unorganized or redundant regulations, and band plans.

Findings related to this objective can be summarized and explained through three key findings:

- Efficiency metrics should be defined and developed to measure levels across multiple public safety services and frequency bands.
- Public safety spectrum needs a comprehensive, long-term vision to maximize efficient and beneficial use.
- Opportunities exist to leverage commercial services to complement existing public safety communications and increase efficiency, but differing reliability requirements must be taken into account.

Key Finding #1 for Objective 3

The first key finding relates participants' comments that, *"Efficiency metrics should be defined and developed to measure performance levels across multiple public safety services and frequency bands*." It was generally acknowledged that communications services should be held to efficiency standards in order to best use spectrum, but participants debated current perceptions of efficiency and its effects on spectrum use. The results of one survey question generally validate this finding with the majority of respondents agreeing to some degree. Figure 3-12 depicts the results of that survey question.

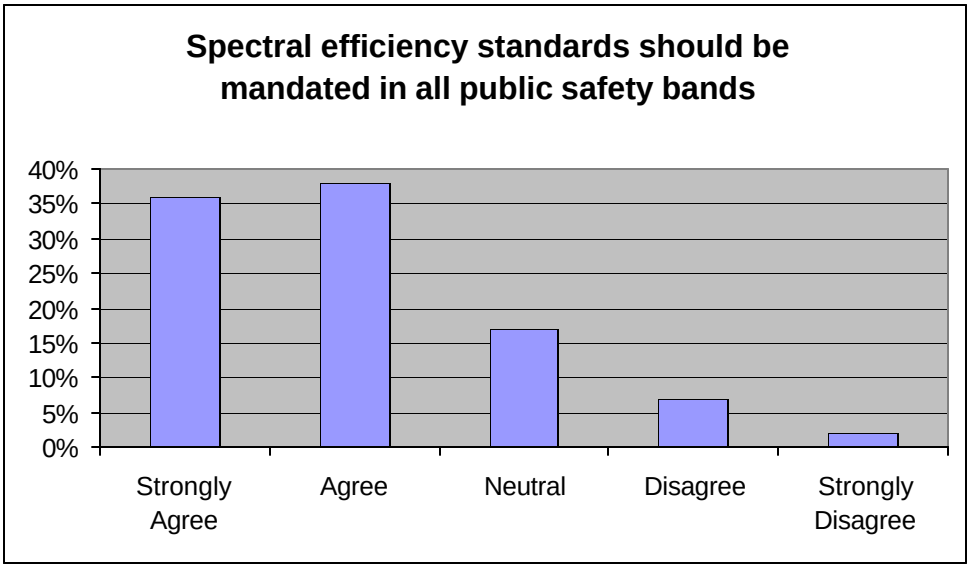


Figure 3-12
Mandated Spectral Efficiency Standards

The supporting findings described in Table 3-7 below relate other important participant comments with respect to the key finding.

Table 3-7
Objective 3, Key Finding 1 and Supporting Findings

Key Finding	Efficiency metrics should be defined and developed to measure performance levels across multiple public safety services and frequency bands
Supporting Findings	Factors for defining efficiency might include— • Quality of service • Number of users per unit of frequency • Throughput per channel • System downtime
	Future systems and technologies should be accounted for when developing efficiency metrics
	The FCC's current Rules do not always appropriately define efficient power levels or jurisdictional boundaries
	The FCC's current Rules are not keeping pace with technological development
	Rules, regulations, and information must be kept up-to-date and standardized

During efficiency metric defining discussions, participants at the National Forum remarked on several possibilities, noting that, *"Factors for defining efficiency might include quality of service, number of users per unit of frequency, throughput per channel, or system downtime.*" Public safety, it was pointed out, required a certain level of service to be maintained for communications to be effective. One participant suggested that the quality of service be considered during metric definition. Others commented on the inherent downtime of public safety communications systems, describing the ebbs and flows of usage during crisis situations versus routine, day-to-day operations. Those fluctuations could greatly affect the appearance of efficient spectrum use. Others highlighted possible hard-line metrics, including a defined number of users per given unit of frequency (e.g., a specific number of users per 5 MHz of spectrum, and throughput rate per channel). In the November meeting, it was noted that current efficiency and standards issues were not regularly considered between various levels of government, which presents problems when multiple layers of government, governed by separate regulatory bodies, routinely share channels and equipment.

Participants also commented on the need for systems planning and evolution, stating that, *"Future systems and technologies should be accounted for when developing efficiency metrics*." This supporting finding emphasizes the importance placed on long-term communications systems convergence. Participants at the National Forum discussed the necessity of interoperability between agencies and among levels of government and commented on movements toward better coordination, cooperation, and sharing of both spectrum and equipment. These trends must be accounted for when developing and instituting efficiency metrics.

National Forum participants discussed instances in which efficient spectrum use was hampered by inefficient regulations. They noted in particular that, *"The FCC's current Rules do not always appropriately define efficient power levels or jurisdictional boundaries*." Participants gave several examples that included pointing out that some communications stations over-licensed their spectrum use. This amounts to unnecessarily high emission power levels that extended the boundary of a signal area to distances outside of practical use, which caused interference to signals reusing the frequency or on nearby channels, thereby causing efficiency losses. Other participants noted that current rules required some local public safety agency license areas to extend beyond their geographic jurisdictions, at which point the agency no longer had the need to operate using those frequencies, yet the required coverage area prevented reuse and might interfere with neighboring frequencies.

Another supporting finding states that, *"The FCC's current Rules are not keeping pace with technological development*." Forum participants commented on the progress that technological development was making compared with review of the FCC's Rules. Several participants pointed out that some of the FCC's methods of measuring interference were obsolete, given the current state of technology employed by public safety agencies. Commenters at the November meeting noted that the FCC's Rules did not always reflect the reality of the frequency coordination process in the field. They pointed out that some regulations were expected to apply uniformly across the country,

but in reality, different geographic conditions required various planning and decision models not always allowable or defined within the Rules.

National Forum participants went a step further than the previous two findings in discussing the current state of the authority system governing public safety communications, noting that, *"Rules, regulations, and information must be kept up-to-date and standardized*." Participants commented on the rapidity of technological advancement and how new and updated rules and regulations were slow to follow. Several participants pointed out that outdated governance measures made it difficult for systems designers and planners to accurately gauge the needs or requirements of new communications networks. Participants also noted that all system and design information should be required for submission to the FCC and become part of the public record, so that accurate planning could be conducted and interference protection safeguards could be established.

Key Finding #2 for Objective 3

The second key finding describes participant sentiments on defining a strategic view or plan for efficiently addressing future public safety spectrum usage. Participants noted that, *"Public safety spectrum needs a comprehensive, long-term vision to maximize its efficient and beneficial use*." Perhaps the most important discussions surrounding this finding occurred at the National Forum, where participants conversed on several independent topics and reached this general conclusion on separate occasions. When discussing the FCC's mandated migration to narrowband technology, participants pointed out that while such a transition made sense for voice applications, it did not provide the same efficiencies for data transmission. They also noted that public safety agencies could not afford to migrate and upgrade systems and equipment every time a new, more spectrally efficient technology was developed, particularly if efficiencies could not be realized across multiple services. Other examples were pointed out as being piecemeal, ad hoc solutions or plans, with little regard for long-term visions. Table 3-8 shows that supporting findings point to additional instances where strategic planning would be wise.

Table 3-8
Objective 3, Key Finding 2 and Supporting Findings

Key Finding	**Public safety spectrum needs a long-term, comprehensive vision to maximize efficient and beneficial use**
Supporting Findings	In any rebanding or band repacking situation, green space must be identified to maintain communications capabilities during migration
	High-band VHF spectrum should be rebanded or repacked to increase the opportunity for public safety agencies to employ trunking technologies
	Public safety agencies should increase sharing of spectral resources and break the "stovepipe" mentality of owning spectrum
	The FCC's Enforcement Bureau should take a more active role in compliance testing during the planning and construction phases of systems design and development
	A priority-of-service scheme for public safety operations should be developed for public safety systems
	Funding provisions should accompany any mandated migration

While National Forum participants discussed both positive and negative aspects of technology migration and rebanding, they pointed out that, *"In any rebanding or band repacking situation, green space must be identified to maintain communications capabilities during migration*." Several participants noted that public safety communications safety-of-life aspects required uninterrupted service, especially during technological migration periods. During those times, public safety agencies must still be assured that they could handle the volume of communications traffic that occurred at their defined peak usage level, usually during a crisis situation. It is imperative that any mandate account for this need for a transition plan.

Commenters noted that channel plans within frequency blocks often affected the type of technology that could be used within that block, thereby impacting efficiency to some degree. National Forum participants specifically pointed out that, *"High-band VHF spectrum should be rebanded or repacked to increase the opportunity for public safety agencies to employ trunking technologies*." Discussion points noted that narrowbanding requirements would break up the channelization plan of that specific spectrum block, making it very difficult for public safety agencies to develop or adapt trunked systems across a new channel plan. Participants discussed repacking that spectrum in order to preserve the efficiencies realized by the technology. They also commented on channel aggregation as a possible alternative to narrowbanding.

Another supporting finding relates to the interagency problem of cooperation and sharing. Traditionally, public safety agencies had been very reluctant to give up any control of what they considered their agencies' assets. This mindset led National Forum participants to find that, *"Public safety agencies should increase sharing of spectral resources and break the "stovepipe" mentality of owning spectrum*." Historically, public safety agencies developed independent communications systems on exclusively licensed spectrum. Participants explained that public safety agencies gradually understood the efficiency and interoperability benefits of opening their exclusive spectral resources to sharing situations with other agencies. The benefits of operating shared and coordinated systems using technology such as trunking were slowly being realized among traditionally independent, closed organizations.

> "Historically, the mindset of public safety agencies has been 'This is my spectrum.' We need to change that mindset and encourage resource sharing."

The fourth supporting finding indicates that, *"The FCC's Enforcement Bureau should take a more active role in compliance testing during the planning and construction phases of systems design and development*." National Forum participants commented on the usefulness of preventive enforcement, leaning toward increased FCC involvement in the communication systems development and implementation stages.

National Forum participants discussed the fifth supporting finding in terms of spectral efficiency, spectral planning, and beneficial use. They noted that, *"A priority-of-service scheme for public safety operations should be developed for public safety*

systems." When discussing beneficial use of spectrum, participants commented on how different services or functions clearly outweighed others when describing their level of importance in a given situation. One example given described a police officer radioing for backup as more important than a standard license plate query, giving the officer priority access to the same spectrum. Other participants pointed out that artificial intelligence programs could make those determinations in real time. Identifying, classifying, and prioritizing types of services and applications should be part of developing a plan for future use of spectrum and should include analyzing efficiency characteristics, technological needs, and spectral propagation requirements. In addition to conversational discovery, participants strongly agreed with the finding when questioned through the survey, as shown in Figure 3-13 below.

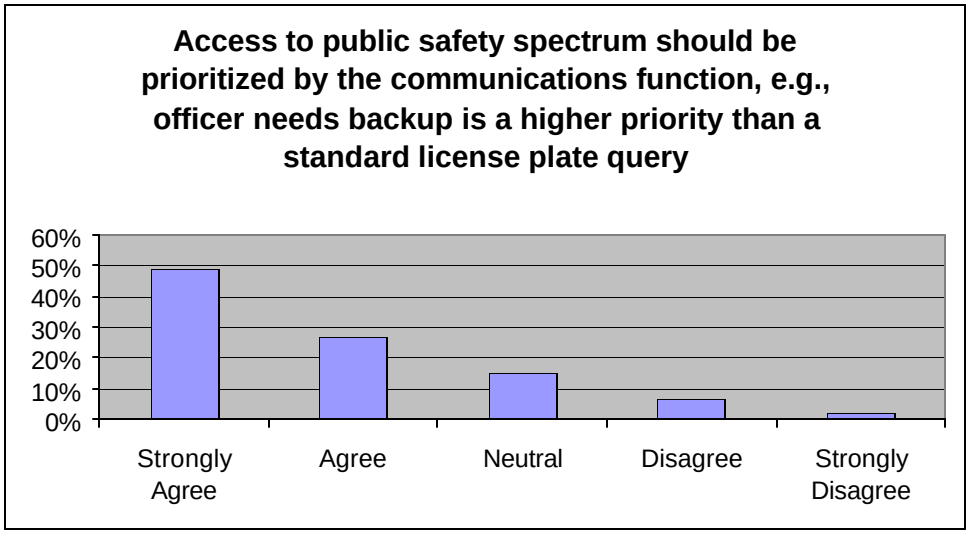


Figure 3-13
Prioritized Access to Public Safety Spectrum

National Forum participants specifically noted that because public safety agencies operate on limited, fixed budgets, *"Funding provisions should accompany any mandated migration.*" This supporting finding lends itself to the key finding by highlighting the need for public safety agencies to do long-term budget planning for equipment upgrades and technology migrations. Participants acknowledged that some mandatory migration schedules allowed for long-term planning, but also pointed out that technological advancement might outpace a mandated migration by the time agencies and governments were able to allocate funds to accomplish the transition. Participants remarked that funded mandates would be much more effective, allowing the benefits of technological migration to be realized much faster.

Key Finding #3 for Objective 3

The third key finding points out the benefits and drawbacks of including commercial technologies into public safety operations. Participants found that, "*Opportunities exist to leverage commercial services to complement existing public safety communications and increase efficiency, but differing reliability requirements must*

be take into account." Many commercial technologies appear to complement existing public safety systems and may offer special applications, but participants pointed out that when a technology was used and controlled outside of the public safety domain, commercial services often could not satisfy the strict requirements of public safety communications. Participants explained that in addition to the cost requirements of incorporating commercial technologies into public safety communications plans, system reliability was a big factor. It was noted that some commercial systems were built to accommodate a specific degree of reliability in which a certain percentage of lost or dropped calls was acceptable. Participants pointed out that any given call by a public safety agency could mean the difference between life and death, and arbitrarily or systematically dropping that call was unacceptable. The supporting findings in Table 3-9 address the relationship between public safety and commercial communications.

Table 3-9
Objective 3, Key Finding 3 and Supporting Findings

Key Finding	**Opportunities exist to leverage commercial services to complement existing public safety communications and increase efficiency, but differing reliability requirements must be taken into account**
Supporting Findings	Public safety agencies should increase their use of unlicensed devices and technologies for non-mission-critical applications
	Commercial entities might subsidize public safety efficiency efforts in order to maximize the efficient use of all spectrum
	Unproven technologies should not be tested or experimented with in public safety spectrum bands
	The dangers of partnerships with commercial providers and using commercial technologies outweigh the potential benefits

While most public safety communications are subject to the requirement of 100 percent reliability all of the time, certain mundane functions could improve spectral efficiency by freeing up scarce, critical need spectrum. National Forum participants found that, *"Public safety agencies should increase their use of unlicensed devices and technologies for non-mission-critical applications.*" Discussion generally acknowledged that the unreliable nature of unlicensed spectrum use prevented exploration of its use for mission-critical applications, however, several participants pointed out that routine, non-mission-critical requirements could be met by the available technologies.

One supporting finding points out that, *"Commercial entities might subsidize public safety efficiency efforts in order to maximize the efficient use of all spectrum*." National Forum participants discussed the creation of incentives for public safety agencies to become more spectrally efficient, but budgetary concerns were seen as a significant obstacle to overcome. Other discussions raised the possibility of some mechanism by which public safety communications efficiency was funded by another source, thereby reducing public safety's requests for additional spectrum and minimizing competition for resources with the commercial sector.

Other supporting findings reflect National Forum participants' discussion of the benefits of examining new technologies for potential efficiency improvements. While acknowledging those benefits, participants also explicitly stated that, *"Unproven*

technologies should not be tested or experimented with in public safety spectrum bands." It was generally recognized that the inherent nature of public safety communications required reliable, proven technologies for operations. Participants opposed testing or deploying new technologies with potential benefits before they had been fully evaluated for compliance with public safety needs and standards.

The last supporting finding relates some concerns of National Forum participants, and states that, "*The dangers of partnerships with commercial providers and using commercial technologies outweigh the potential benefits.*" This discussion included comments on spectrum leasing and secondary markets, or public safety agencies renting out spectrum during off-peak usage times to other entities. While the efficiency benefits were recognized and acknowledged, participants were also quick to point out two negative implications of the scenario—reliability of reversion mechanisms and dedicated revenue streams. A major concern of public safety agencies considering spectrum leasing is that of regaining access to rented spectrum during an emergency. In a crisis situation, public safety personnel must have access to all of the spectrum at their disposal, including any leased spectrum. Participants generally commented that spectrum reversion mechanisms had not yet been proven fully reliable. Participants also commented on the potential financial pitfall that could befall some agencies and the governments behind them. It was noted that bureaucracies might come to depend on spectrum leasing as a dedicated revenue stream accounted for in fiscal budgets. Such an assumption by budget planners might put public safety agencies in the unfortunate position of having to "earn" money for their spectrum as the cost of using it when necessary.

Key Findings for Objective 4: Develop Tools to Streamline the Deployment of New Services and Technologies, While Preserving National Security, Homeland Security, and Public Safety, and Encouraging Scientific Research

Objective 4 focuses on the deployment and regulation of new technology for the State and local public safety community. Within this objective, it was the intent for participants to explore the ways in which regulators, manufacturers, and the public safety community itself could get timely access to new technologies that would meet or exceed stringent public safety requirements.

Within the breakout sessions, the facilitators guided the participants through a series of slides. The slides focused the participants on some examples that best illustrate the deployment of a new technology. The participants identified attributes that worked well and those that did not, and suggested improvements to the process. These discussions naturally led to more general interchange on new technologies for State and local public safety communications and the related regulations.

As the communications, and more particularly wireless technology, is being developed, the public safety community must endure lengthy approval processes and often inadequate testing procedures to protect their operations. Many attendees noted the new commercial services both on the market and on the horizon that might meet some of

public safety's operational requirements. Echoing throughout the 2-day forum was the need for advanced technology, but not at the cost of reliability and lives.

These issues and thoughts of the participants in the National Forum can be summarized in key findings:

- Public safety requires equipment to meet specific standards, thorough testing of that equipment, and its timely deployment, as well as innovative planning to maximize the markets and cost savings associated with new technologies.

- Commercial services serve, and will continue to serve, as an important asset to public safety communications; however, most services do not meet public safety requirements.

Key Finding #1 for Objective 4

Public safety agencies have requirements that exceed those of ordinary users and consequently have high operational standards for their new technologies. There are thresholds that the technologies must surpass to be successful, while at the same time meeting the financial restrictions to which the public safety community is typically subject. Table 3-10 illustrates the eight findings that support the first key finding within Objective 4.

Table 3-10
Objective 4, Key Finding 1 and Supporting Findings

Key Finding	**Public safety requires equipment to meet specific standards, thorough testing of that equipment, and its timely deployment, as well as innovative planning to maximize the markets and cost savings associated with new technologies**
Supporting Findings	Saving lives is the greatest concern of public safety when evaluating new technology; therefore, the technology must be simple to use, functional, and reliable
	The size of engineering staff at the FCC and NTIA should be increased to enhance the ability to address new technology in a timely and thorough manner
	There is a distinct need for an area of spectrum devoted exclusively to testing
	Spectrum management and new technology should be considered jointly to help foster larger markets while developing more useful regulations
	Standards should be leveraged to cover larger markets with new technologies, while ensuring that operational and interoperable needs are addressed, by inviting community participation in the standards development process
	Lack of funding resources available to public safety agencies has limited commercial research and development investment in new technologies
	Outreach efforts regarding new technologies should be broader to involve more end users to gain a greater diversity of inputs
	The public safety community is encouraged by the ease with which a license for use of 4.9 GHz spectrum is obtained, but enforcement needs to be effective

Public safety's primary function is to save lives and protect property. If the communications system or related technology cannot support that mission, it is of little or

no use to public safety. The first supporting finding states, *"Saving lives is the greatest concern of public safety when evaluating new technology; therefore, the technology must be simple to use, functional, and reliable."* When evaluating any new technology public safety must consider these implications on many levels. Participants particularly noted that while technology and application development should be encouraged, using unproven emerging technologies on public safety spectrum might put lives in jeopardy. They added that the technology had to be proven in advance of purchase and deployment. At the same time that designers and manufactures consider a technology's safety of life mission, they should pay strict attention to other public safety requirements, including ease of use and simple functionality (e.g., can a fireman in full gear and gloves operate the radio from the top of a ladder).

Part of preparing the equipment for deployment is testing and evaluating the equipment both in the laboratory and in an operational environment. The second finding notes, *"The size of the engineering staff at the FCC and NTIA should be increased to enhance the ability to address new technology in a timely and thorough manner."* The agencies that are responsible for deploying this equipment or officially allowing it into service have the burden of certifying it ready for use. Participants noted that, in many cases, both the FCC and NTIA did not have the engineering staff necessary to keep up with the new technologies streaming onto the market. They pointed out that sometimes there had been delays so significant that the developing company went bankrupt before its technology was even tested. This situation cannot continue—development of life-saving technology must not be stymied by a backup in the approval process. Participants added that the testing staff must carefully balance timeliness and thoroughness to ensure that new technology does not fail or disrupt incumbent technology when implemented.

The survey posed the same question. Overall, the participants supported the need for increased engineering capabilities at both the FCC and NTIA as shown in Figure 3-14 below. Interestingly, industry representatives did not support this idea, with 60 percent of respondents neutral, 20 percent disagreeing, and another 20 percent strongly disagreeing. The industry vote constituted approximately 75 percent of the neutral or negative responses to this question. On the other hand, 100 percent of State-level public safety representatives supported these additional engineering capabilities.

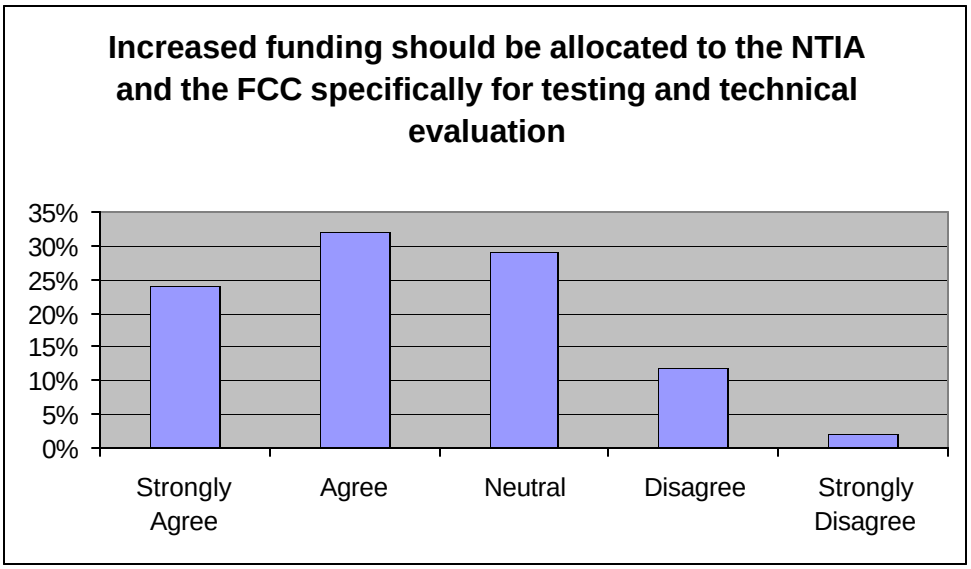


Figure 3-14
Increased Testing and Evaluation Funding

Another important step in the testing and evaluation process that should be accomplished before deploying a new technology is to conduct a series of operational tests. The third finding states, *"There is a distinct need for an area of spectrum devoted exclusively to testing."* On multiple occasions, attendees asked for spectrum, specifically "green" spectrum to test new technologies and their impacts. They noted that especially in public safety, testing could be a dangerous proposition because at any moment the full communications system's capabilities might be needed, or technical problems could be caused during testing. Either way, this situation creates potential problem for the public safety community. The OptionFinder survey's results supported these findings as indicated in Figure 3-15 below.

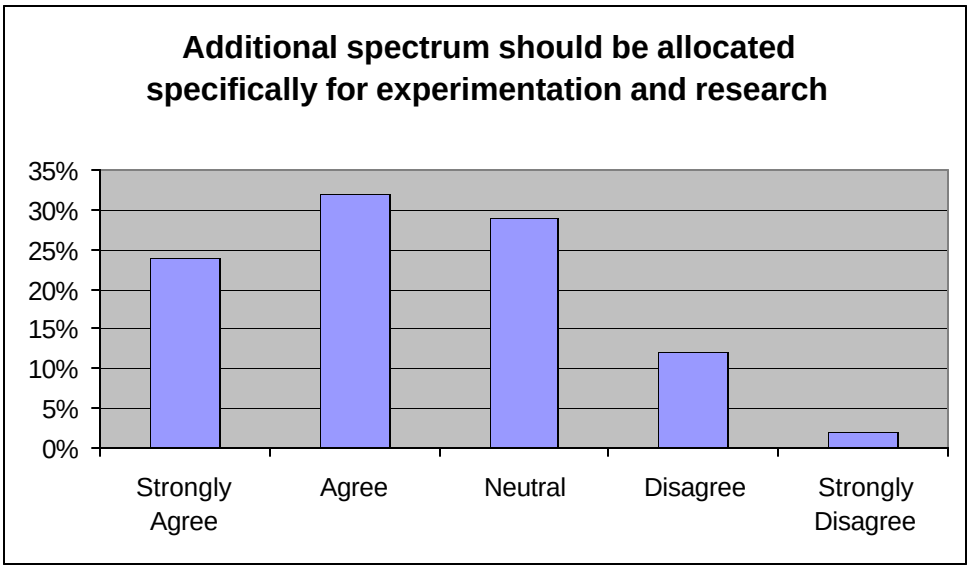


Figure 3-15
Dedicated Research Spectrum

Several regulatory considerations must be addressed in conjunction with new technology testing. Specifically, the fourth supporting finding states, *"Spectrum management and new technology should be considered jointly to help foster larger markets while developing more useful regulations."* It was noted that public safety shared mission similarities with the critical infrastructure community, and that if the management of spectrum could coincide with the technologies and end users, then those markets could be widened. However, coordination and sharing between those two communities would need to be promoted from a regulatory perspective before any benefits would be realized. The benefits that were pointed out included more spectral efficiency and cheaper equipment. In November, while discussing public safety spectrum requirements, the participants suggested developing a long-term migration strategy that would ultimately direct the technological transition of public safety systems.

Building out the market for public safety equipment is important to attract advanced technology, but also to reduce costs. The fifth supporting finding notes, *"Standards should be leveraged standards to cover larger markets with new technologies, while also ensuring that operational and interoperable needs are addressed, by inviting community participation in the standards development."* It was pointed out that, compared with the commercial market, the public safety market was small. Therefore, development of standards across multiple user groups, whether within the public safety community as a whole or spanning other user groups, would help to drive down costs. Attendees cautioned that the development of standards should be an inclusive process, upholding the technical requirements and the operational ones such as interoperability. Overall, the attendees noted that the public safety community needed to find a way to take advantage of economies of scale for equipment requisitions.

"If the public safety community is truly interested in using commercial technologies for public safety applications, it would need to look at ways to bring its buying power together."

To effectively take advantage of the new technologies, public safety agencies must first be able to afford them. The sixth supporting finding states, *"Lack of funding resources available to public safety agencies has limited commercial research and development investment in new technologies."* The commercial manufacturers realize that the public safety market is diverse and not well funded, so it has been less attractive for them to enter with new technologies, especially compared with the commercial market. Participants suggested that with additional funding from a sponsoring federal entity or granting authority, the commercial developers might be more attracted to the public safety market.

As mentioned earlier, the involvement of the stakeholders in the process is important to public safety. Specifically, the seventh supporting finding states, *"Outreach efforts regarding new technologies should be broader to involve more end users to gain a greater diversity of inputs."* Participants on several occasions stressed the importance of broad involvement of a wide array of public safety users to ensure that the new technologies could impact a wider market. On a more basic level, the regulatory approach currently in place was described by participants as "not user friendly." If the regulatory and approval process were more open, simpler, and approachable, the users might become more involved in the development and acceptance of new technologies.

The new public safety band has proven, thus far, to be a good model for deployment of a new technology. The final supporting finding states, *"The public safety community is encouraged by the ease with which a license for use of 4.9 GHz spectrum is obtained, but enforcement needs to be effective."* The participants thought that the 4.9 GHz band represented a timely and well balanced regulatory approach to a new technology and spectrum band. In particular, they pointed out the speed of opening the band up for licenses—that approach matched the intent and use of the band. They added, however, that the lack of an interoperability mandate was disconcerting. Overall, they thought the regulation model would be effective as long as the rules were enforced through peer pressure; however, the FCC must also serve as an effective enforcement body.

Key Finding #2 for Objective 4

Public safety communications needs have grown at substantial rates parallel with the technological capabilities. Agencies cannot afford to use wholly owned systems to meet all of their needs. In many cases, there are commercial offerings that agencies have been able to purchase to supplement their communications capabilities. Table 3-11 identifies the key findings.

Table 3-11
Objective 4, Key Finding 2 and Supporting Findings

Key Finding	**Commercial services serve, and will continue to serve, as an important asset to public safety communications; however, most services do not meet public safety requirements**
Supporting Findings	Cellular telephone technology is a useful tool for public safety personnel
	Most technological advancements are developed for commercial applications and are not easily adaptable to public safety uses
	The public safety community must find a way to take advantage of economies of scale for equipment requisitions
	Local agencies need more in-house communications expertise, and should not solely rely on vendors' knowledge and advice

In many cases, when non-emergency communications are needed, commercial services have filled the void. Specifically, the first supporting finding states, *"Cellular telephone technology is a useful tool for public safety personnel."* Participants noted that across the country, agencies were using cellular telephones or push-to-talk telephones for years with great success. They pointed out that the commercial services allowed complete interoperability because they were telephones and did not congest the land

mobile radio (LMR) systems nor use any public safety spectrum. Overall, it was noted that they were useful tools, but had limited capabilities with respect to public safety operations. This mixed response was evident in the survey, as demonstrated in the normalized data shown in Figure 3-16 below. The industry respondents did not impact these results because they contributed evenly across all five responses at 20 percent.

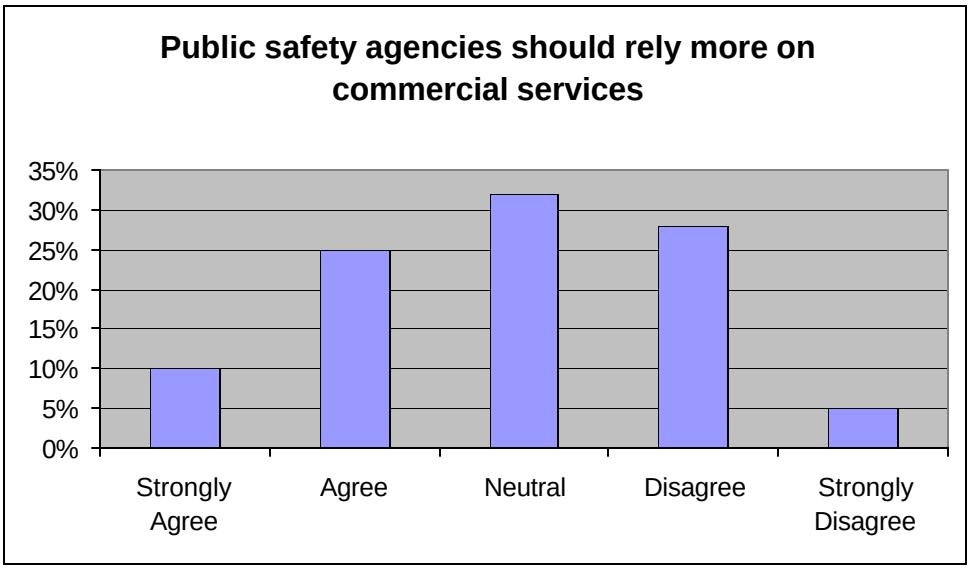


Figure 3-16
Public Safety Commercial Service Use

These limitations could be addressed with the close attention to the needs of public safety. The second supporting finding notes, *"Most technological advancements are developed for commercial applications and are not easily adaptable to public safety uses."* As alluded to earlier, the commercial market represents a much more attractive market for technology developers, leaving the public safety market was largely ignored. Of particular concern, participants mentioned that commercial services did not offer products or services that met public safety's stringent standards for reliability, encryption, security, or interception. Although these standards were not required, if commercial services wanted to be readily accepted by public safety, they needed to address public safety's requirements.

To motivate the commercial services to address public safety needs, the public safety community must make that market more attractive. The third supporting finding notes, *"The public safety community must find a way to take advantage of economies of scale for equipment requisitions."* Participants noted that it was important to involve other user groups to build up demand for the technology and thus gain the ability to push vendors to address public safety needs. They added that the public safety community could either coordinate to create a unified demand or combine with another user group, such as the intelligent transportation systems community, for a common standard.

Within agencies, the staff often does not possess nor could afford communications experience to assist with their planning or evaluation of commercial technologies.

Specifically, the final supporting finding notes, *"Local agencies need more in-house communications expertise, and should not solely rely on vendors' knowledge and advice."* Participants pointed out that if local agencies could use in-house communications professionals, those agencies could make more informed financial decisions and neutral technological evaluations. Attendees further asserted that the training of these in-house experts would be a valuable asset for an agency.

ENDNOTES

1. The National Public Safety Telecommunications Council (NPSTC) is a federation of associations representing public safety telecommunications. The purpose of NPSTC is to follow up on the recommendations of the Public Safety Wireless Advisory Committee (PSWAC). In addition, NPSTC acts as a resource and advocate for public safety telecommunications issues.

2. Regional Planning Committees (RPCs) are allowed maximum flexibility to meet State and local needs, encourage innovative use of the spectrum in portions of the 700 and 800 MHz bands, and accommodate new and as yet unanticipated developments in technology equipment. They are responsible for creating and managing regional plans.

3. The FCC determined that administration of the interoperability channels in the 700 Mhz band should occur at the State level either by a State Interoperability Executive Committee (SIEC) or an existing equivalent agency.

4. ULS is the FCC's online electronic filing system that also allows a user to research applications, licenses, and antenna structures, among other things.

APPENDIX A

Presidential Memo on Spectrum Policy

For Immediate Release
Office of the Press Secretary
June 5, 2003

Presidential Memo on Spectrum Policy

Memorandum for the Heads of Executive Departments and Agencies
Subject: Spectrum Policy for the 21st Century

The radio frequency spectrum is a vital and limited national resource. Spectrum contributes to significant technological innovation, job creation, and economic growth, and it enables military operations, communications among first responders to natural disasters and terrorist attacks, and scientific discovery.

Recent years have witnessed an explosion of spectrum-based technologies and uses of wireless voice and data communications systems by businesses, consumers, and Government. Today there are over 140 million wireless phone customers and, increasingly, businesses and consumers are installing systems that use unlicensed spectrum to allow wireless data, called Wireless Fidelity (WiFi), on their premises. The Federal Government makes extensive use of spectrum for radars, communications, geolocation/navigation, space operations, and other national and homeland security needs. We must unlock the economic value and entrepreneurial potential of U.S. spectrum assets while ensuring that sufficient spectrum is available to support critical Government functions.

The existing legal and policy framework for spectrum management has not kept pace with the dramatic changes in tech-nology and spectrum use. Under the existing framework, the Government generally reviews every change in spectrum use, a process that is often slow and inflexible, and can discourage the introduction of new technology. Some spectrum users, including Government agencies, maintain that the existing spectrum process is insufficiently responsive to the need to protect current critical uses.

My Administration is committed to promoting the development and implementation of a U.S. spectrum policy for the 21st century that will: (a) foster economic growth; (b) ensure our national and homeland security; (c) maintain U.S. global leadership in communications technology development and services; and (d) satisfy other vital U.S. needs in areas such as public safety, scientific research, Federal transporta-tion infrastruc-ture, and law enforcement. My Administration has already proposed several legislative changes or program initiatives to improve elements of the spectrum management process. These proposals would greatly enhance the Governments ability to efficiently manage spectrum. To further promote the development and implementation of a U.S. spectrum policy for the 21st century, I hereby direct the following:

Section 1. Establishment. There is established the "Spectrum Policy Initiative" (the "Initiative") that shall consist of activities to develop recommendations for improving spectrum management

policies and procedures for the Federal Government and to address State, local, and private spectrum use. The Secretary of Commerce shall chair and direct the work of the Initiative. The Initiative shall consist of two courses of spectrum-related activity: (a) an interagency task force that is created by section 3 of this memorandum; and (b) a series of public meetings consistent with section 4 of this memorandum. The interagency task force and the public meetings shall be convened under the auspices of the Department of Commerce and used by the Department to develop spectrum management reform proposals.

Sec. 2. Mission and Goals. The Initiative shall undertake a comprehensive review of spectrum management policies (including any relevant recommendations and findings of the study conducted pursuant to section 214 of the E-Government Act of 2002) with the objective of identifying recommendations for revising policies and procedures to promote more efficient and beneficial use of spectrum without harmful interference to critical incumbent users. The Department of Commerce shall prepare legislative and other recommendations to:

(a) facilitate a modernized and improved spectrum management system;

(b) facilitate policy changes to create incentives for more efficient and beneficial use of spectrum and to provide a higher degree of predictability and certainty in the spectrum management process as it applies to incumbent users;

(c) develop policy tools to streamline the deployment of new and expanded services and technologies, while preserving national security, homeland security, and public safety, and encouraging scientific research; and

(d) develop means to address the critical spectrum needs of national security, homeland security, public safety, Federal transportation infrastructure, and science.

Sec. 3. Federal Government Spectrum Task Force. There is hereby established the Federal Government Spectrum Task Force (the "Task Force") to focus on improving spectrum management policies and procedures to stimulate more efficient and beneficial use of Government spectrum. The Secretary of Commerce, or the Secretary's designee under this section, shall serve as Chairman of the Task Force.

(a) Membership of the Task Force. The Task Force shall consist exclusively of the heads of the executive branch departments, agencies, and offices listed below:

(1) the Department of State;

(2) the Department of the Treasury;

(3) the Department of Defense;

(4) the Department of Justice;

(5) the Department of the Interior;

(6) the Department of Agriculture;

(7) the Department of Commerce;

(8) the Department of Transportation;

(9) the Department of Energy;

(10) the Department of Homeland Security;

(11) the National Aeronautics and Space Administration;

(12) the Office of Management and Budget;

(13) the Office of Science and Technology Policy;

(14) such other executive branch departments, agencies, or offices as the Chairman of the Task Force may designate; and

(15) subject to the authority of the Director of the Office of Management and Budget, the Office of Project SAFECOM.

A member of the Task Force may designate, to perform the Task Force functions of the member, any person who is a part of the member's department, agency, or office, and who is a full-time officer or employee of the Federal Government.

(b) Functions of the Task Force. The functions of the Task Force are advisory and shall include, but are not limited to, producing a detailed set of recommendations for improving spectrum management policies and procedures to stimulate more efficient and beneficial use of spectrum by the Federal Government. The recommendations shall be consistent with the objectives set out in section 2 of this memorandum. The Task Force may hold meetings to obtain information and advice concerning spectrum policy from individuals in a manner that seeks their individual advice and does not involve collective judgment or consensus advice or deliberation. At the direction of the Chairman, the Task Force may establish subgroups consisting exclu-sively of Task Force members or their designees under this section, as appropriate.

Sec. 4. Recommendations to Address State, Local, and Private Spectrum Use. Consistent with the objectives set out in section 2 of this memorandum, the Department of Commerce, separately from the Task Force process, shall, in accordance with applicable law, conduct public meetings that will assist with that Departments development of a detailed set of recommen-dations for improving policies and procedures for use of spectrum by State and local governments and the private sector, as well as the spectrum management process as a whole. These meetings will involve public events to provide an opportunity for the input of the communications industry and other interested parties. Partici-pants may include spectrum users, wireless equipment vendors, financial and industry analysts, economists, technologists, and consumer groups. Interested Federal, State, and local government agencies will be welcome to attend and participate. The

Federal Communications Commission is also encouraged to participate in these activities and to provide input to the National Telecommunications and Information Administration at the Department of Commerce on these issues.

Sec. 5. Reports. The Secretary of Commerce, or the Secretary's designee, shall present to me, through the Assistant to the President for Economic Policy and Director of the National Economic Council and the Assistant to the President for National Security Affairs, in consultation with the Assistant to the President for Homeland Security, two separate reports no later than 1 year from the date of this memorandum, one of which shall contain recommendations developed under section 3 of this memorandum by the Task Force and the other containing recommendations developed under section 4.

Sec. 6. General Provisions.

(a) The heads of Federal Government departments and agencies shall assist the Chairman of the Task Force established by section 3 and provide information to the Task Force consistent with applicable law as may be necessary to carry out the func-tions of the Task Force. Each Federal department and agency shall bear its own expense for partici-pating in the Task Force. To the extent permitted by law and within existing appropria-tions, the Department of Commerce shall provide funding and administrative support for the Task Force.

(b) Nothing in this memorandum shall be construed to impair or otherwise affect the functions of the Director of the Office of Management and Budget relating to budget, administrative, or legislative proposals.

Sec. 7. Judicial Review. This memorandum is intended only to improve the internal management of the Federal Government and is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or equity by a party against the United States, its departments, agencies, instrumentalities or entities, its officers or employees, or any other person. Sec. 8. Publication. The Secretary of Commerce is authorized and directed to publish this memorandum in the Federal Register.

GEORGE W. BUSH

# # #

APPENDIX B
LIST OF ATTENDING ORGANIZATIONS

(November 12, 2003)

The following organizations were invited to participate in the November 12, 2003 meeting. There were three distinct types of groups represented at the meeting. The first group consisted of frequency coordinators with expertise in the frequency assignment process, the second category contained user advocacy groups that advise agencies on how to build, fund, and maintain communication systems, and the users group represented state and local public safety users.

- ***Frequency Coordinators***
  - *American Association of State Highway and Transportation Officials (AASHTO)*—AASHTO exclusively coordinates frequencies for highway maintenance communications in low- and high-band very high frequency (VHF) and low-band ultra high frequency (UHF) spectrum bands. AASHTO also coordinates the channels specifically made available to all public safety coordinators.

  - *Association of Public-Safety Communications Officials—International, Inc. (APCO)*—APCO exclusively coordinates frequencies for police communications in low- and high-band VHF and low-band UHF spectrum bands. APCO also coordinates the channels specifically made available to all public safety coordinators. In addition, APCO has been an active advocate for public safety wireless communications policy.

  - *Forestry Conservation Communications Association (FCCA)*—FCCA exclusively coordinates frequencies for forestry and conservation communications in low- and high-band VHF and low-band UHF spectrum bands. FCCA also coordinates the channels specifically made available to all public safety coordinators.

  - *International Municipal Signal Association (IMSA)*—IMSA coordinates frequencies for fire, emergency medicine, and special emergency for low-, mid-, and high-band VHF and low-band UHF spectrum bands. IMSA also coordinates the channels specifically made available to all public safety coordinators.

- ***User Advocacy Groups***
  - *International Association of Chiefs of Police (IACP)*—IACP represents the interests of police chiefs and their departments. IACP's Communications and Technology Committee serves as a liaison between police chiefs and agencies that are devoted to the development of science and technology and use of modern communication systems.

- *International Association of Fire Chiefs (IAFC)*—IAFC represents the interests of fire chiefs and their departments. The government relations department of the IAFC provides testimony to the Congress and conducts lobbying activities relating to fire protection.

- *National Public Safety Telecommunications Council (NPSTC)*—NPSTC is a federation of associations representing public safety telecommunications that follows up on the recommendations of the Public Safety Wireless Advisory Committee (PSWAC). Additionally, NPSTC has recently been charged with continuing the work of the Public Safety National Coordination Committee (NCC).

- *National League of Cities (NLC)*—NLC provides a forum for cities to coordinate and solve member issues. The Information Technology and Communications Policy committee of NLC reviews and proposes policies in the information technology and communication fields.

- *National Sheriffs' Association (NSA)*—NSA works to raise the level of professionalism among those in the criminal justice field. NSA has been involved in numerous programs to enable sheriffs, their deputies, chiefs of police, and others in the criminal justice field to perform their jobs in the best possible manner and to better serve the people of their cities, counties, or jurisdictions.

- *National Association of State EMS Directors (NASEMSD)*—NASEMSD is the lead national organization for emergency medical services (EMS) and develops national EMS policy for effective, integrated, community-based, universal and consistent EMS systems.

- ***Users***
  - *State and Local User Representative*—State and local users have first-hand experience with the radio system planning, coordination, and implementation processes. The users can provide in-the-field stories necessary to see the full picture.

APPENDIX C
SUPPLEMENTAL RESPONSES FROM NOVEMBER 12, 2003

Supplemental Responses
From the National Association of State EMS Directors (NASEMSD)

The National Association of State EMS Directors, as Represented by Its Communications and Technology Committee (Chair – Margaret Trimble, Pennsylvania State EMS Director; Staff – Kevin McGinnis, 207-622-7203; mcginnis@nasemsd.org) presents comment on the following section of "Improving the Spectrum Management Policies and Procedures for State and Local Public Safety Users - November 12, 2003 Meeting Summary and Request for Further Information"

General State and Local Topics

A. State and Local Public Safety Participation

It is vital, in assuring complete public safety representation on the Task Force and the CAG, that emergency medical services (EMS) systems are represented as a distinct discipline along side police, fire and other entities. All solid EMS systems have at their foundation a strong administrative director and a strong medical director. At the national level, this best represented by the National Association of State EMS Directors and the National Association of EMS Physicians which together represent those charged with building and leading EMS systems.

B. The Local, State, and Federal Relationship

Any "State Entity" designated as a single point of contact should be an agency that represents all of public safety in the State (police, fire and EMS) not just police. While this should be an issue resolved within each state, if the FCC or DOC made it clear that they want an entity that demonstrates direct accountability in its representation of the other entities of public safety, it would make our jobs easier. EMS often gets lost when it comes to statewide public safety "spokesmen".

The NPSTC and the 700 MHZ RPCs and 800 MHZ RPRCs, where they exist,are among entities that should be considered to provide that bridge between local, county, state, and federal users.

The process for obtaining or sharing federal resources are not known or understood by users. Users do not know what federal channels or infrastructure exists, let alone how to obtain use or develop a relation ship for accessing.

C. Continuation of the Public Safety Wireless Advisory Committee or Similar Mechanism

This process should be continued with adequate EMS systems representation as noted in "A" and "B". EMS is EMS and cannot be adequately represented by agencies or organizations whose primary concern is other than EMS systems development, even if those agencies and organizations represent constituents who provide EMS as a part of their mission.

D. Improvement in Interference Protection

With regard to the further training and integration for frequency coordinators, the CASPRAD data base should prove to be a good tool as NPSTC gets this process rolled out.

The coordination process is too broadly stretched between various coordination entities that use the process as a revenue producing mechanism. License applicants are not clear on the coordination process or its function.

Some communications applicants should be exempt from the requirement to submit to the coordination process. There is no mechanism to bypass the process. Examples include the development and expansion of statewide systems that have been previously coordinated, such as the UHF "MED" systems where all license applicants are granted the full complement of MED channels or wide area hospital radio networks. The coordination process only serves as a method to submit a license application to the FCC. It does not provide any technical coordination service or frequency protection.

All coordinators should be required to be examined and licensed by the FCC, not just certified. There does not appear to be a method to insure technical competency for spectrum or frequency recommendations.

There should be a mechanism to insure technical requirements for frequency recommendations made by coordinators. Coordinators should be held accountable for their assignments with a clear process for recourse and finical accountability.

There should be a process established for geographic frequency assignment and licensing. For example, a state should be given the responsibility and duty to manage the spectrum for some public safety services. A geographic spectrum license or frequency assignment process should be established, offering the state government the responsibility and right to issue user certificates for clearly established wide-area geographically deployed systems.

Spectrum Needs Identification—Objective 1 Topics

A. Identification of Individual Public Safety Agency Spectrum Needs

The NASEMSD concurs with the following finding and notes that small EMS providers and hospitals are particularly susceptible to this effect, and therefore require special consideration in representation on any level.

- "Vendors or consultants usually drive the requirements of some mid-size agencies and most small agencies."

B. Identification of Nationwide Spectrum Requirements for Public Safety Agencies

There should be strong, guidance and standards from the Federal level to provide "top down" insight into the frequency assignment process. The process must be driven from both the federal level and from the local level.

The Spectrum Management Process—Objective 2 Topics

A. User Activities in the Spectrum Management Process

The frequency coordination process should not be driven by economic incentive. Frequency coordinators should not have an economic incentive or involvement for assignment of public safety channels.

B. Frequency Coordinator Activities in the Spectrum Management Process

The "Line A" restraints put on public safety systems approximately 80 miles below the Canadian border are overly restrictive. This area includes a large number of big cities. A system that passes the US standards for frequency coordination in terms of interference potential may not pass the much more restrictive Canadian standards. The Canadian government appears to want to have no chance at all of ever hearing a new US station in Canada. As a result, we do not have access to large numbers of frequencies that would otherwise be usable under our own standards of acceptable interference.

C. FCC Activities in the Spectrum Management Process

Delegation of more responsibility to coordinators should not be pursued. This only serves to perpetuate financial incentive for coordinators. The FCC must look after the public good.

Peripheral Topics for Further Consideration

A. The Proper Role of Information Technology in Spectrum Management

The complexity of obtaining an FCC license, required forms and procedures have grown too complex for the average public safety user such as an ambulance service, fire department, or 9-1-1 communications center. The use of a form that is intended for many different application processes and users is confusing. The FCC's "password" system, designed to provide more security, has instead been a significant barrier to the average public safety user. The forms are far too long and complicated, and payment should be accepted by the coordinators electronically, as it is by the FCC.

Further requirement for a paper signature, particularly in addition to the "password" system, is unnecessary. After coordinator approval, there is an unacceptably long delay for the FCC to issue a license. Other than “Line A” issues, the process should be almost automatic once coordination has taken place.

A license term of 10 years is compounding the problem, as few persons that have completed the licensing process will be present when the license requires renewal. Over the ten year license term, many of these persons will advance or retire, leaving the licensed agency without historic perspective. Retention of the knowledge of how the license was obtained or of the process of “on line” renewal, password protection and FIN number retention leave the user confused and without recourse or information on how to renew. The process needs to be clearly explained and established at a more intuitive level so a person that only performs the function one time can complete it.

The actual frequency coordination process must still have a real person, skilled in radio system design, to review it and give it an approval. It is paramount that individuals vested with this responsibility be credentialed in one manner or another in radio systems design.

B. Solutions to Interstate, Interregional, and International Coordination Issues

The "Line A" restraints experienced by public safety systems, which extend to approximately 80 miles below the Canadian border, are overly restrictive. This area includes a large number of big cities. A system that passes the US standards for frequency coordination in terms of interference potential may not pass the much more restrictive Canadian standards. The Canadian government appears to want to have no chance at all of ever hearing a new US station in Canada. As a result, we do not have access to large numbers of frequencies that would otherwise be usable under our own standards of acceptable interference.

Supplemental Responses
From Ron Haraseth
(Public Safety Frequency Coordinator)

Introduction Email

I have attached a section-by-section response from the view of a coordinator as well as from my background from working at a state level and participating in PSWAC.

It may or may not be a "consensus" view but may have some items that could be used in a consensus reply. It was done in spirit of the request by the NTIA CAG to openly respond to each segment of the RFI.

This was submitted to the "rest of the PS group", but I have seen no effort to formulate a consensus before or since, so I offer it as my own work and not attributable to APCO or any of the other organizations participating.

I have some definitive ideas how public safety needs to be protected as we move into new technology, and how public safety should be heard. I am also concerned about some of the directions in the future. For one, I attended a meeting with your people a while back to discuss the system we used for frequency coordination. It appeared to me that NTIA was looking for a magic button. It does not exist in non-federal Part 90 spectrum. The systems, the regulations, etc. are far too complex to leave to a computerized model. The FCC failed in their implementation of ULS. Their intent was total regulatory review of all applications. They could not do it. Just too complex. Perhaps 50 year in the future when all of the incumbent technology is no longer evident, but for now, that road does not exist.

Ron

Response Body

Improving Spectrum Management Policies – NTIA

12-18-03

draft

General State and Local Public Safety Topics

Section A

Public Safety system "ownership" in the US is driven from the local level up. This is quite different from models in virtually any other country. While this provides an excellent representation of the democratic process, it complicates national policy development. The stated existing input processes, the CAG and SAFECOM Executive Committee do not necessarily accurately represent the total national picture and diversity of the non-federal public safety system "owners".

It is fairly widely recognized that the PSWAC process produced a very effective result and was based on a very open mechanism for participation. This open mechanism does not exist within the current framework of the CAG and SAFECOM EC. The members of the CAG are entirely representative of the federal side of the process. The SAFECOM EC, transferred from the PSWN program, was essentially directly appointed by a process directly under the control of federal partners. While this group is in fact fairly representative of a fairly broad segment of the non-federal public safety sector, non-the-less, it was not a selection derived and appointed from the non-federal public safety sector. The SAFECOM EC members typically are higher level representatives, but should be considered, and clearly defined, as an oversight and steering group, not as the equivalent of the full open membership of the PSWAC process nor were they appointed with input from any of the major non-public safety representative user associations, groups, or consortiums.

Section B

Local, State and Federal agencies do indeed share requirements to cooperatively work together at an increasing rate. There is a clear requirement for the two, federal and non-federal, to be able to cooperatively use appropriately identified spectrum to inter-communicate. Both sides are currently restricted by extremely vertical and greatly different policies. So far, it appears that it is much easier to share physical plant components, but this sharing is still inhibited when applied to actual radio systems and spectrum.

One step (6^{th} bullet) lists the possibility of a state level coordination point. This brings the cooperation process much closer to the local level of control and inherently different regional differences and requirements of the non-federal community. Similarly, it also puts local federal representatives in a closer relationship with the state/local non-federal partners, both of which have a clearer picture of regional policy and operational differences. However, the level of expertise and proactive nature of state level operations varies drastically among different states and regions. The level of performance of the 800 MHz RPCs is a good example of the divergent levels of capabilities of different state's abilities to perform.

A critical missing component for this model is consistent and sufficient funding to support the program.

Section C
Basic agreement with this item as referenced in other section comments.

Section D
Global issue: The public safety segment is highly response to the implementation of new technology that help perform the functions of public safety in a more efficient and effective manner. Still, public safety is highly reliant upon incumbent technology and is not in an environment that is conducive to major shifts in technology due to the impact of transitioning to such technologies. Implementation of new technology is not a problem where its implications are a clear enhancement of existing operations and do not conflict with legacy operations nor impair the ability of public safety agencies to supply services. Public safety has a long history of creative uses of emerging technology where it is clearly beneficial to operations and is financially feasible and prudent.

The scenario that does pose a problem is where proposed technology significantly impacts the performance of existing, and needed incumbent systems. The problem in this case is continued operation at an acceptable level with a clear migration strategy. Interference introduced by new technologies is a clear danger to current legacy operations. The public safety community needs to determine whether or not it is willing to be subject to some degradation, if so, how much, and how it is to be monitored and managed. Public safety clearly will be involved with new and exiting capabilities in the future, but can not suffer irreparable harm to operations in the interim. The problem becomes one of managing the transition to these new technologies.

Public safety should seize upon the opportunity to establish well thought out transition policies in order to present a clear and consistent position to the industry and regulators. **This should include a clear statement indicating an absolute stance on protecting current public safety spectrum from encroaching technologies.**

Objectives issues:

- The need for a consistent application of band/bandwidth specific co-channel and adjacent channel assignment criteria. There are few current rules (800 MHz and exception) that indicate a consistent and enforceable technical parameter based frequency assignment criteria. Any such development should include exception criteria. (Current trends towards simplistic mileage based or outmoded contour methods of predicting interference levels tend to be very subjective and are only effective in a narrow range of terrain scenarios. There must be a standard waiver process that allows presentation of much more detailed and specific engineering modeling in cases were closer spacing is requested or increased interference is suspected.)
- Antenna patterns, or more preferably, geo-referenced coverage level limit polygons, is highly desirable.
- Currently, APCO is the only coordinator that maintains a significant training program. Historically, the Department of Commerce conducted training for spectrum managers. The DOC continues to hold annual limited sessions, but only authorized non-nationals

(members of foreign countries) to attend. This training process NEEDS to be reinstated and highly updated for US based spectrum mangers, particularly the coordinators and any personnel that officially perform frequency coordination for the coordinators. Possibly leading to a formal certification process.

Spectrum Needs Identification-Objective 1 Topics

A.
Awareness by the public safety community of the requirements for spectrum access and for determining spectrum availability is, indeed, lacking.

Vendors often exacerbate this situation, knowingly, or unknowingly. Local sales personnel are often very uninformed. National level sales forces are often driven by proprietary requirements that provide an edge to their specific vendor regardless of the limitations and/or true requirements of their clients in the public safety community.

Per the third bullet, not only do frequency coordinators non have the authority, more to the point, they are not in a position nor do most have the knowledge to provide this level of required engineering support.

B.
The creation of state/regional planning committees is of utmost importance when addressing regional spectrum requirements which can then be fed into a national spectrum requirement policy. The concept of state/regional planning committees is a positive step. The FCC has taken steps to prompt the creation of these committees. However, the FCC has essentially complicated the process by isolating by band the roles of state/regional committees creating quagmire of disassociated actions and direction not only inter-state, but intra-state. Even the roles and requirements for each requested regional committee is incomplete and confusing.

If these multiple, task specific regional committees within each region were truly consolidated into a standardized general purpose public safety spectrum committee, then there would be more likely hood of coordinated activity within each regional committee. Those committees that had little incentive to go through the formal process of creating and initiating a new committee for a narrowly defined process that it knows has little impact on their region, would actually be more likely to perform a minimal action merely through the normal business as an adjunct to its more critically identified functions.

The majority of these separate committees consist of the same people. If they could simply advertise specific meetings which included appropriate agenda including all spectrum actions, they would probably attract a broader range of participants to any and all meetings. This would clearly be beneficial in providing a broader, educated group of people within each region and would lead to greater integration of input, increased efficiency of actions, etc.

These consolidated regional committees could be the crux of a national program to provide a structured input to national strategy and policy development (**think PSWAC with regional chapters**).

C.
A high level spectrum plan is important. The current environment appears to be a rush to new technologies with minimal respect to existing "services". Public safety needs to have access to emerging technologies to continue providing superior service to the public. **However, this should not come at the expense of degraded service of current technologies.** The public safety community needs to formalize a policy that absolutely protects current technology and provides a migration path to assimilate the newer technologies in a graceful manner.

A more structured bi-directional process is mandatory to provide for a cohesive national public safety spectrum policy. The consolidation and standardization of regional committees is an important step in creating a process that provides significant information both upwards to the national level as well as down to the regions from the national level. It is imperative that the current trend towards multiple task specific committees be aborted and consolidated into a much more structured, and simplified national network of regional committees.

The Spectrum Management Process-Objective 2 Topics

A.
User activities associated with obtaining a valid operational license can be broken into two distinct areas. The first is the assimilation and preparation of the pertinent administrative and technical information and the second is the technical action of coordinating and assigning specific frequencies and technical restrictions. It is currently very difficult for agencies to consistently, accurately, and successfully complete an application (Form 601). The process is close to impossible for a non-technical person. There is a trend to the use of third party operations (both non-profit and for-profit) to assist agencies in successfully completing applications. As an example, APCO maintains external services (to frequency coordiantion) specifically to address those preparatory requirements. This includes facilities to help identify appropriate and available spectrum prior to the licensing process and a service that assists the applicant in successfully completing an application.

Over the last several years, the actual process of coordiantion has become much more structured as a screening process to assure regulatory compliance as well as provide specific technical frequency coordination. Years gone by, when systems where significantly simpler, spectrum was more available, and forms were simpler; frequency coordinators were able to provide some assistance. This has evolved to a situation were the complexity of the systems, that scarcity of easily assignable spectrum, greater sharing of existing spectrum, and complexity of regulations has required the coordinators to restrict assistance along very strict lines.

B.
As discussed in previous sections, the FCC Rules do not provide clear, consistent guidelines for coordiantion. In several areas where technical assignment criteria is indicated, it is based on highly outmoded and occasionally, inappropriate technical basis.

Even should more appropriate and consistent guidelines be created, not every scenario can be adequately (or accurately) addressed. Specific alternative technical methods should be allowed

on a clear technical waiver process (as opposed to policy waivers) allowing recognized advanced engineering based studies (usable to both promote or deny any given application).

Per bullet one, coordination processes could be made available for regional review, but only on an advisory basis with a mandatory response time. This does occur currently at varying degrees within the current public safety coordinators processes. This is different from the NPSPAC and 700 RPC processes where applications are actually pre-coordinated to a certain degree prior to submission to an official frequency coordinator. Even in this later scenario, while the coordinator may have a better application which has been reviewed for compliance with a region's plan making it easier and quicker to process, it is still coordinator who is the certifying body in the eye of the FCC. There is still an underlying requirement for the coordinator to provide a quality screened application that is compliant to the FCC Rules as well as to provide minimal potential interference.

Bullet 2, for coordination across national borders, particularly Canada, there has been some discussion that an independent (non-government) body in Canada with access to the Canadian LMR database, could be used to provide pre-FCC coordination to greatly speed the process of frequency clearance and approval. Impediments include a requirement to avoid non-compliance with State Department inter-governmental negotiation laws and regulations. An independent non-federal coordination body on each side of the border could "unofficially" pre-clear frequency selections and technical parameters before an application is processed through the official conduit between the FCC and Industry Canada. With pre-clearance on each side, there should be a significant increase in the successful licensing of stations above line A. The reverse is applicable and would also be of advantage to Canada with pre-coordination clearance with a US based counterpart for Canadian applications in their border areas as well.

An informal, non-federal relationship for across border frequency coordiantion could also lead to a more localized information path to facilitate harmonization of spectrum policy in general between the two countries.

While there are other significant problems with the Mexican border, something developing on the Canadian front could be duplicated on the southern border as appropriate to the differences.

Final bullet – There has been a significant trend that has moved the level of waiver away form the licensing process, both supplied by a coordinator as well as processed by the FCC Licensing Bureau staff. There are a couple of possible explanations. The more complex nature of licensing along with a more codified (and computerized) process of licensing is one explanation. Another is the trend for the regulatory policy drafters that tend to write regulations that are not altogether clear, often contradictory, and with no specific alternative mechanism with reliable metrics. Such a trend makes interpretation of such waivers very difficult for the Licensing Bureau staff and makes most waiver processes a policy level decision. When a waiver becomes a policy level decision, it must proceed onto Washington in which case the process becomes extremely time consuming.

Rules should be drafted with a thought to allowing alternatives through pre-determined constructive waiver options. This, along with better delegation of authority to the Licensing

Bureau would enhance such the waiver process. It is noted that there will always be a need for certain higher level policy decisions. In general, the lower the level a decision can be made, the more efficient and quicker the resolution.

C.
One comment. The FCC does indeed need to make the process clearer. A series of statuses with minimal (or no) explanation and definition is very frustrating.

D.
The FCC currently follows a very rigid structure based on the legal system. It is very exacting in its requirements, especially in its form, format, and function. But not necessarily content. The FCC imposes strict deadlines on accepting comments, but apparently has no internal response deadlines. This is also a trend regarding less formal contacts directly with department personnel.

D-2.
Without a detailed analysis of the NTIA process, it is difficult to make any real decision. The policy and rules development process are a complete unknown to the public safety community. There is little indication of any true independent and locally originated higher level advocacy for public safety such as exists with in the Legislative Branch. With such disparity, public safety would have a difficult time approving any such merger.

It is true the FCC is extremely complex in its operation and is overtaxed with other communications issues ranging from telephony to TV cable regulations, but there is no indication that a joint independent operation would provide even the level of support and advocacy public safety now enjoys with the FCC in a new consolidated operation.

Peripheral Topics for Further Consideration

A.
Computerization and information technology have played a key role in the current operations of frequency coordiantion and FCC licensing. While there is room for improvement in the technical analysis of frequency coordination, as well as refinements that can be made in the administrative aspect of data entry and status monitoring, improvements would be greater in consolidating the processes. This includes streamlining and focusing a system specifically for land mobile radio. Also, consolidating actual coordiantion databases to insure identical information availability for competing coordinators.

As mentioned in other above section responses, creation of more standardized methodologies, computer programs, and **training**, would lead to a better process.

B.
See previous responses above. Consolidated and structured regional committees could play a key goal. The availability of detailed application information and granted license information at the local level (dependent on the above consolidation) would also be of great benefit.

The cross border situation similarly, is mentioned above and could also benefit from the same harmonization and consolidation of the regional committees and support of similar activities in adjoining countries. Since the actual public safety operators are indeed local people, the creation and promotion of local information exchange along with consistent processes between regional committees and the exchange of operational information and understanding at the local level would translate to better, and easier, negotiations at the national level.

C.
Again, one answer to better understanding, better information flow, and resultant better efficiency of any funding issues could be addressed through a structured, and supported, region/national coalition of committees based from within each region.

Supplemental Responses
From American Association of State Highway and
Transportation Officials (AASHTO)

Introduction Letter

January 14, 2003

Don Speights, Chief
Public Safety Division
National Telecommunications & Information Administration
Washington DC 20553

Dear Mr. Speights:

Attached are AASHTO's comments on Improving the Spectrum Management Policies and Procedures for State and Local Public Safety Users. This document is the result of the work of AASHTO's Special Committee on Wireless Technology. Members of the committee include past and present chairs of both 700 and 800 MHz Regional Planning Committees.

If you have any questions concerning any of the positions presented in the paper, do not hesitate to contact me.

Yours truly,

Larry A. Miller
Frequency Coordination Manager

Response Body

Improving the Spectrum Management Policies and Procedures for State and Local Public Safety Users

The American Association of Highway and Transportation Officials is the national association of the state departments of highways and transportation in the 50 states, the District of Columbia and Puerto Rico. Its scope includes all five principal transportation modes, and its major purpose is to foster development, operation and maintenance of an integrated national transportation system.

AASHTO's Special Committee on Wireless Technology is comprised of three members from each of AASHTO's four regions, a Chair and Vice-Chair. The committee is charged with developing the association's positions on spectrum management and related regulatory matters affecting member departments regarding wireless technologies.

AASHTO conducts an annual workshop for the member departments. The workshop features training for the member department wireless telecommunications managers, updates on regulatory issues and new technologies. APCO has participated in these workshops and training sessions. AASHTO is a member of the Intelligent Transportation Society Telecommunications Committee and has been a participant in the ITSA Dedicated Short Range Communications writing group.

AASHTO also serves as a FCC certified frequency coordinator.

AASHTO welcomes the imnitiave of the NTIA and provides this input which will assist the NTIA in developing recommendations for improving spectrum management.

AASHTO supports the concept of having one Federal Agency which manages spectrum allocation and management for both Federal and state and local governmental entities. We feel that the existing and future interaction and cooperation between these agencies would be improved by having one agency overseeing both groups.

The Nevada Department of Transportation currently operates a statewide wireless telecommunications system which shares infrastructure with Federal, local and county governments. This type of shared resource system makes AASHTO uniquely qualified to address the issues presented by the NTIA.

AASHTO has examined the document titled Improving the Spectrum Management Policies and Procedures for State and Local Public Safety Users.

AASHTO supports the concept of having one Federal Agency which manages spectrum allocation and management for both Federal and state and local governmental entities. We feel that the existing and future interaction and cooperation between these agencies would be improved by having one agency overseeing both groups.

General State and Local Public Safety Topics

Section A.

AASHTO agrees that the Task Force and CAG process should include knowledgeable local and state public safety stakeholders. Response to incidents frequently requires many different levels of government agencies to interact and cooperate. The Task Force and CAG process will provide the structure necessary to formalize the working relationships needed for efficient emergency incident response.

Section B

The concept of each state serving as the single point of contact for all state and local public safety agencies within that state is a good concept. The FCC has established a similar system for the 700 MHz Public Safety spectrum.

Section C.

AASHTO agrees with the Key Finding and other statements under section C.

Section D.

Interference rules and consistent, standardized signal interference to noise ratios should be developed for **all** receivers.

We strongly support the storing of antenna pattern information in the FCC's Universal Licensing System or a new system should it be required. This would assist frequency coordinators in determining the interference level created by new transmitters by analyzing them against the parameters of existing systems. If this data is to be valuable to frequency coordinators it must be accurate. If the system operator installs an antenna in a manner which changes the characteristics of the antenna pattern, the coordinators will be basing decisions on faulty data.

A test should be established for frequency c coordinators. This test would be similar to the FCC radiotelephone operator examination which was required for technicians who repair transmitters.

Spectrum Needs Identification-Objective 1 Topics

Section A.

The spectrum planning process must consider new technologies and regulations. One method of achieving greater spectrum efficiencies is the deployment of new digital narrowband technologies. Many end users rely on local vendors who may not be familiar with the latest technologies.

Rules regarding technical and operational issues containing defined engineering standards would assist frequency coordinators in helping manage spectrum. Channel loading requirements for the frequency bands below 512 MHz could assist with a more uniform distribution of spectrum. The frequency coordinators must be granted the authority necessary to enforce applicable rules.

Section B.

Regional Planning Committees like most political institutions are sometimes plagued by internal personality disputes. Oversight of these committees by the agency charged with the responsibility of spectrum management is vital if the committees are to be effective.

Existing Regional Planning Committees operate on a best guess methodology as to the future spectrum needs of agencies in their geographic areas. Experience in some regions is that 40percent of the spectrum set aside for future use is not licensed. This restricts access to the spectrum by applicants who would construct systems if frequencies were available. Only after a period of time, sometimes five years or more, does the entity for which spectrum is reserved decide that the will not construct a system does the spectrum become available.

We suggest that an improvement on this process is to implement loading standards based on census data and accept and process applications in order of receipt as is done for spectrum below 512 MHz. This would allow applicants to receive licenses and operate systems as needed. After systems are constructed packing and short spacing could be used where applicable to maintain spectrum efficiency.

Section C.

A national spectrum policy is needed to ensure that public safety on all levels of government is afforded the priority it deserves. A single agency approach should improve spectrum utilization and interoperability between all responders to incidents.

A national spectrum policy must consider commercial and non public safety private wireless networks and how they affect the public safety spectrum users.
Long term migration strategy should be developed but not mandated. Small agencies in rural do not have the financial resources or need for new technologies.

The Spectrum Management Process-Objective 2 Topics

Section A.

The flow chart titled User Activities requires clarification of what Non-NPSPAC/700 MHz Channel Applications represent.

Section B.

The coordination process (can) **shall** involve regional review. It is important that regional input is utilized in making decisions regarding spectrum usage.

A pre-coordination system which allows input from the users on both sides of the border is needed and should be mandated. The authority to grant waivers should reside with the licensing branch and not with the central office.

Frequency coordinators work diligently in making the "most appropriate" frequency recommendations. A request for waiver is the last option for them. The FCC should consider this fact and grant waivers if accompanied by a reasonable justification. To require frequency lists when both the originating and home coordinator for the frequencies submitted is an undue burden on the applicant and the coordinators.

Section C.

If the FCC decides to delegate more authority to the frequency coordinators, it must also clearly define and mandate information transfer protocols. This will ensure the timely transfer of reliable and accurate data.

Section D.

We favor a single spectrum management system because it could result in improvements to coordination, cooperation between different levels of government who share pertains which mitigate the loss of life and property.

The current rulemaking process seems to be too slow. We support mandatory time frames with limits on the time a rulemaking initiative can be in process. An example would be that a ruling must be made within two years after a petition for rulemaking is filed. Rulemaking dockets initiated by the Commission should follow the same time limits.

We agree that the current spectrum management process could be improved. We have not ruled out any possible solutions at this time. Further discussions between the Public Safety organizations and regulatory authorities should result in an approach which serves all well.

Peripheral Topics for Further Consideration

Section A.

The implementation of the Universal Licensing System by the FCC has made information retrieval faster. It has not however reduced the time required for the Commission to issue a license. Coordinators now provide notification of frequency recommendations electronically. This has greatly increased the speed of service where more than one coordinator is involved.

Section B.

The establishment of a pre-coordination procedure for border areas is needed to reduce the number of applications which are rejected by other countries. This process must have the

participation of the wireless telecommunications systems users on both sides of the borders. Providing the technical and operational information for proposed systems before the application is submitted for formal consideration should resolve most if not all issues. This would result in faster license grants with fewer objections.

Section C.

New technologies offer the best opportunity for Public Safety agencies to achieve their goals with respect to wireless telecommunications systems. There is however no single universal solution for all users. The needs differ between rural and urban areas. New technologies should be promoted but not mandated. To do so could present an undue financial burden on small agencies which do not need the increased performance.

If funding for new systems is provided by the Federal Government then al agencies will be able to implement new systems and technologies.

Summary of Key Findings

General State and Local Public Safety Topics

Participation by state and local representatives is vital to determining the needs and capabilities of those agencies to address the needs. It will be difficult for many of these representatives to attend meetings due to funding limitations. The intergovernmental joint committee could accomplish the goal if the state and local agencies area represented in the committee.

Spectrum Needs Identification—Objective 1 Topics

A national spectrum planning policy could help if the all levels of government accept its findings. Many existing wireless telecommunications systems were implemented without considering future users. The result is that it is difficult to implement certain operations including mobile relay systems due to the lack of planning with respect to input frequency usage. If a national plan was developed and implemented many systems could be reconfigured with improvements realized by all users.

The Spectrum Management Process—Objective 2 Topics

The coordination process is at least somewhat dependent upon local input. While sharing of frequencies sometimes does not appear to be technically feasible, some state and local agencies are willing to share while others are not. Decisions cannot be based solely upon technical and engineering standards and FCC Rules. National planning and oversight could assist the coordinators.

Supplemental Response
from the Association of Public Safety Communications Officials-International, Inc., International Association of Chiefs of Police, International Municipal Signal Association and International Association of Fire Chiefs, Forestry Conservation Communication Association, Major Cities Chiefs Association, Major County Sheriffs Association, National Association of Counties, National League of Cities, and National Sheriffs Association

Before the
United States Department of Commerce
National Telecommunications and Information Administration

COMMENTS

The Association of Public Safety Communications Officials-International, Inc., International Association of Chiefs of Police, International Municipal Signal Association and International Association of Fire Chiefs, Forestry Conservation Communication Association, Major Cities Chiefs Association, Major County Sheriffs Association, National Association of Counties, National League of Cities, and National Sheriffs Association, hereby provide the following comments regarding the November 12, 2003 Meeting Summary and Request for Further Information. ("RFI"), "Improving the Spectrum Management Policies and Procedures for State and Local Public Safety Users." Some of the named organization have submitted, or intend to submit, separate statements in response to the RFI.

In general, we believe that the document captures the discussion that occurred, and raises the appropriate questions. The key exception is relates to the suggestion for a single spectrum management agency. The text of the document states only that "while the meeting participants voiced concerns regarding the negative impacts of a single spectrum management agency, full discussion of both benefits and drawbacks did not occur." This document does not reflect the

fact that the parties had submitted a detailed statement opposing moving management of state and local public safety spectrum to the Executive Branch. "Full discussion" was unnecessary insofar as the views of the participants had been set forth in that statement, which should be referenced accordingly.

The following are some specific comments on each of the sections.

Spectrum Management Process

A. (page 11)

In the diagram, the word "Coordinator" should probably be deleted from the center box.

B. (pages 12-13)

In third bullet under "additional findings" the term "in the field" should probably read "in Gettysburg" and "field staff" should be "Gettysburg staff.

There should also a point made about the timeliness of obtaining waivers. The FCC should have a policy of resolving public safety waiver requests within a specified time frame.

C. (page 13)

We strongly reiterate our view that the FCC staff needs to be involved in the discussion of these issues. Otherwise we are working in a vacuum.

APPENDIX D

JOINTLY-AUTHORED SUBMISSION

STATEMENT OF

ASSOCIATION OF PUBLIC-SAFETY COMMUNICATIONS OFFICIALS INTERNATIONAL, INC.
INTERNATIONAL ASSOCIATION OF FIRE CHIEFS, INC. and INTERNATIONAL MUNICIPAL SIGNAL ASSOCIATION
INTERNATIONAL ASSOCIATION OF CHIEFS OF POLICE
MAJOR CITIES CHIEFS ASSOCIATION
NATIONAL SHERIFFS' ASSOCIATION
MAJOR COUNTY SHERIFFS' ASSOCIATION
NATIONAL PUBLIC SAFETY TELECOMMUNICATIONS COUNCIL

October 10, 2003

ALLOCATION AND MANAGEMENT OF RADIO SPECTRUM FOR STATE AND LOCAL GOVERNMENT PUBLIC SAFETY COMMUNICATIONS

The Communications Act of 1934 provides that all non-Federal Government use of the radio spectrum is to be allocated and managed by the Federal Communications Commission ("FCC" or "Commission"), an independent regulatory agency. This includes spectrum licensed to commercial entities, as well the spectrum licensed to state and local governments for their police, fire, EMS and other public safety communications operations. Federal Government spectrum use is managed by the National Telecommunications and Information Administration ("NTIA"), within the Department of Commerce. We believe that this important, fundamental distinction should be maintained, though we also suggest that greater cooperation and coordination between the FCC and NTIA is necessary to promote more efficient and effective public safety use of the radio spectrum. The FCC should also raise public safety to higher level of importance within its organizational structure.

Maintain FCC/NTIA Jurisdiction

Some have suggested that jurisdiction over state and local public safety spectrum should be shifted to NTIA or another Executive Branch entity. The apparent goal of such move would be to combine under one agency the management of all "public safety" spectrum, including spectrum used by state and local public safety, and by Federal entities such as the Federal Bureau of Investigation, the Department of Treasury, the Department of Defense, and the Department of Homeland Security. We believe that such a fundamental shift would be harmful to state and local government public safety agencies, and would not promote better spectrum efficiency or efficacy.

State and local government public safety radio communication is currently subject to the FCC's jurisdiction. As an independent regulatory agency, the FCC has no vested interest in any of the entities subject to its jurisdiction. Thus, the FCC commissioners and

staff are free to make policy decisions based solely upon the Commission's interpretation and implementation of its enabling statute, the Communications Act of 1934, as amended, and related legislative directives. A principal purpose of that legislation is to promote "the safety of life and property through the use of wire and radio communication."

Federal government spectrum use is currently managed by NTIA, itself part of the Executive Branch. Thus, NTIA has an inherent, vested interest in meeting the communications requirements of Federal agencies under the common control of the President. We do not believe that NTIA (or any other Executive Branch agency) should also have control over the allocation and management of spectrum licensed to and used by state and local governments. Despite good intentions, such an Executive Branch spectrum manager would have a built-in conflict of interest, and would be expected to give preference to the needs of the Executive Branch, potentially to the detriment of state and local government entities.

The FCC provides numerous formal and informal opportunities for public participation in its decision-making process. Over the years, the public safety community has been able to develop good working relationships with commissioners and staff, providing them with critical information regarding the actual operating conditions and needs of public safety communications. The public also has open access to a broad range of data and information regarding non-Federal spectrum allocation and use. Similar dialogue and access to information is difficult if not impossible with NTIA, insofar as much of its spectrum management involves classified information. For example, we have urged that the Department of Defense provide additional spectrum sharing opportunities in certain frequency bands for public safety agencies in portions of the U.S. that do not have extensive military facilities. That effort has been stymied by the unwillingness of the DOD to release classified information regarding its current and future spectrum utilization.

We also do not believe that NTIA is equipped to handle the massive task of issuing, maintaining, and enforcing the tens of thousands of licenses held by state and local governments. The FCC has developed an efficient automated licensing system for both public and private licensees. The FCC also has license enforcement mechanisms in place, including skilled field office personnel, to enforce rules and prevent harmful and disruptive interference to licensed operations. Moving that entire licensing and enforcement structure to NTIA or another Executive Branch agency would be enormously disruptive, inefficient, and unnecessary.

FCC licensing of public safety (and similar private wireless) licensees is built upon decades of regulation and administrative law decisions. That historical record has great value and helps to defines the rights and obligations of public safety licensees and the Commission. It is unclear as to whether and how this regulatory foundation could be maintained if jurisdiction for state and local government public safety is moved to the Executive Branch.

Most state and local government public safety systems currently operate in frequency bands with mixed allocation of public safety and non-public safety channels. Thus, while

specific channels may be designated for public safety, adjacent channels may be licensed to business, industrial, or commercial wireless licensees. The FCC maintains jurisdiction over all of those entities and frequency allocations, and thus is uniquely suited to develop and enforce interference protection criteria. Furthermore, many public safety agencies operate on channels that are open for use by a broad range of public and private licenses (e.g., land mobile operations in 470-512 MHz and 806-809/851-854 MHz, and nearly all point-to-point microwave operations). These mixed frequency allocations and assignments would be difficult to administer if the FCC lost its jurisdiction over state and local government licensees.

Therefore, for the reasons discussed above, we strongly urge that the FCC continue to have primary responsibility for allocating and managing radio spectrum for state and local government public safety agencies.

Need for Improvement

While we do not support major changes in jurisdictional responsibility, we do believe that much greater cooperation is needed between NTIA and the FCC, especially as it relates to public safety communications. Cooperation is needed to promote interoperable emergency communications across local, state, and federal jurisdictional boundaries. Improved inter-agency coordination could also lead to more efficient spectrum utilization. While state and local government public safety spectrum use is different in many respects from Federal government use, the similarities are significant, especially as to the critical nature of the communications. That suggests a potential for far more "sharing" of spectrum across jurisdictional boundaries.

The FCC should also place a higher organizational priority on public safety issues, with high level officials given primary responsibility for coordinating issues related public safety. The Commission should also establish a task force on public safety, drawing from all relevant offices and bureaus, with appropriate participation by representatives of the public safety community.

For further information, please contact:

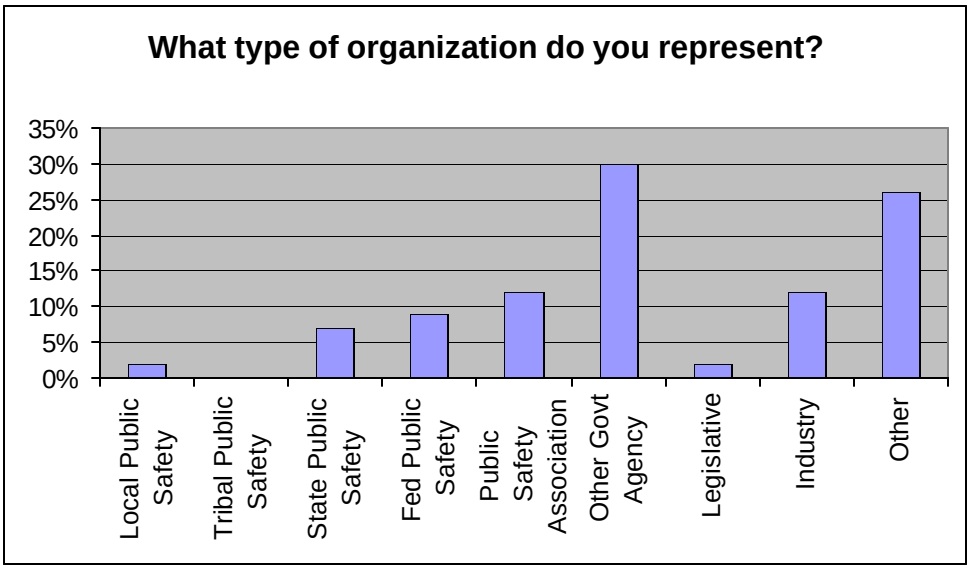
Robert Gurss (APCO) at 202-833-3800 or gurssr@apco911.org
Harlin McEwen (IACP, NSA, MCCA and MCSA) at 607-257-1522 or chiefHRM@leo.gov
Alan Caldwell (IAFC) at 703-273-9815 or dirgovrels@ichiefs.org
Marilyn Ward (NPSTC) at 407-836-9668 or marilyn.ward@co.orange.fl.us

APPENDIX E

National Forum OptionFinder Survey Questions and Results

DEMOGRAPHIC INFORMATION

1.



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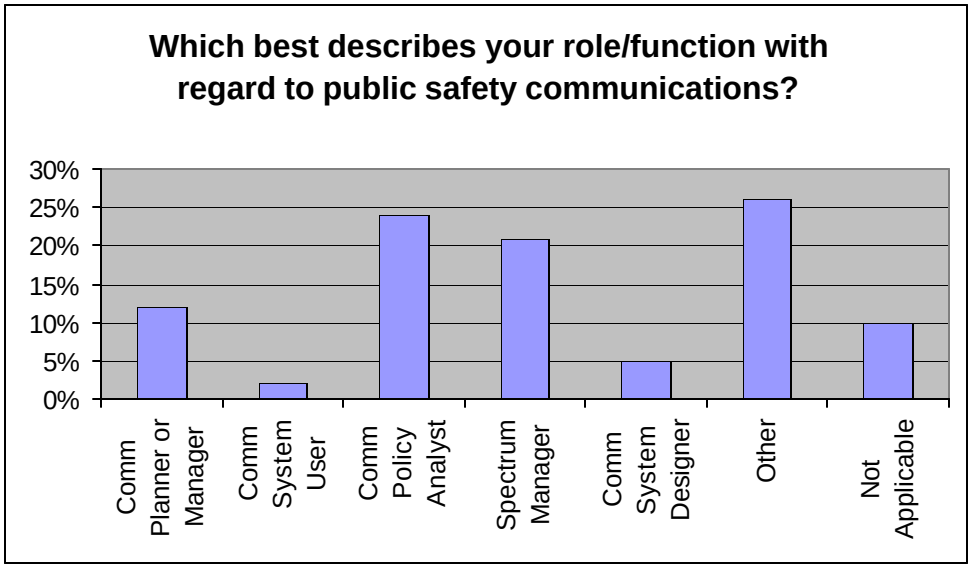
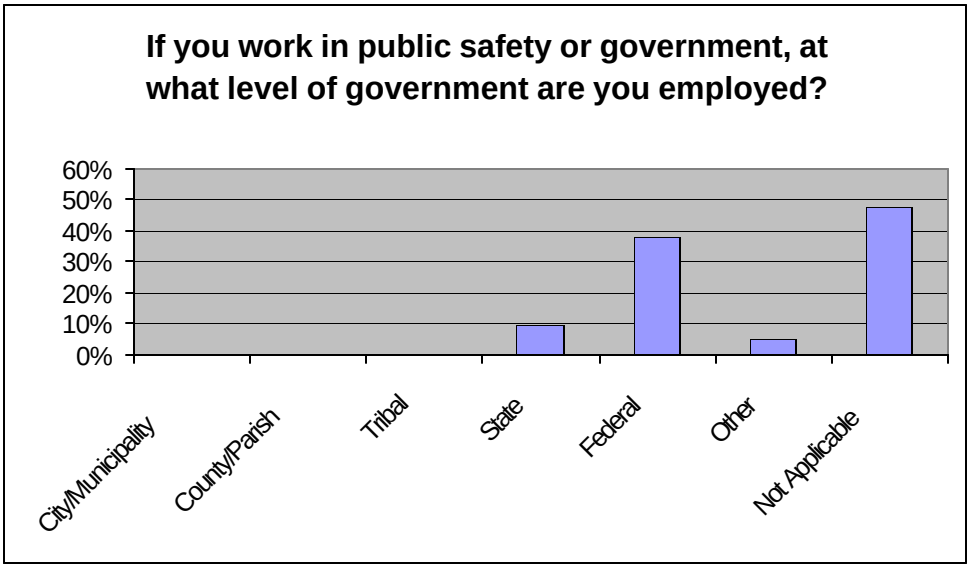


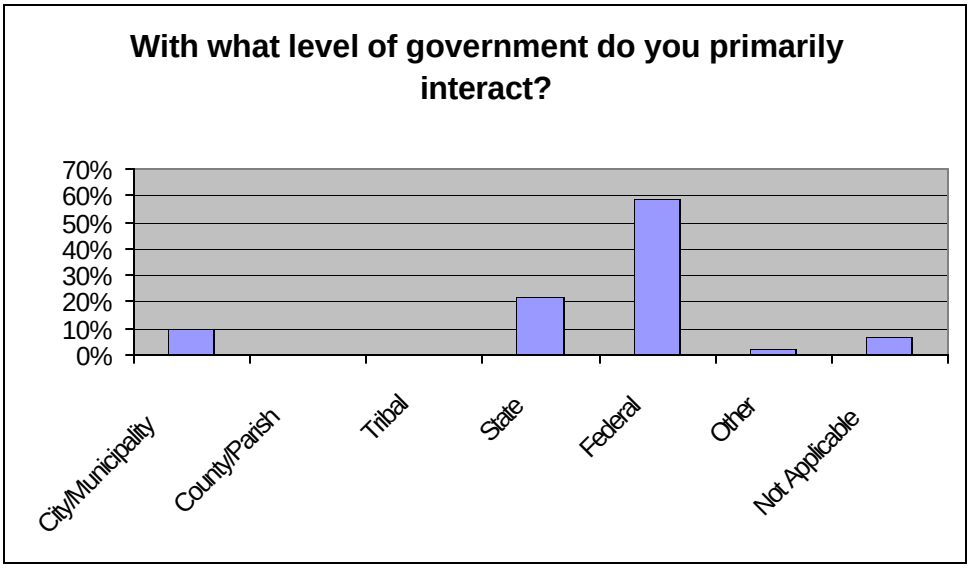
3.

Which best describes your public safety experience?
40%
35%
30%
25%
20%
15%
10%
5%
0%
Law Enforcement
Fire
Emergency Medical Services
Emergency Management
Comm Support
Other
Not Applicable

4.


If you work in public safety or government, at what level of government are you employed?
60%
50%
40%
30%
20%
10%
0%
City/Municipality
County/Parish
Tribal
State
Federal
Other
Not Applicable

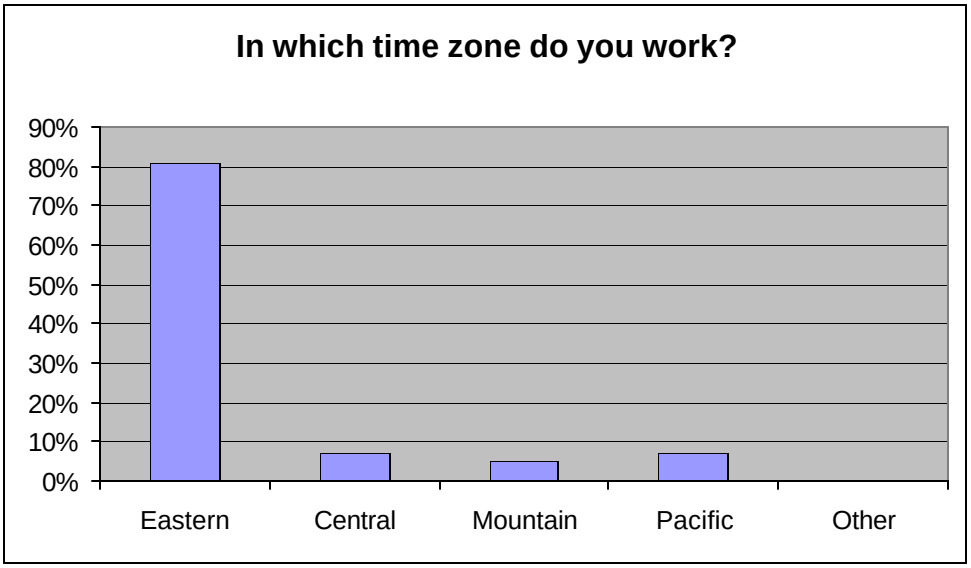
5.


With what level of government do you primarily interact?
70%
60%
50%
40%
30%
20%
10%
0%
City/Municipality
County/Parish
Tribal
State
Federal
Other
Not Applicable

6.

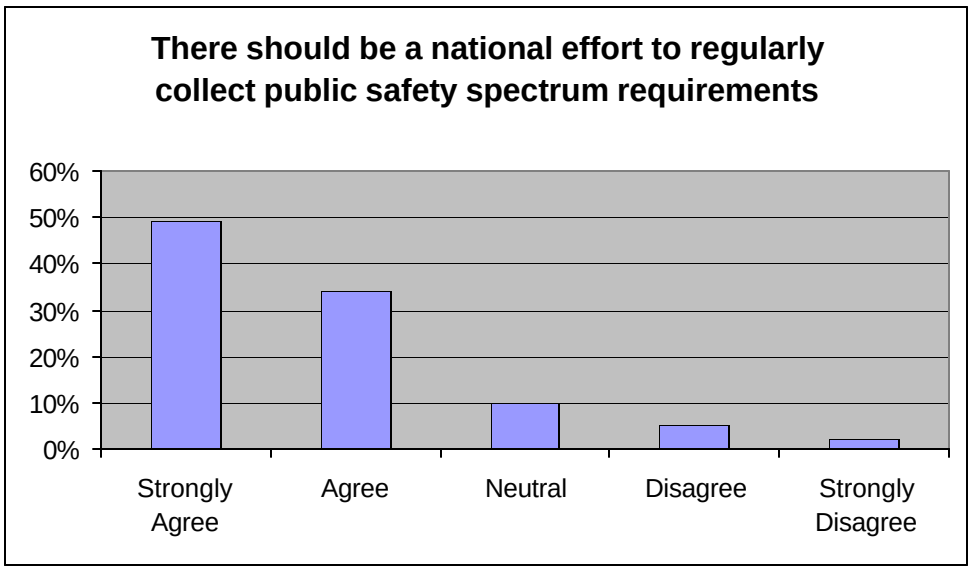
How long have you been involved with public safety communications?
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Less than 5 years
5–10 years
10–15 years
15–20 years
20+ years
Not involved

7.



OBJECTIVE 1: Develop a means to address critical spectrum needs of national and homeland security, public safety, federal transportation infrastructure, and science

1.



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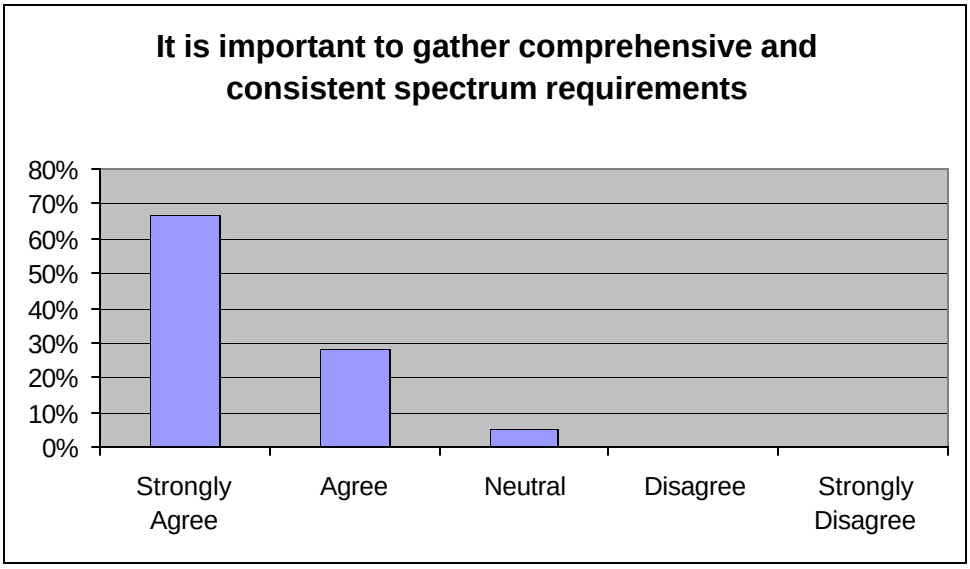
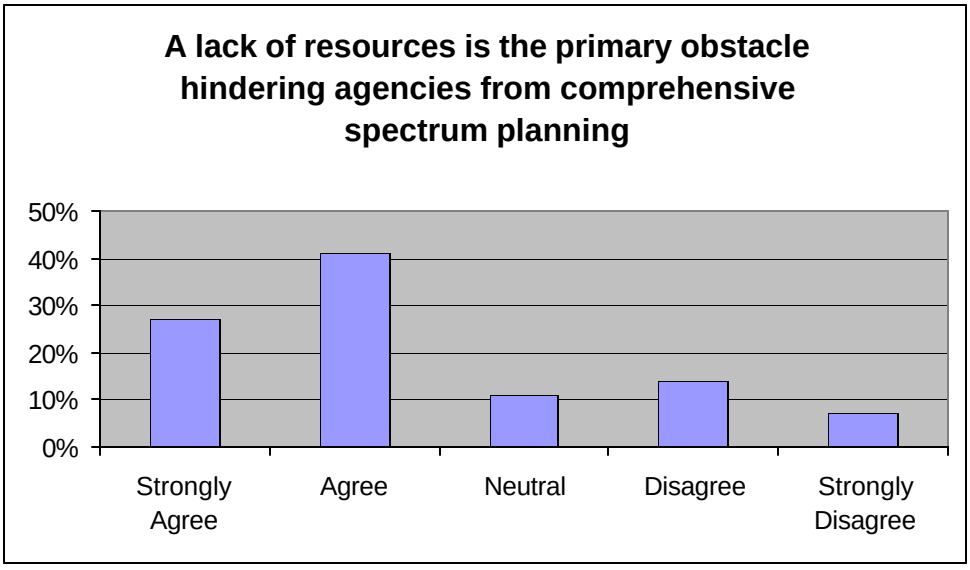


Agency Planning

1.



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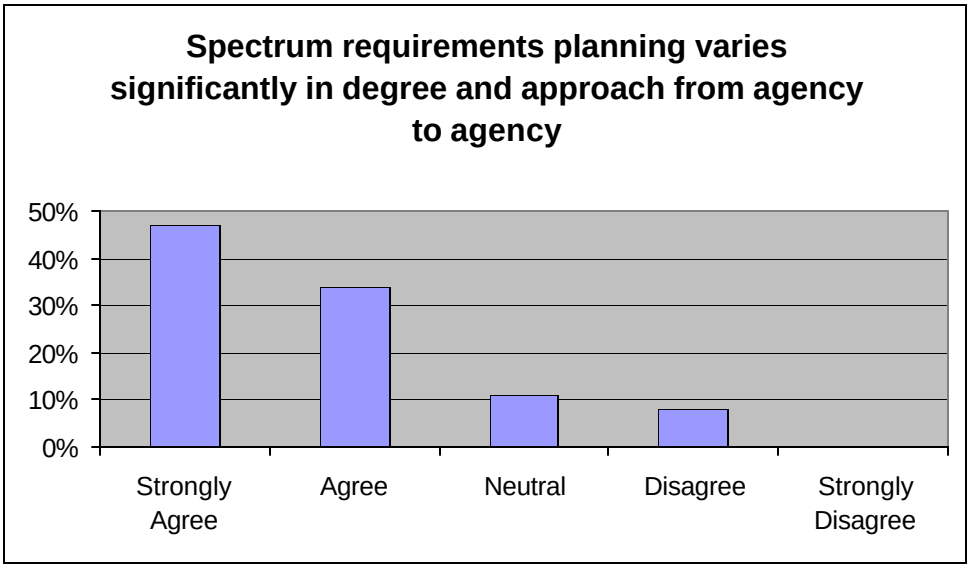
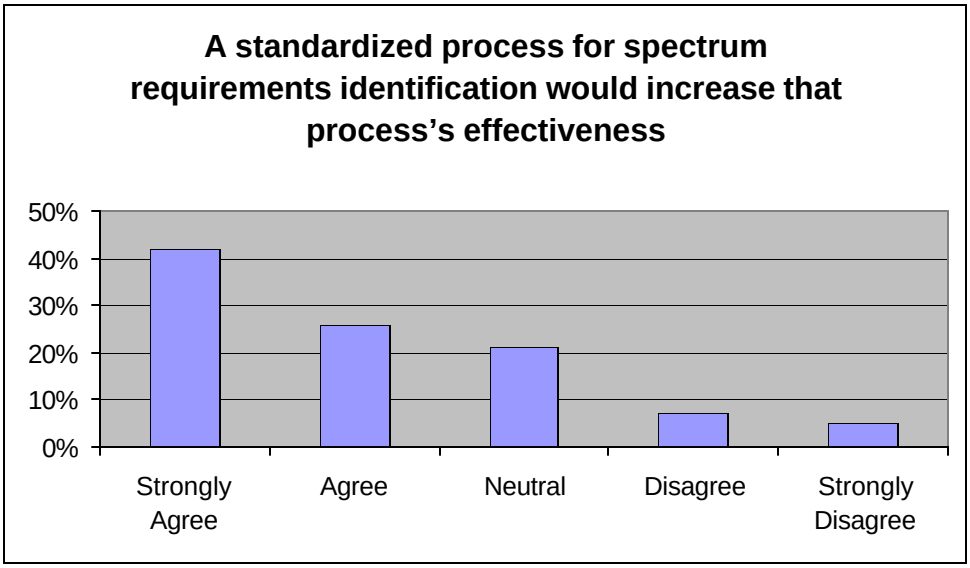
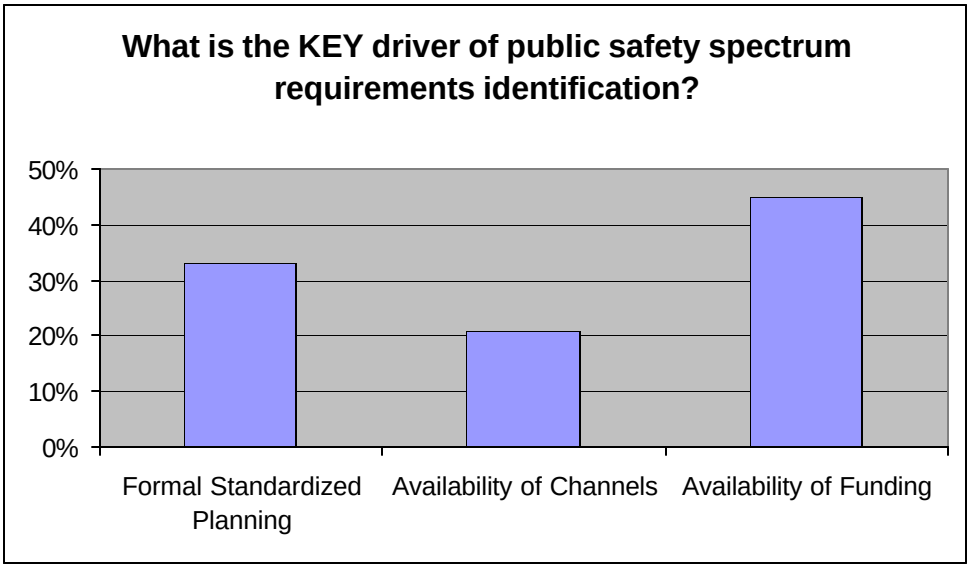

Spectrum requirements planning varies significantly in degree and approach from agency to agency
50%
40%
30%
20%
10%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

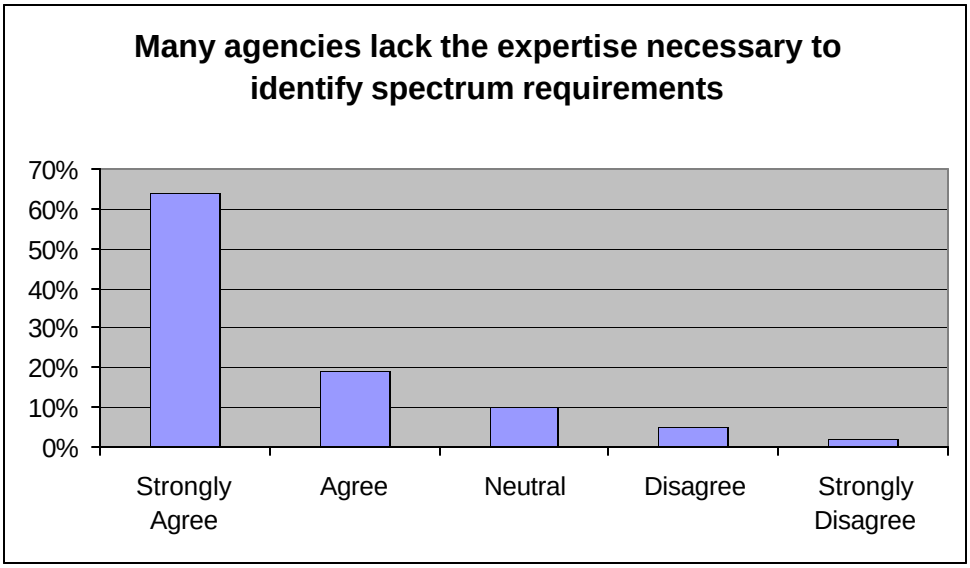
3.


A standardized process for spectrum requirements identification would increase that process's effectiveness
50%
40%
30%
20%
10%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

4.

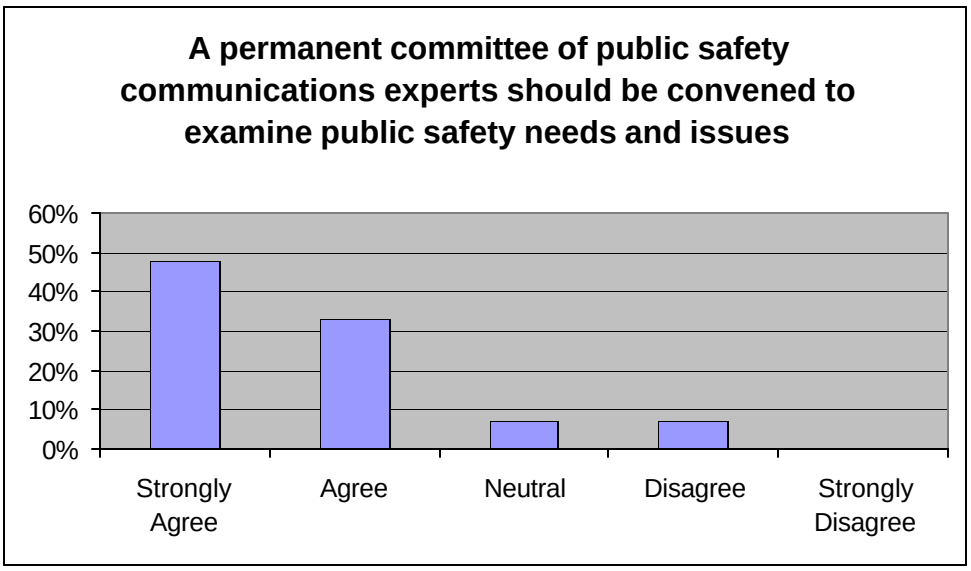

What is the KEY driver of public safety spectrum requirements identification?
50%
40%
30%
20%
10%
0%
Formal Standardized Planning
Availability of Channels
Availability of Funding

5.


Many agencies lack the expertise necessary to identify spectrum requirements
70%
60%
50%
40%
30%
20%
10%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

Spectrum Requirements Leadership

1.



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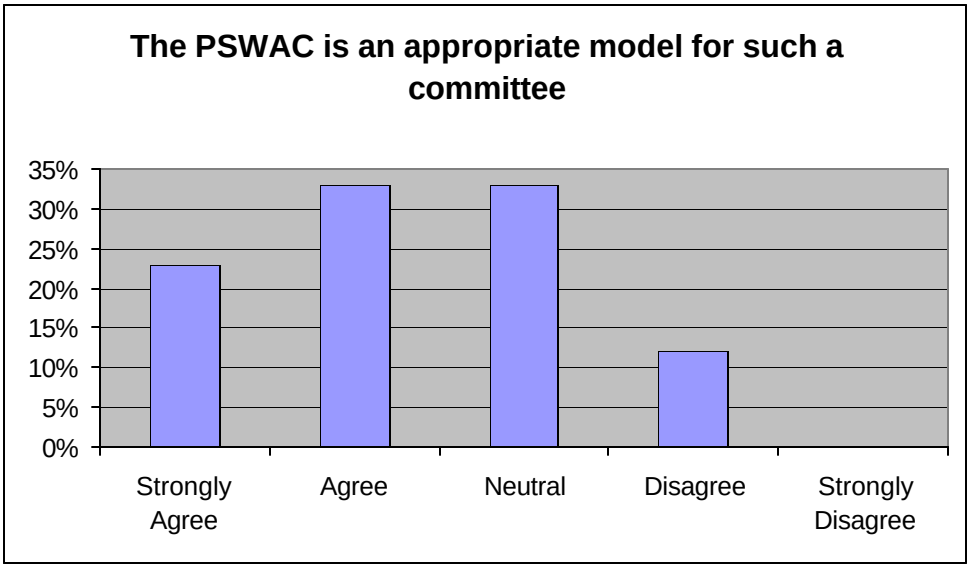

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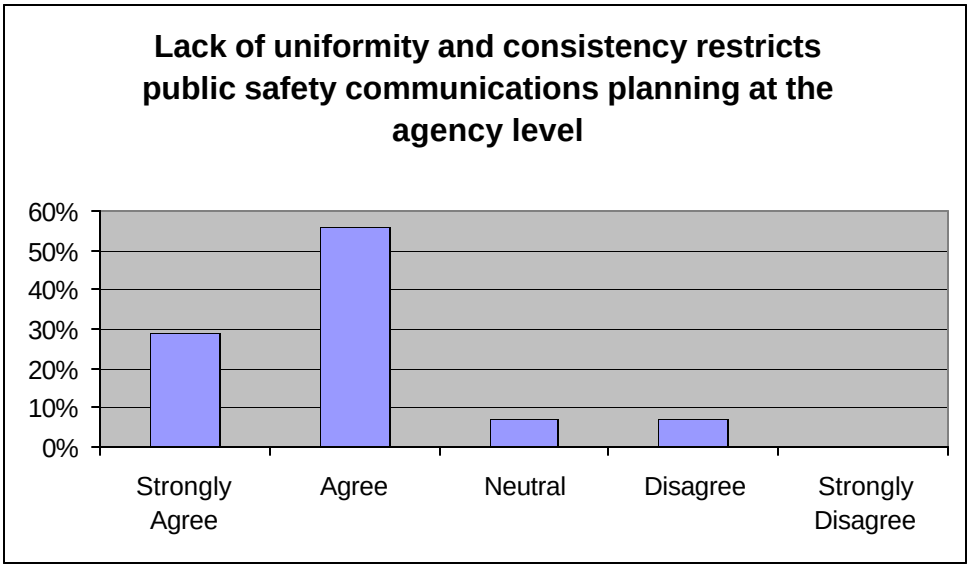
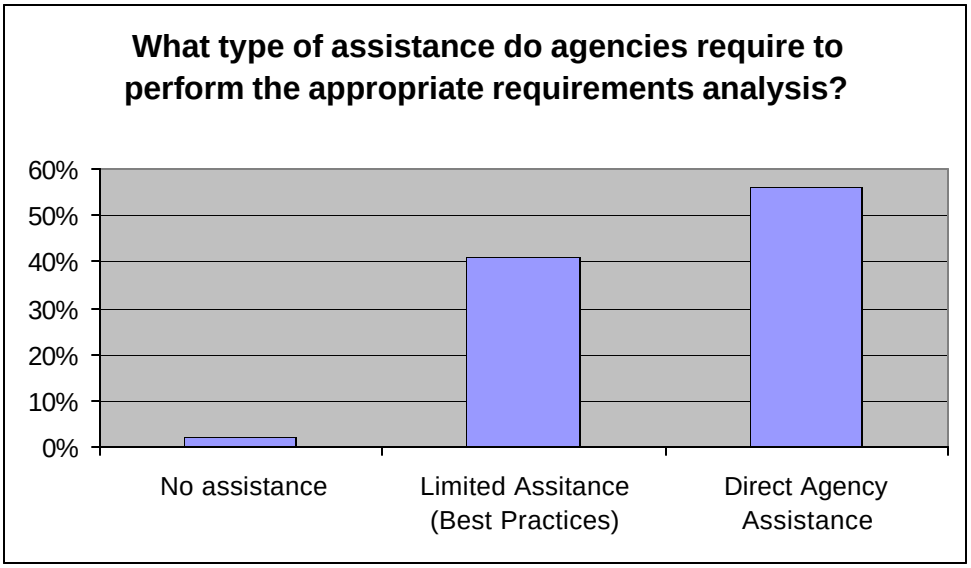
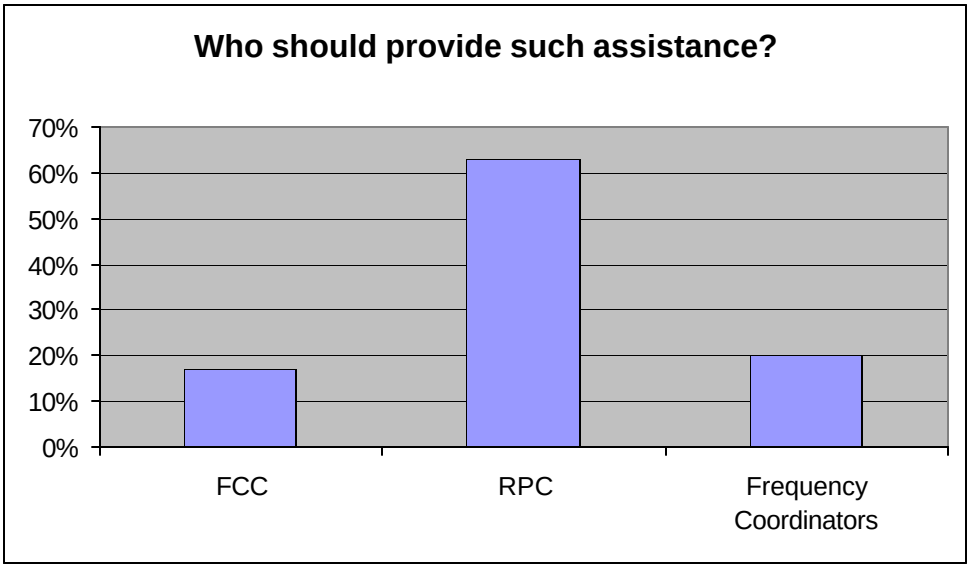

Lack of uniformity and consistency restricts public safety communications planning at the agency level
60%
50%
40%
30%
20%
10%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

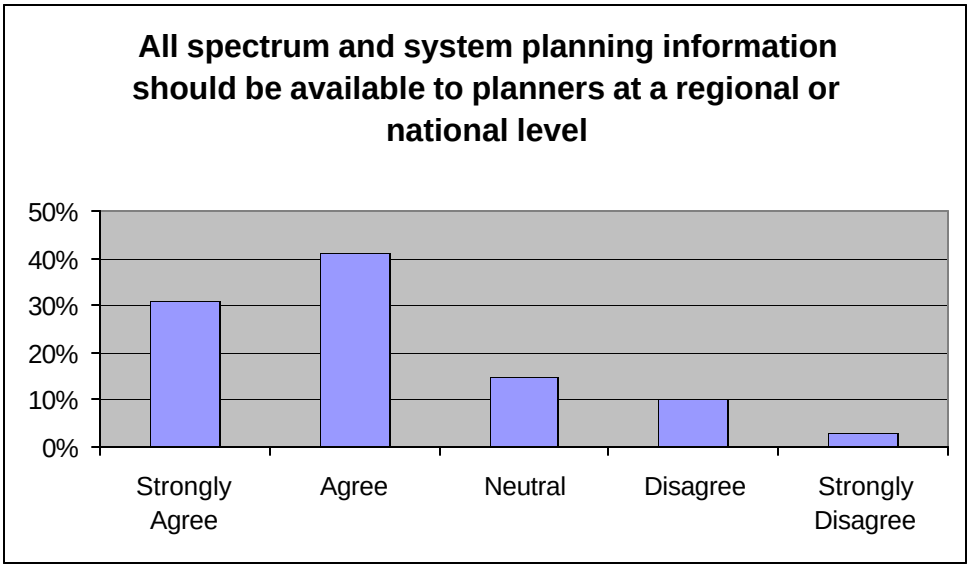
4.


What type of assistance do agencies require to perform the appropriate requirements analysis?
60%
50%
40%
30%
20%
10%
0%
No assistance
Limited Assitance (Best Practices)
Direct Agency Assistance

5.


Who should provide such assistance?
70%
60%
50%
40%
30%
20%
10%
0%
FCC
RPC
Frequency Coordinators

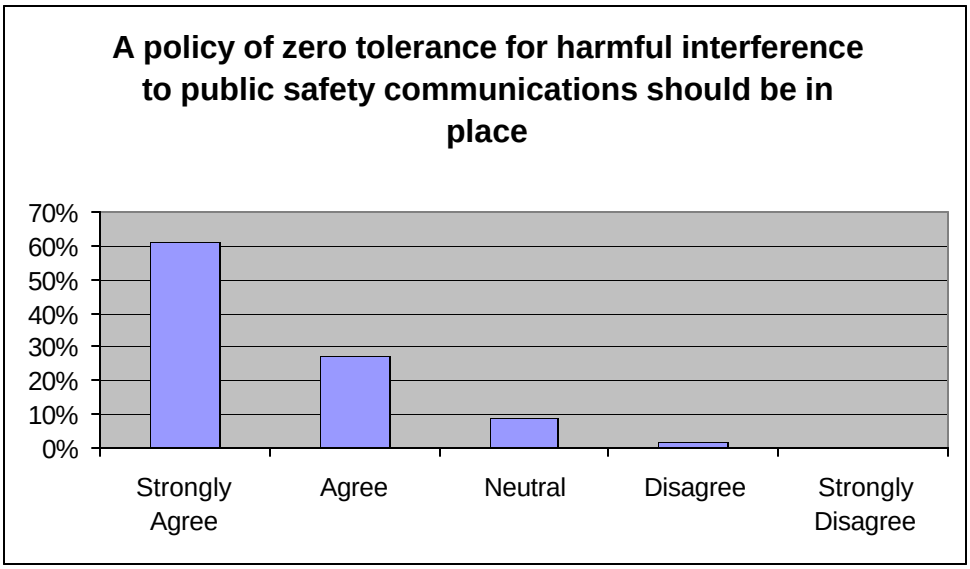
6.


All spectrum and system planning information should be available to planners at a regional or national level
50%
40%
30%
20%
10%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

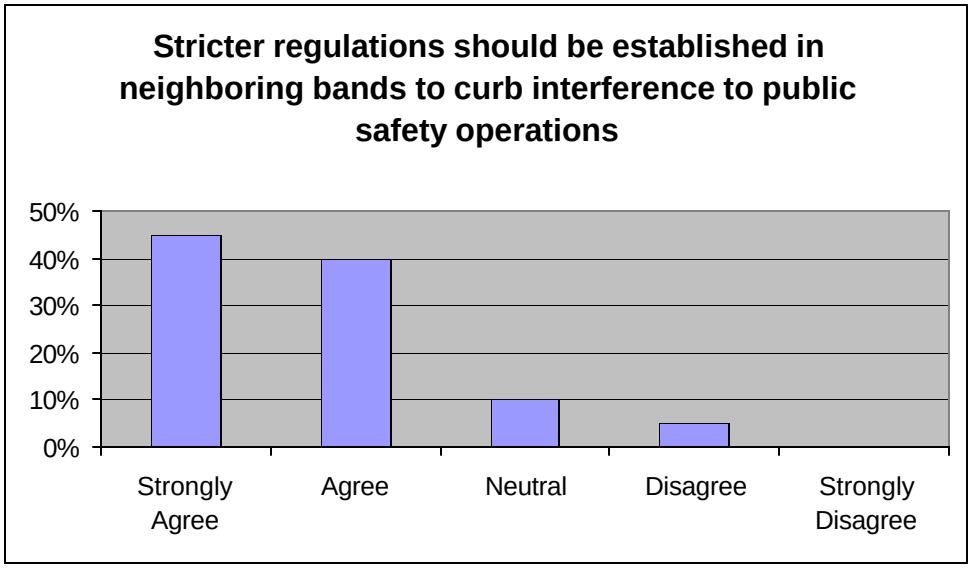
OBJECTIVE 2: Facilitate a modernized and improved spectrum management system

Public Safety Spectrum Management

1.



2.



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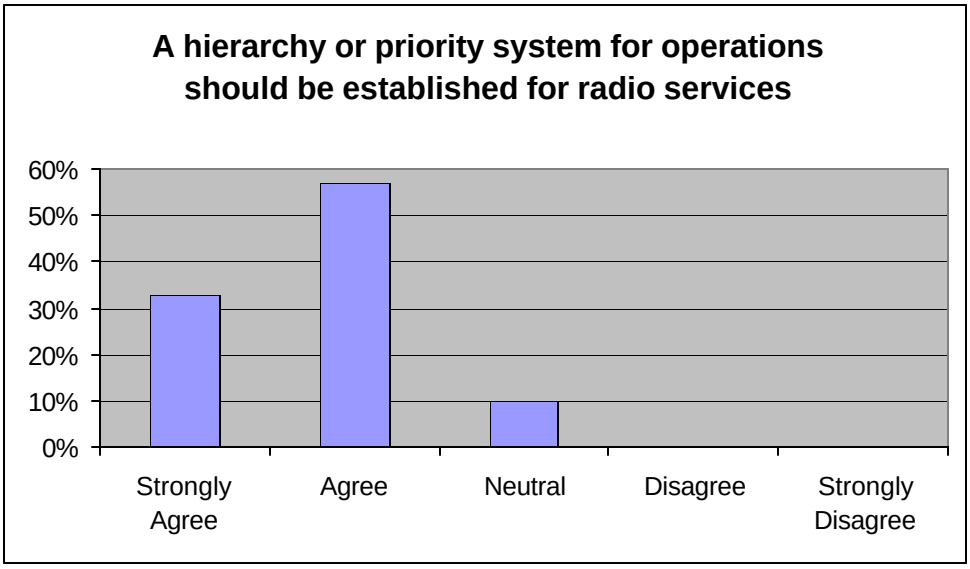
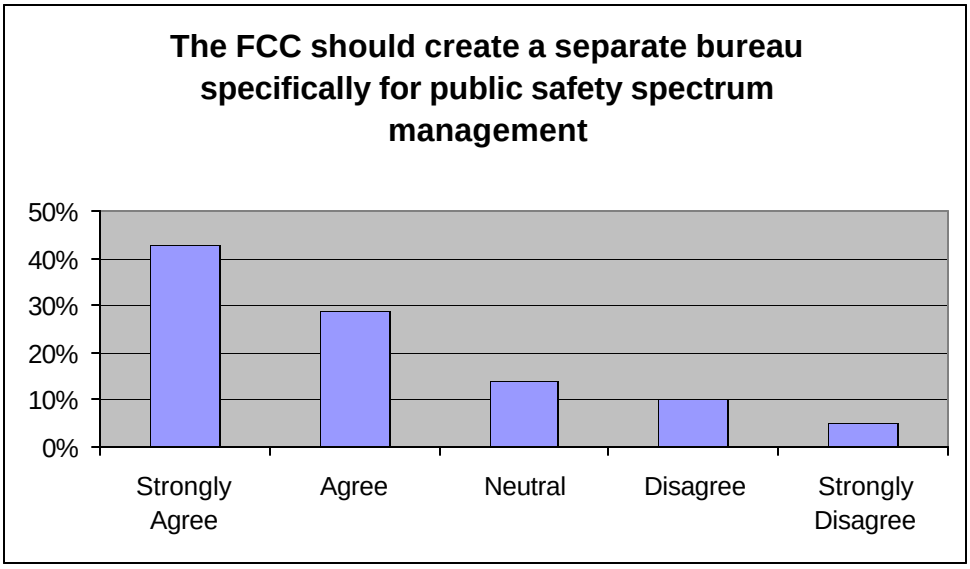
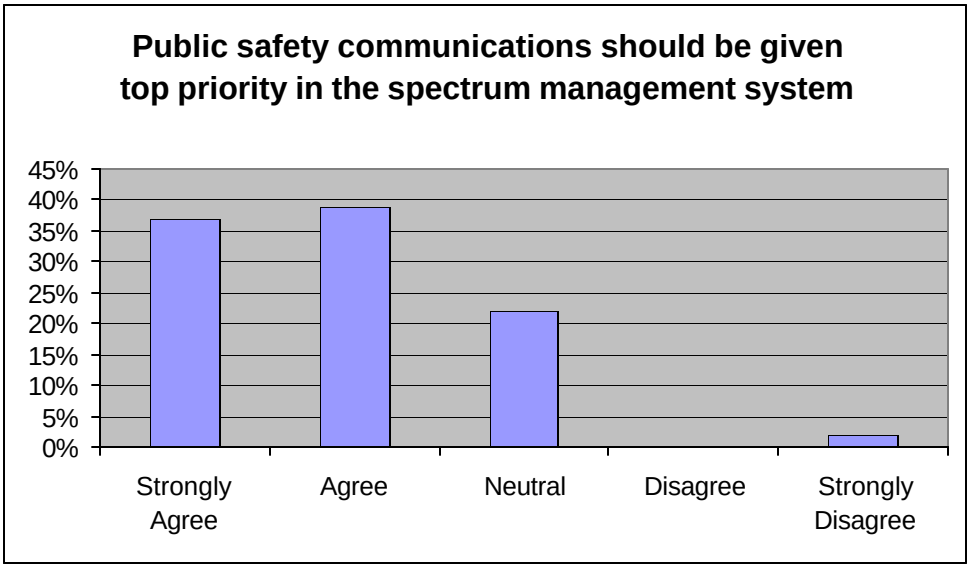

A hierarchy or priority system for operations should be established for radio services
60%
50%
40%
30%
20%
10%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

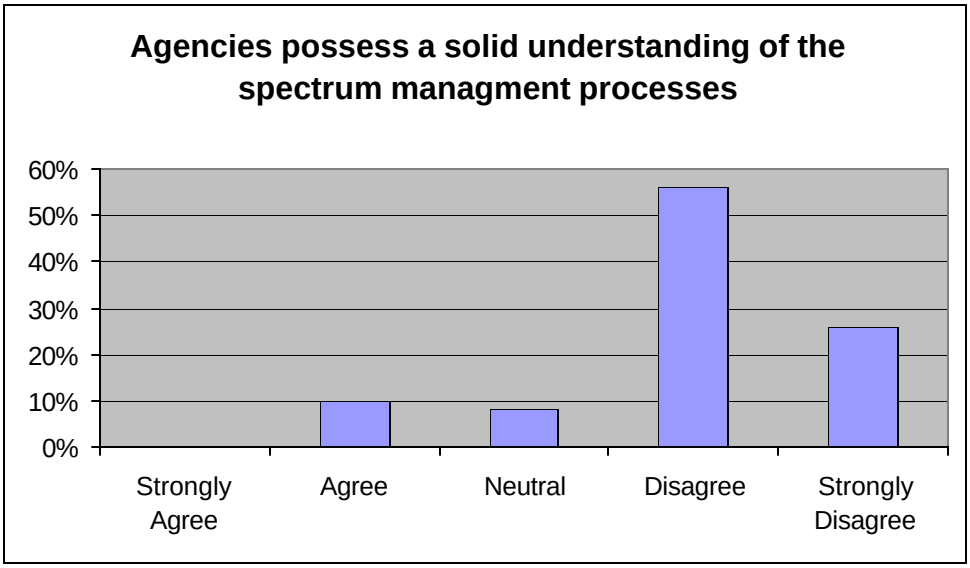
4.


The FCC should create a separate bureau specifically for public safety spectrum management
50%
40%
30%
20%
10%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

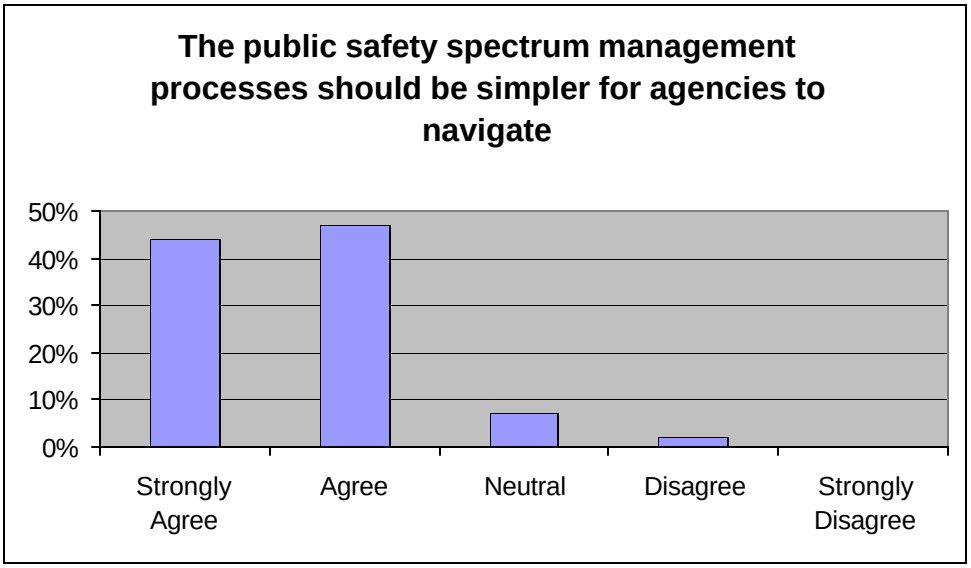
5.


Public safety communications should be given top priority in the spectrum management system
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

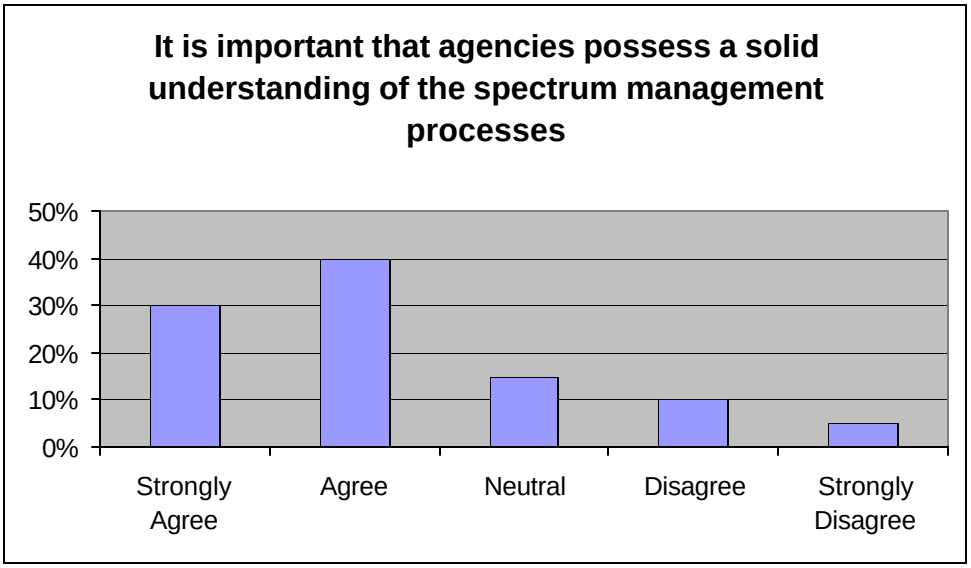
6.


Agencies possess a solid understanding of the spectrum managment processes
60%
50%
40%
30%
20%
10%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

7.

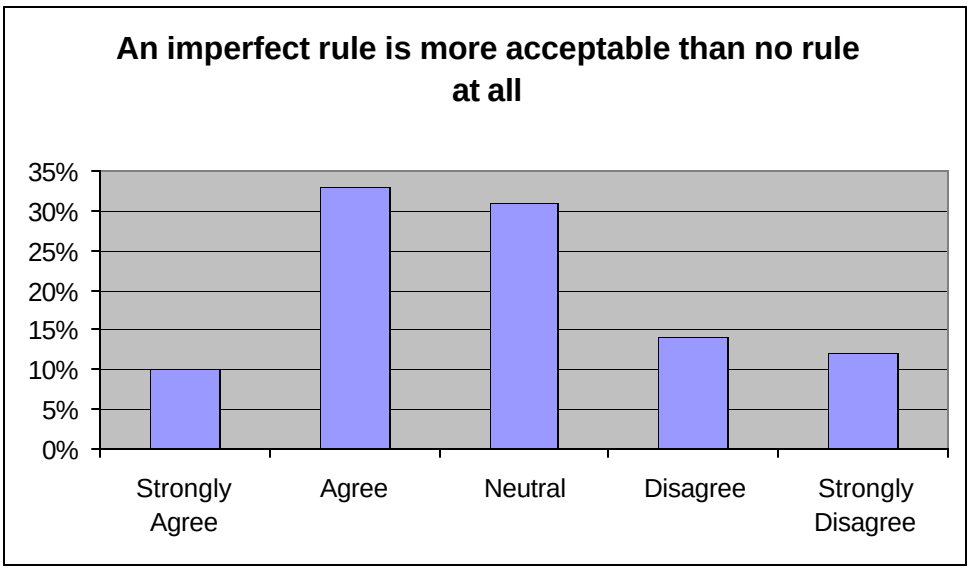

The public safety spectrum management processes should be simpler for agencies to navigate
50%
40%
30%
20%
10%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

8.

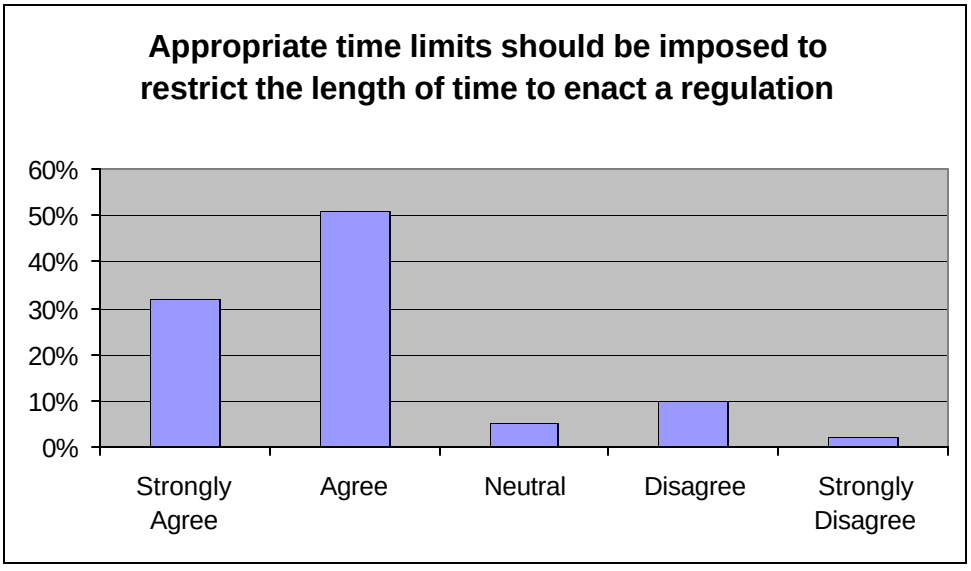

It is important that agencies possess a solid understanding of the spectrum management processes
50%
40%
30%
20%
10%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

Policy and Rulemaking

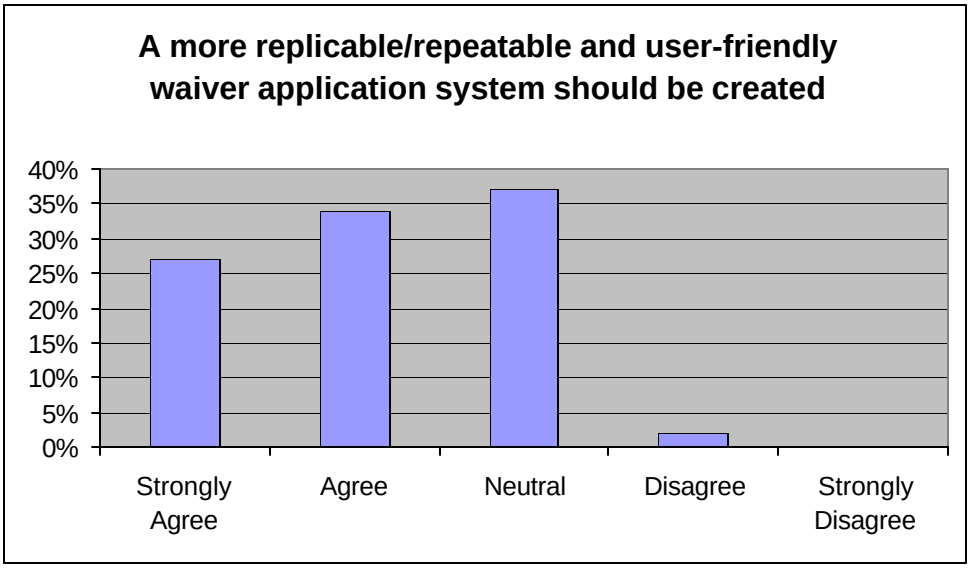
1.



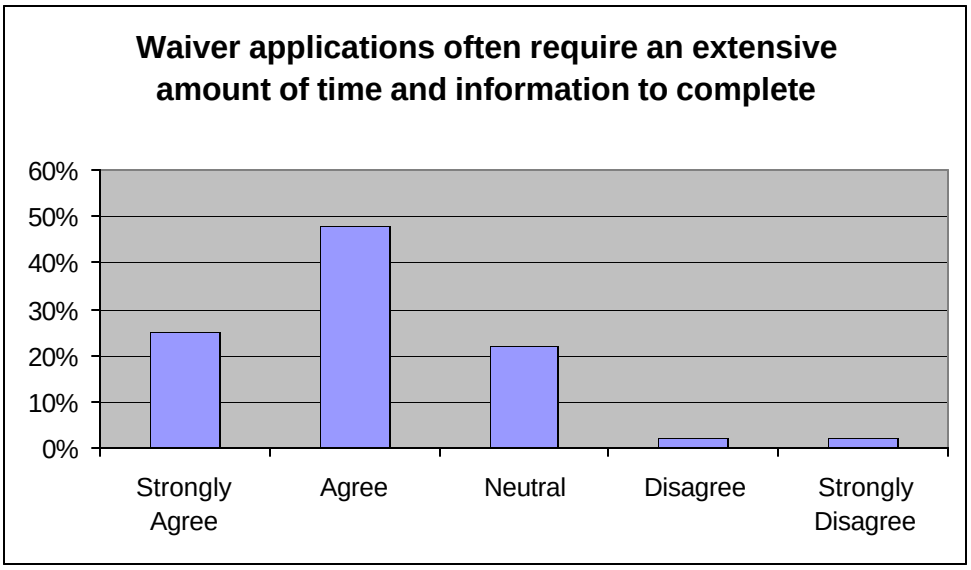
2.



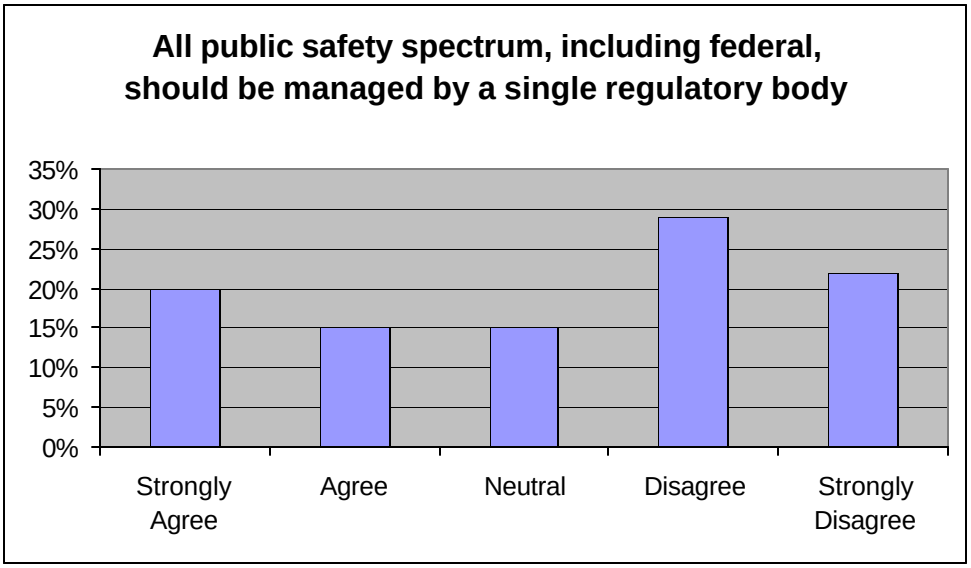
3.


A more replicable/repeatable and user-friendly waiver application system should be created
40%
35%
30%
25%
20%
15%
10%
5%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

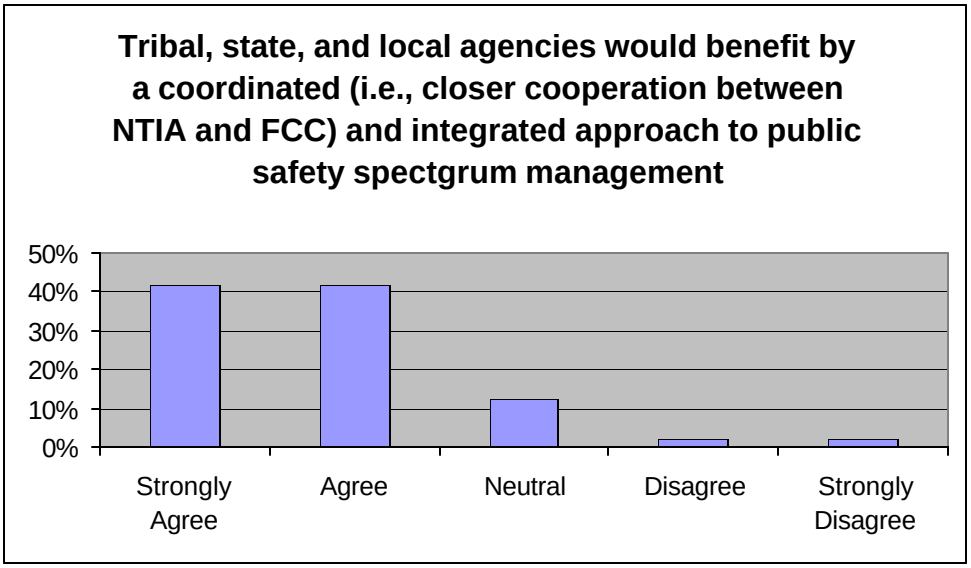
4.


Waiver applications often require an extensive amount of time and information to complete
60%
50%
40%
30%
20%
10%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

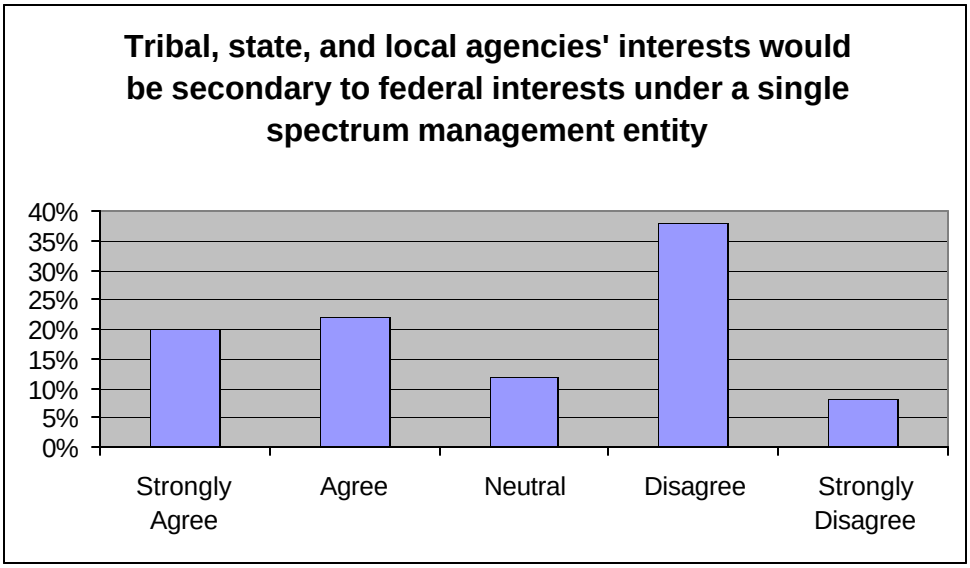
5.


All public safety spectrum, including federal, should be managed by a single regulatory body
35%
30%
25%
20%
15%
10%
5%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

6.

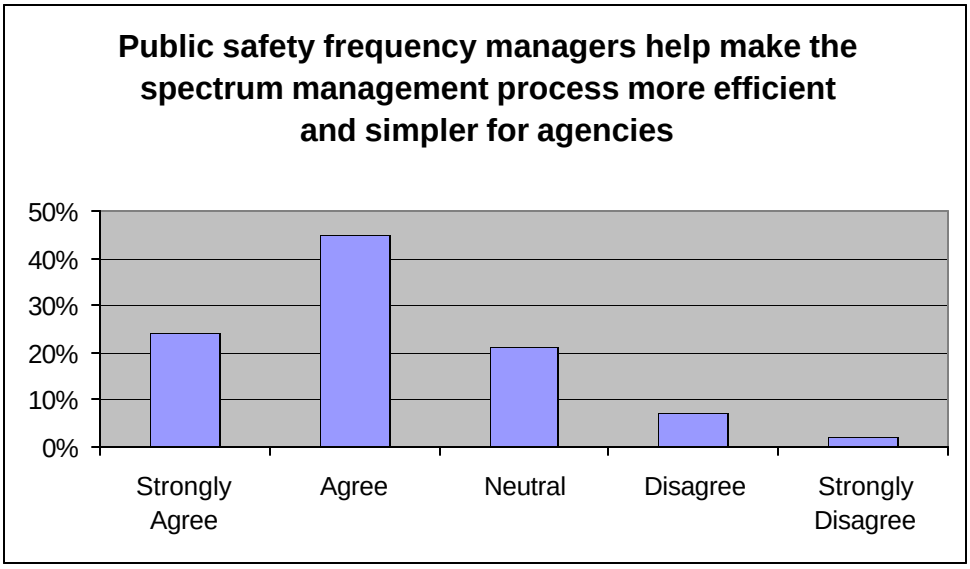

Tribal, state, and local agencies would benefit by a coordinated (i.e., closer cooperation between NTIA and FCC) and integrated approach to public safety spectgrum management
50%
40%
30%
20%
10%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

7.

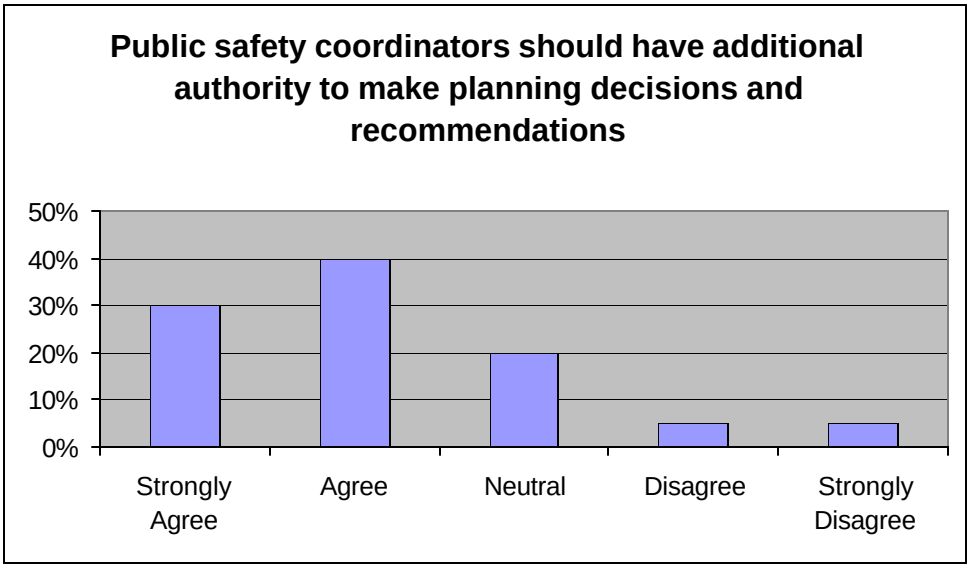


Coordination and Sharing

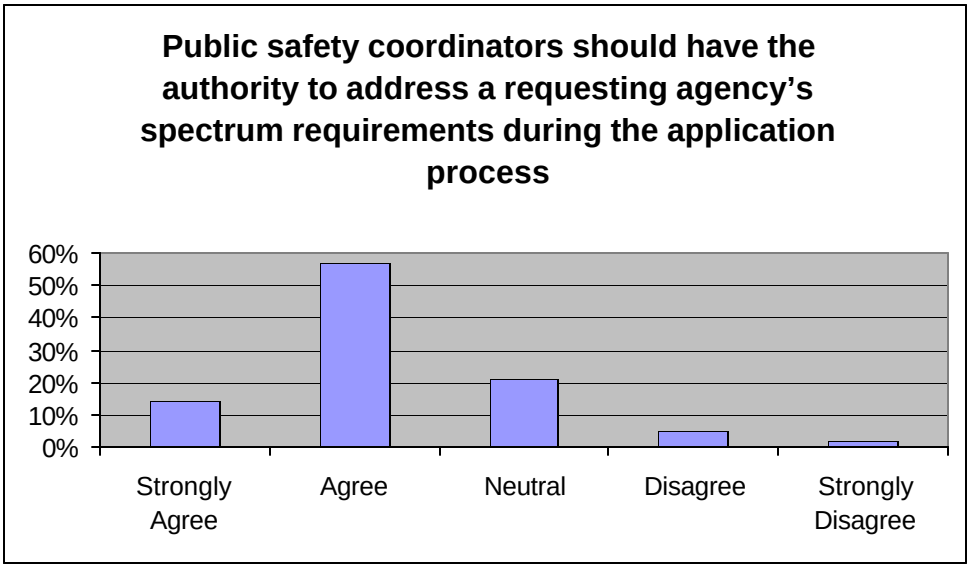
1.



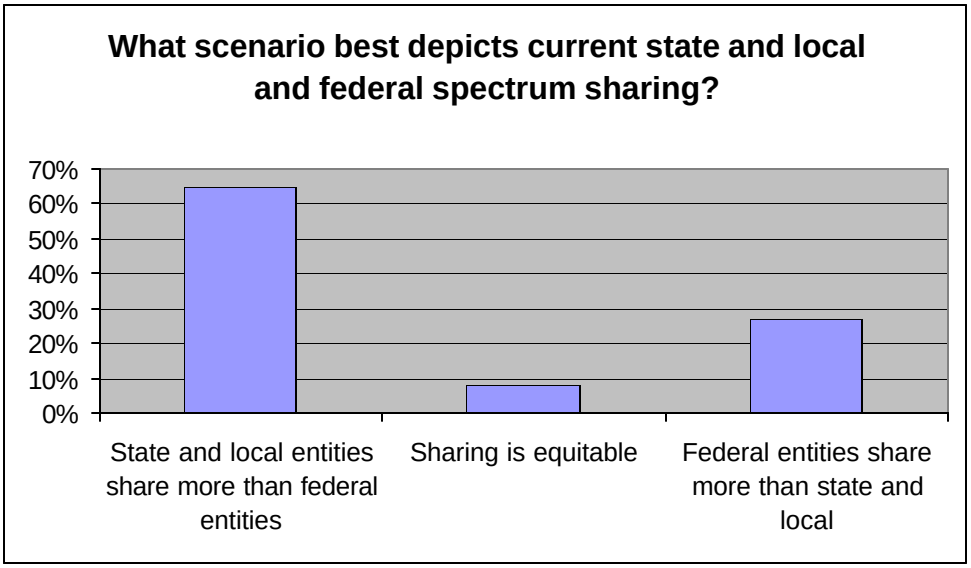
2.


Public safety coordinators should have additional authority to make planning decisions and recommendations
50%
40%
30%
20%
10%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

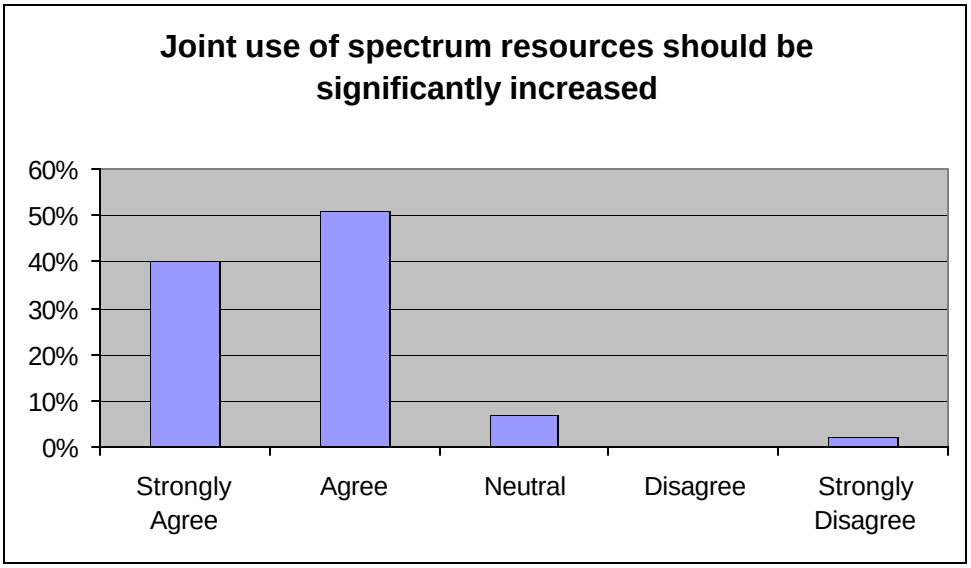
3.


Public safety coordinators should have the authority to address a requesting agency's spectrum requirements during the application process
60%
50%
40%
30%
20%
10%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

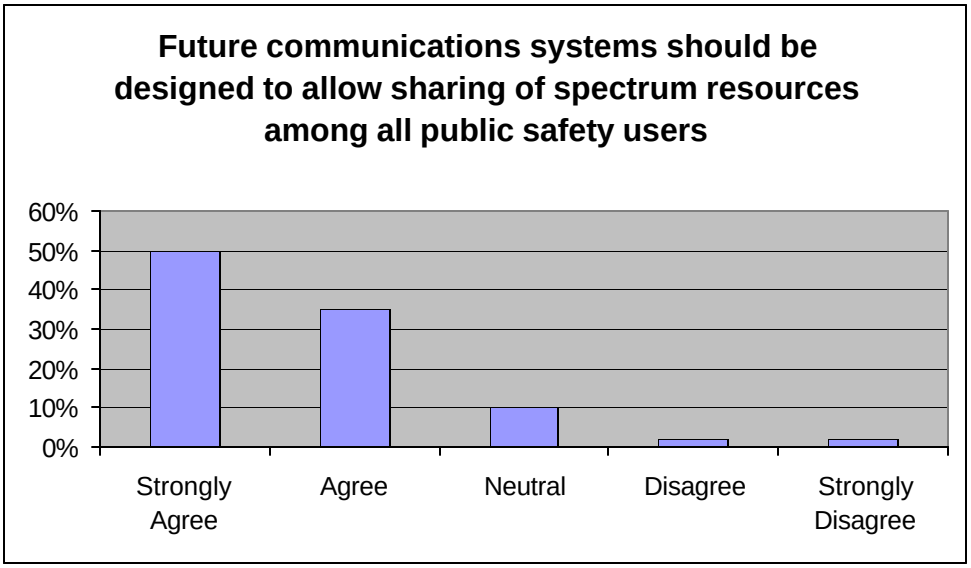
4.


What scenario best depicts current state and local and federal spectrum sharing?
70%
60%
50%
40%
30%
20%
10%
0%
State and local entities share more than federal entities
Sharing is equitable
Federal entities share more than state and local

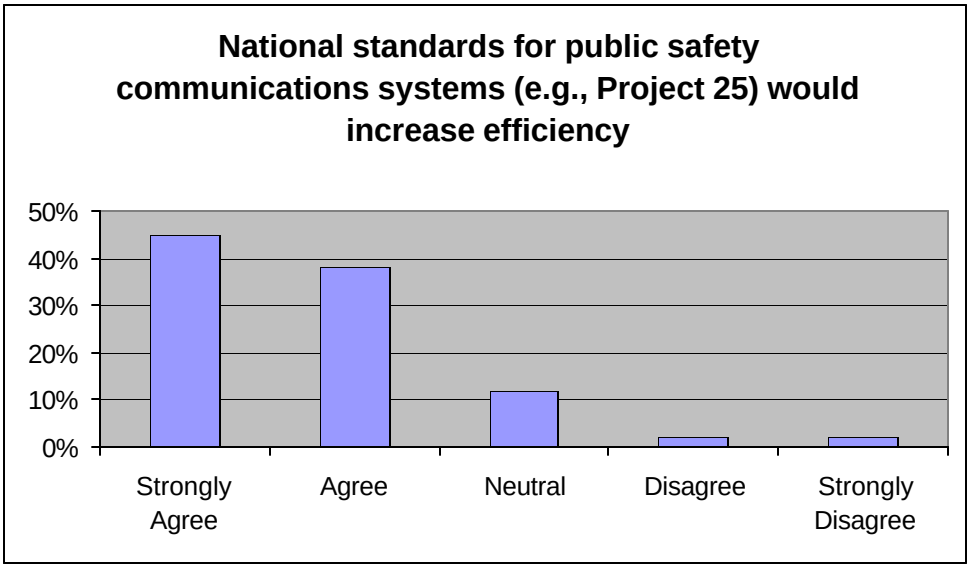
5.


Joint use of spectrum resources should be significantly increased
60%
50%
40%
30%
20%
10%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

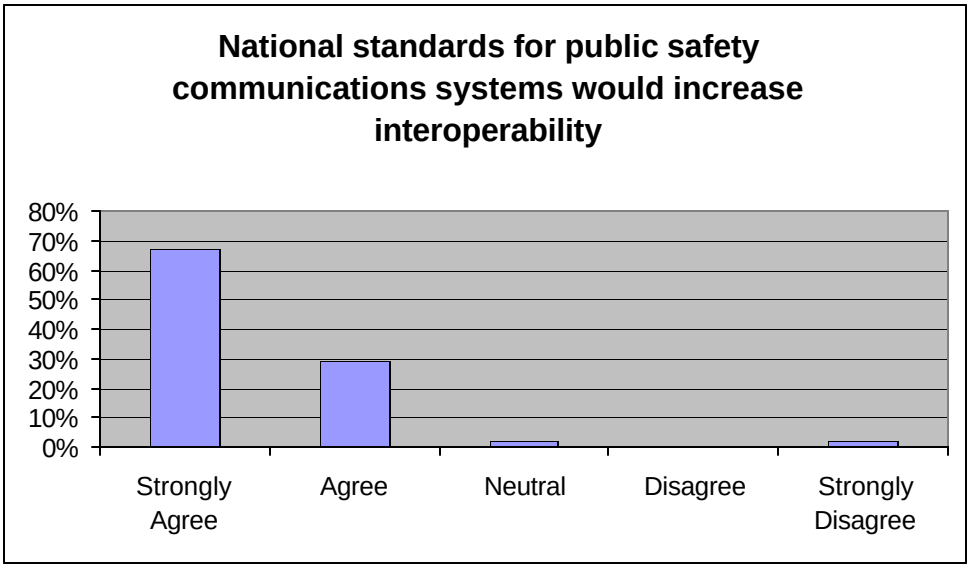
6.


Future communications systems should be designed to allow sharing of spectrum resources among all public safety users
60%
50%
40%
30%
20%
10%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

7.


National standards for public safety communications systems (e.g., Project 25) would increase efficiency
50%
40%
30%
20%
10%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

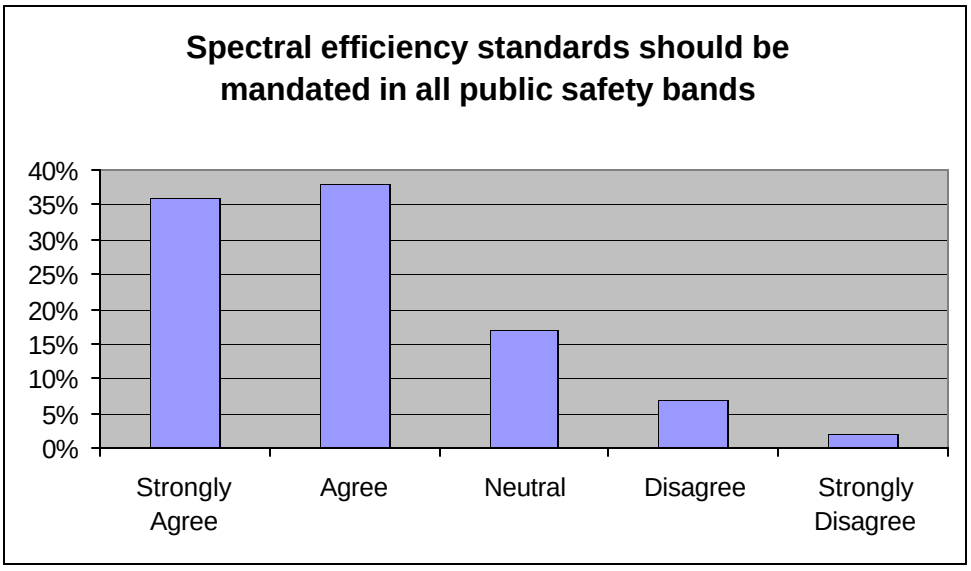
8.



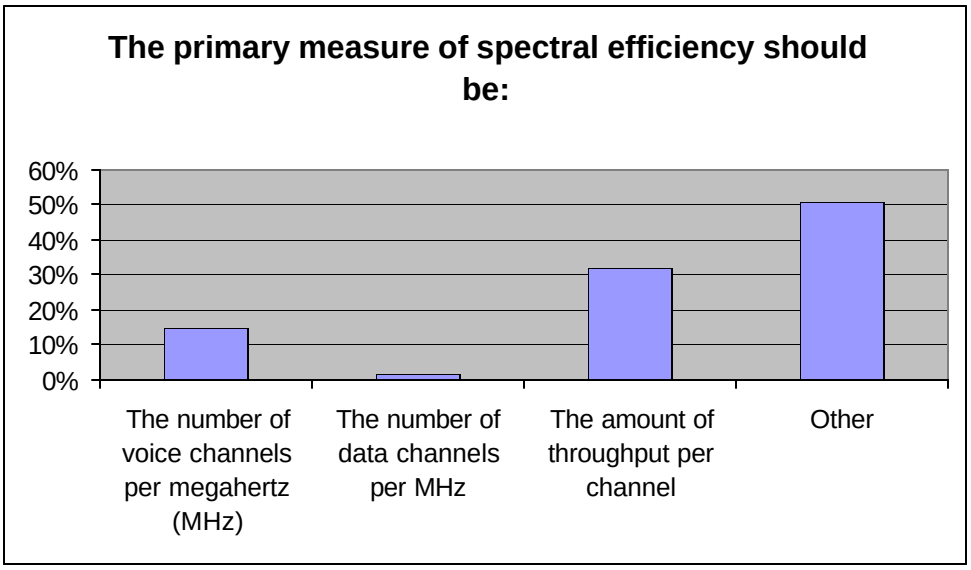
OBJECTIVE 3: Facilitate policy changes to create incentives for more efficient and beneficial use of spectrum and to provide a higher degree of predictability and certainty in the spectrum management process

Spectral Efficiency

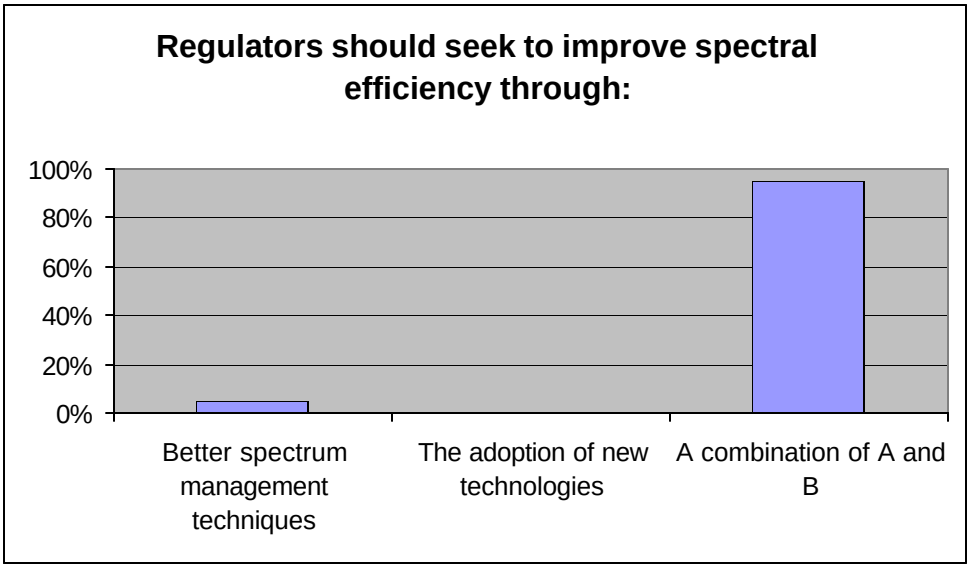
1.


Spectral efficiency standards should be mandated in all public safety bands
40%
35%
30%
25%
20%
15%
10%
5%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

2.

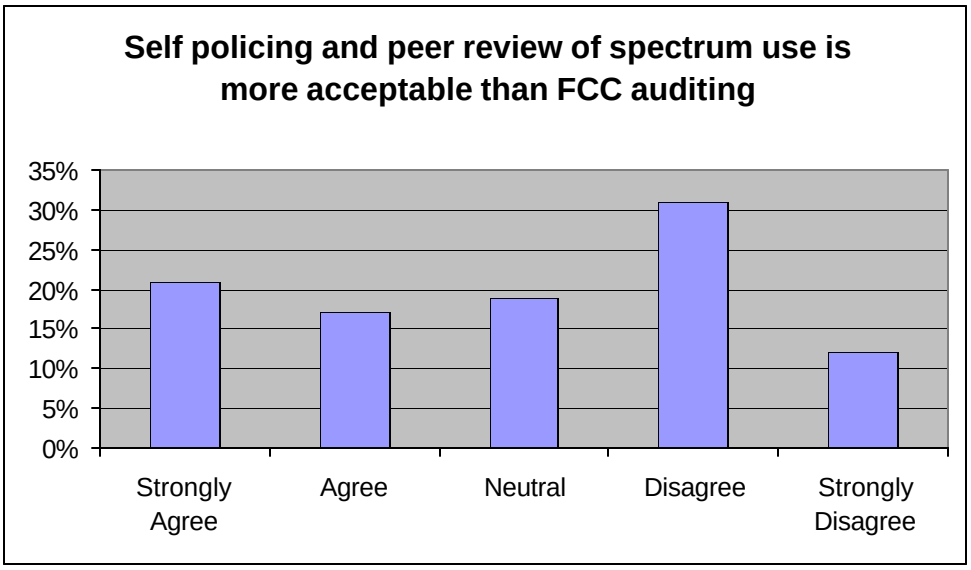

The primary measure of spectral efficiency should be:
60%
50%
40%
30%
20%
10%
0%
The number of voice channels per megahertz (MHz)
The number of data channels per MHz
The amount of throughput per channel
Other

3.

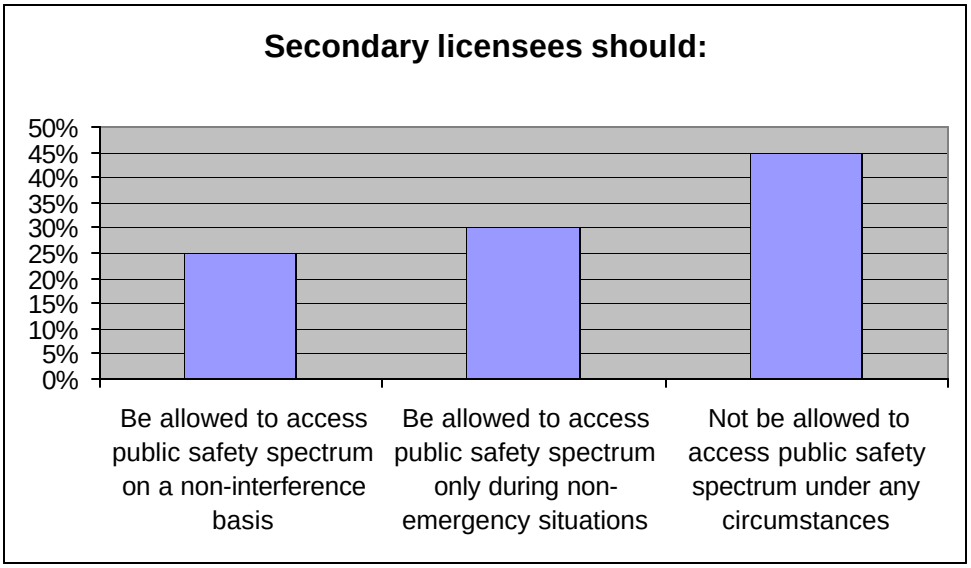


Beneficial Use

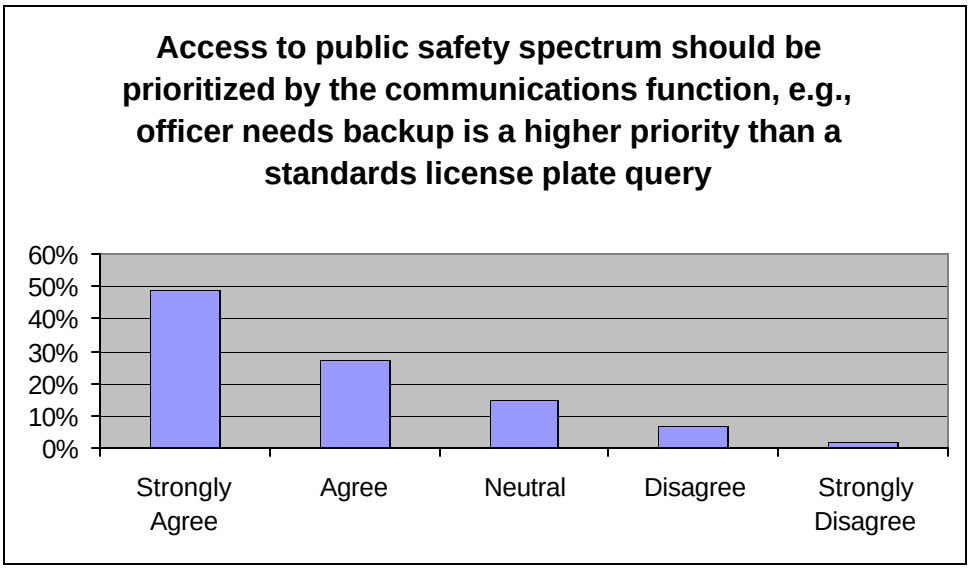
1.



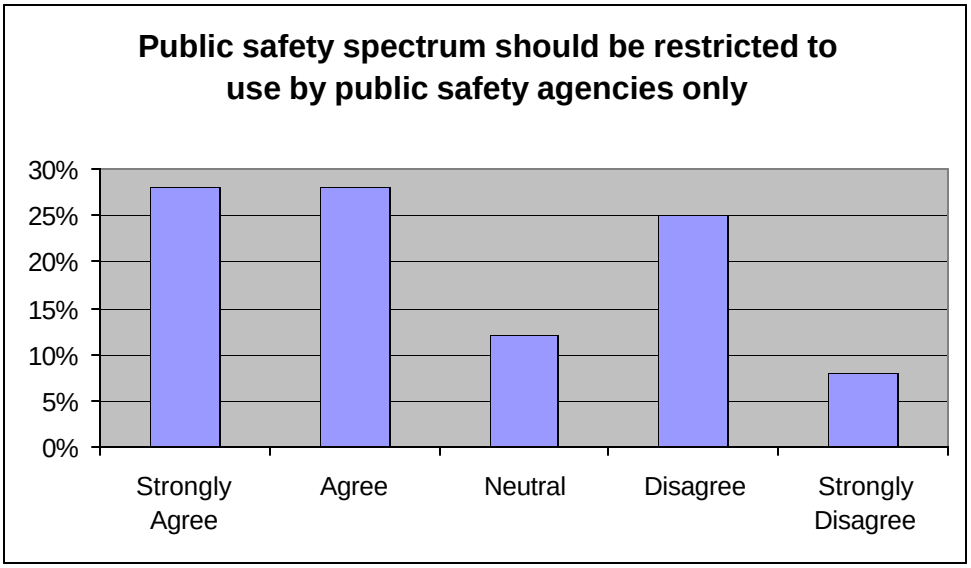
2.


Secondary licensees should:
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Be allowed to access public safety spectrum on a non-interference basis
Be allowed to access public safety spectrum only during non-emergency situations
Not be allowed to access public safety spectrum under any circumstances

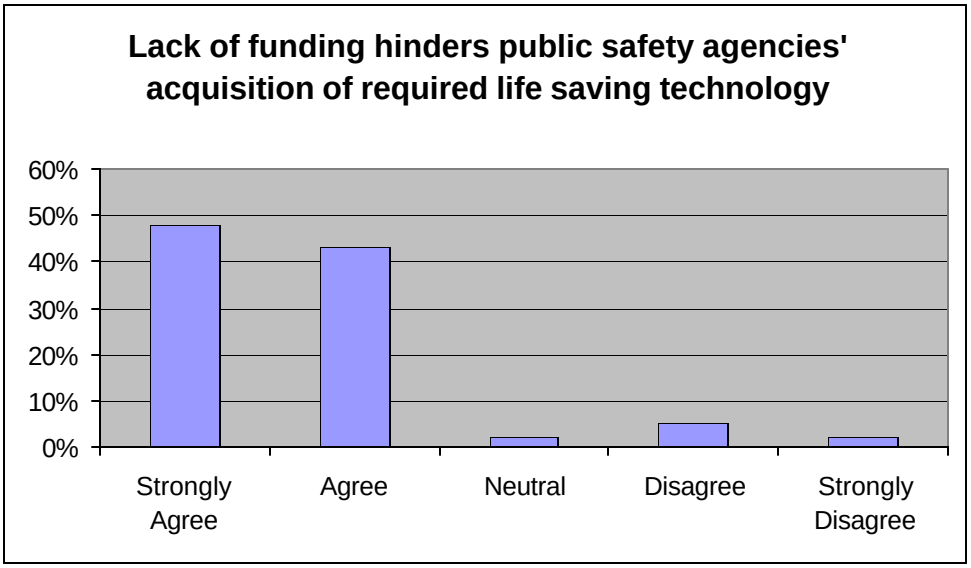
3.


Access to public safety spectrum should be prioritized by the communications function, e.g., officer needs backup is a higher priority than a standards license plate query
60%
50%
40%
30%
20%
10%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

4.

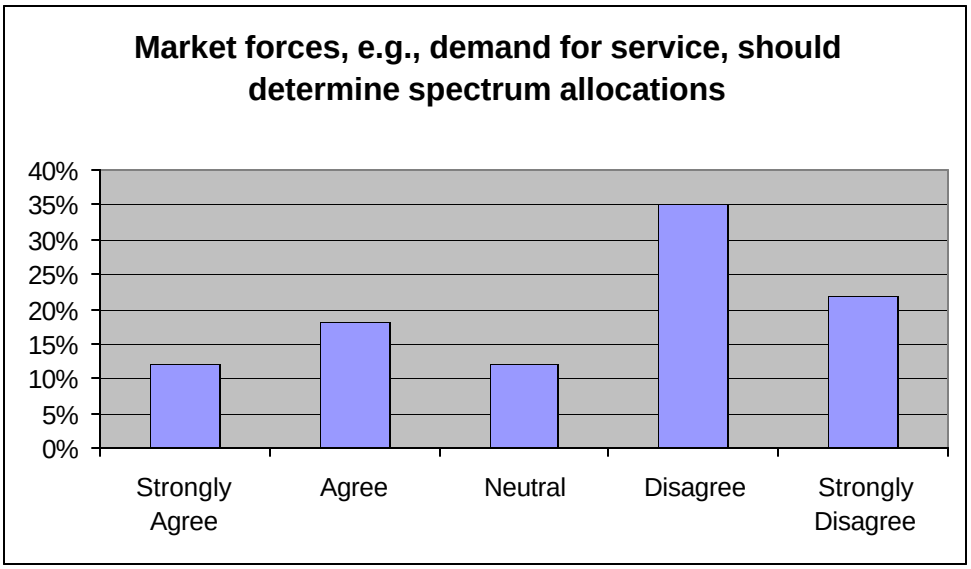

Public safety spectrum should be restricted to use by public safety agencies only
30%
25%
20%
15%
10%
5%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

5.

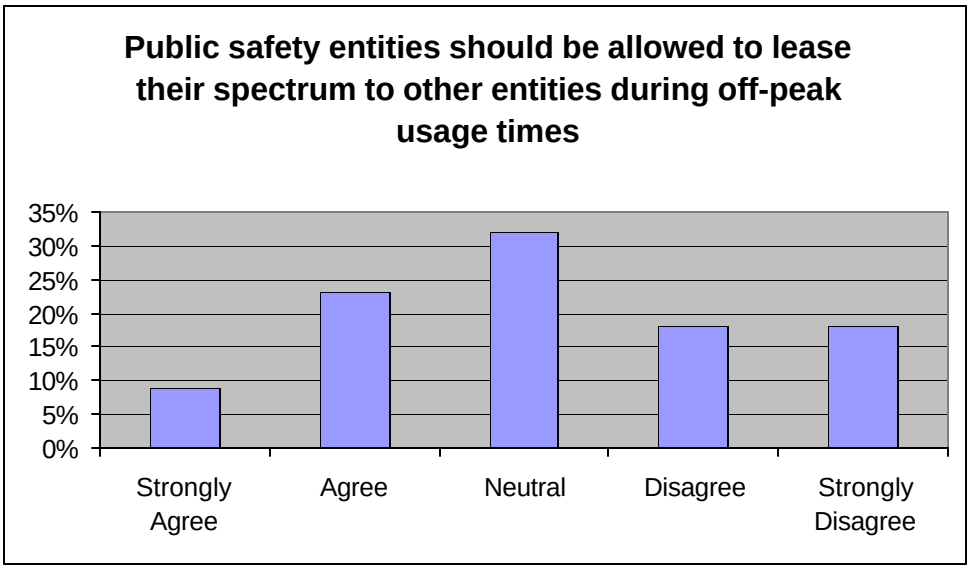

Lack of funding hinders public safety agencies' acquisition of required life saving technology
60%
50%
40%
30%
20%
10%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

Predictability and Certainty

1.

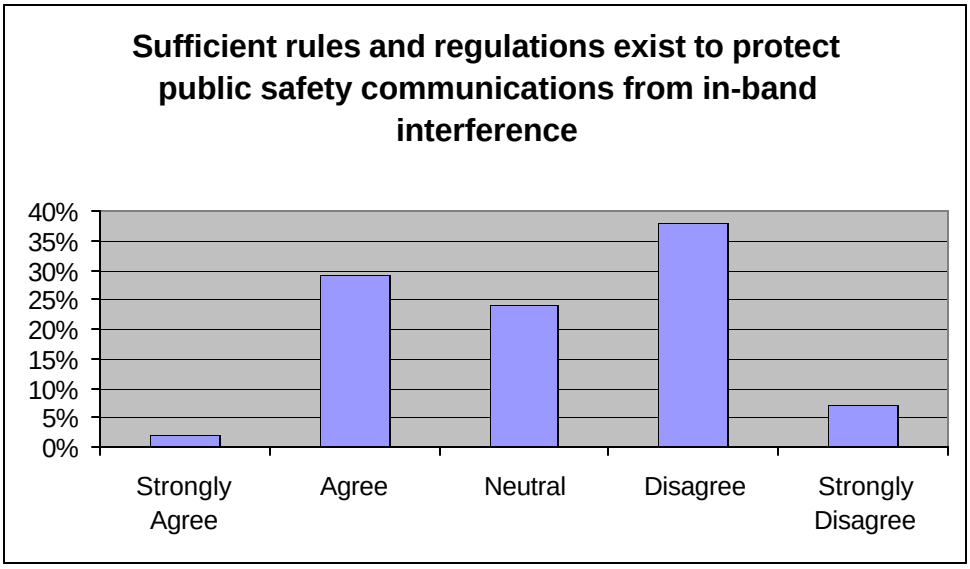


2.

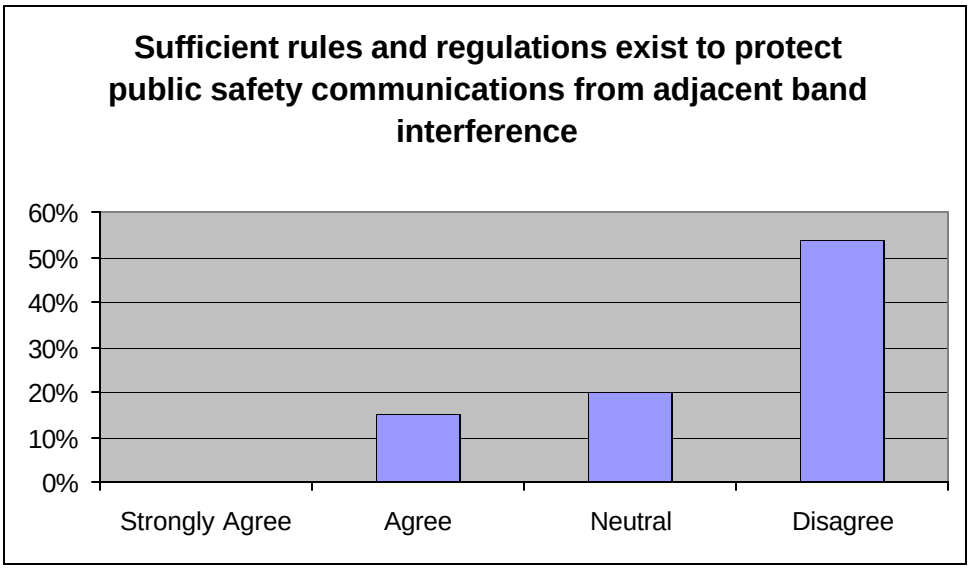


Interference Protection

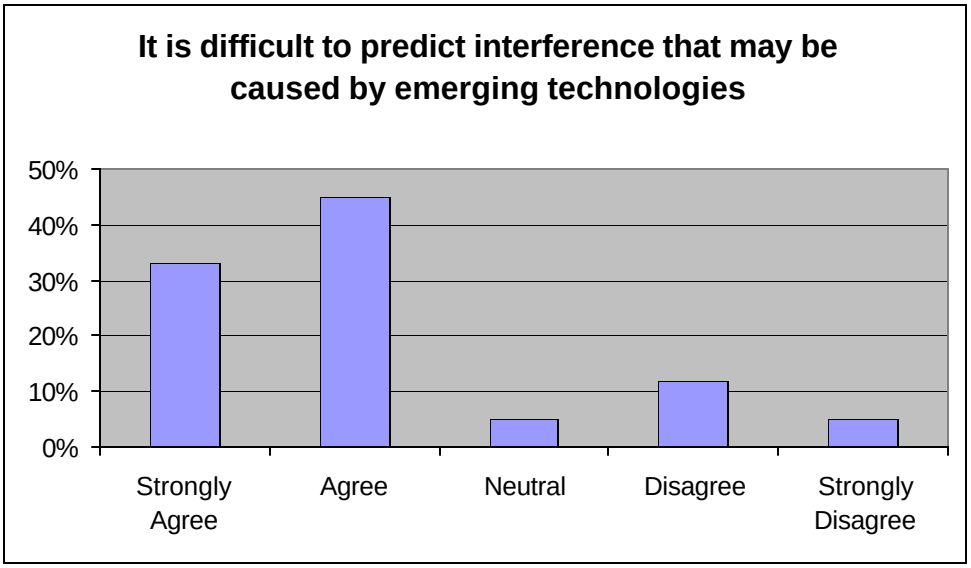
1.



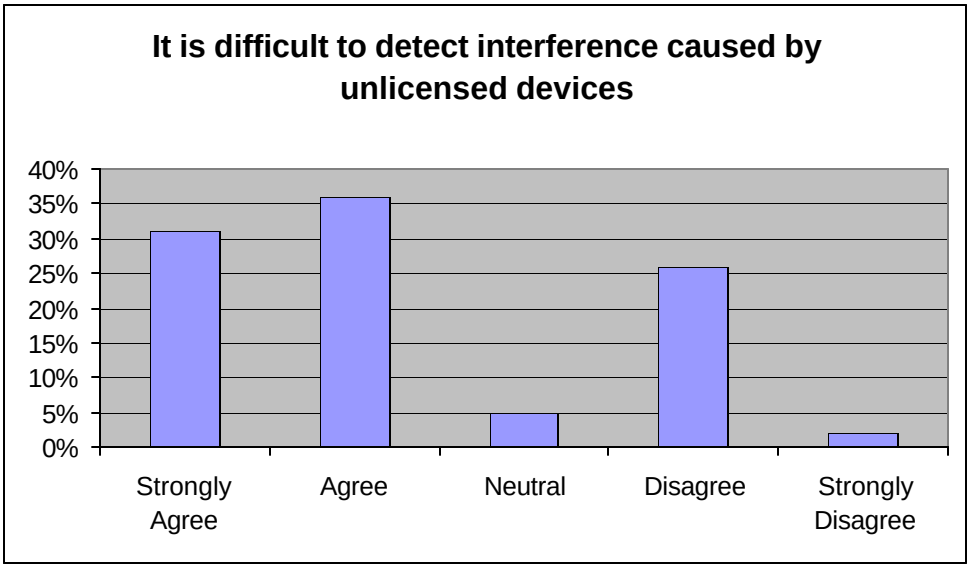
2.



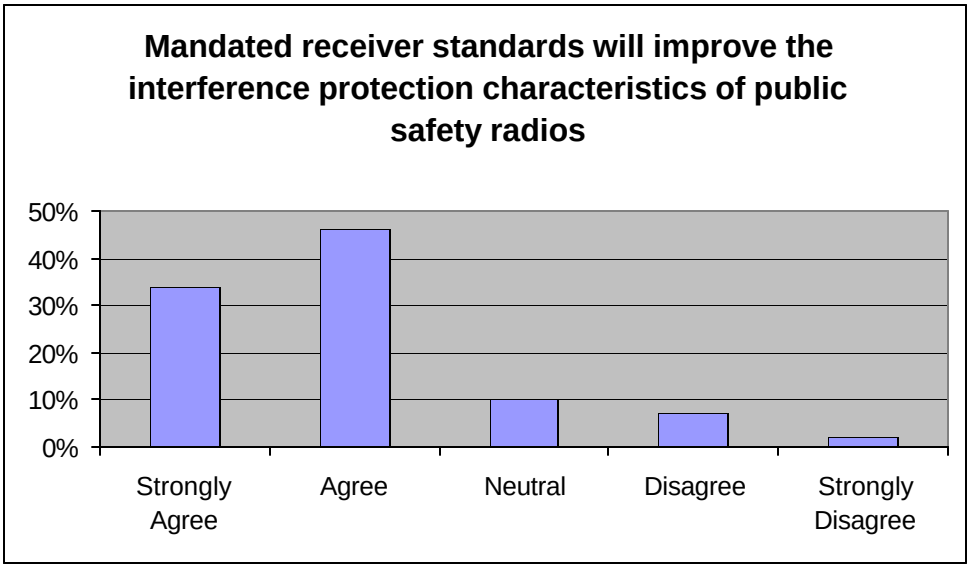
3.


It is difficult to predict interference that may be caused by emerging technologies
50%
40%
30%
20%
10%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

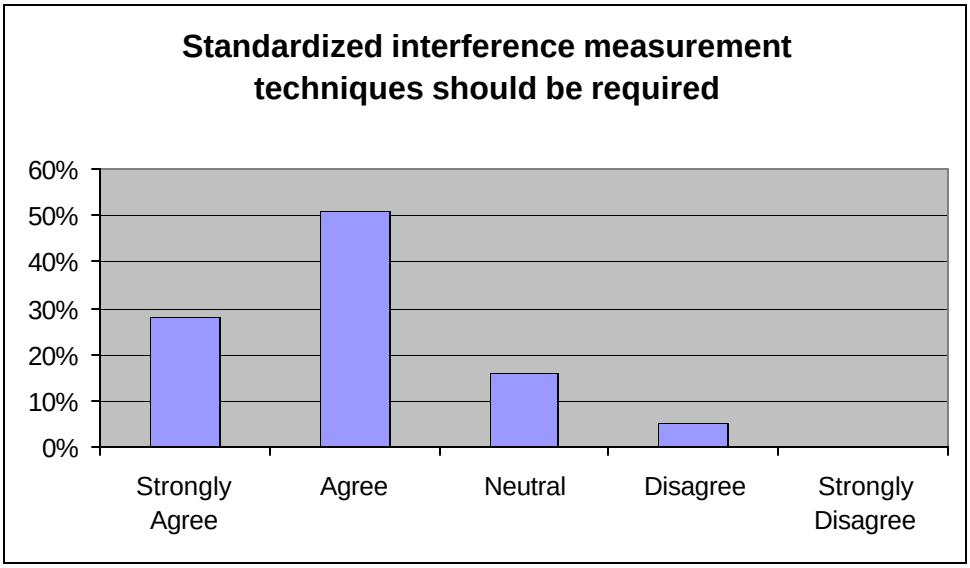
4.


It is difficult to detect interference caused by unlicensed devices
40%
35%
30%
25%
20%
15%
10%
5%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

5.


Mandated receiver standards will improve the interference protection characteristics of public safety radios
50%
40%
30%
20%
10%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

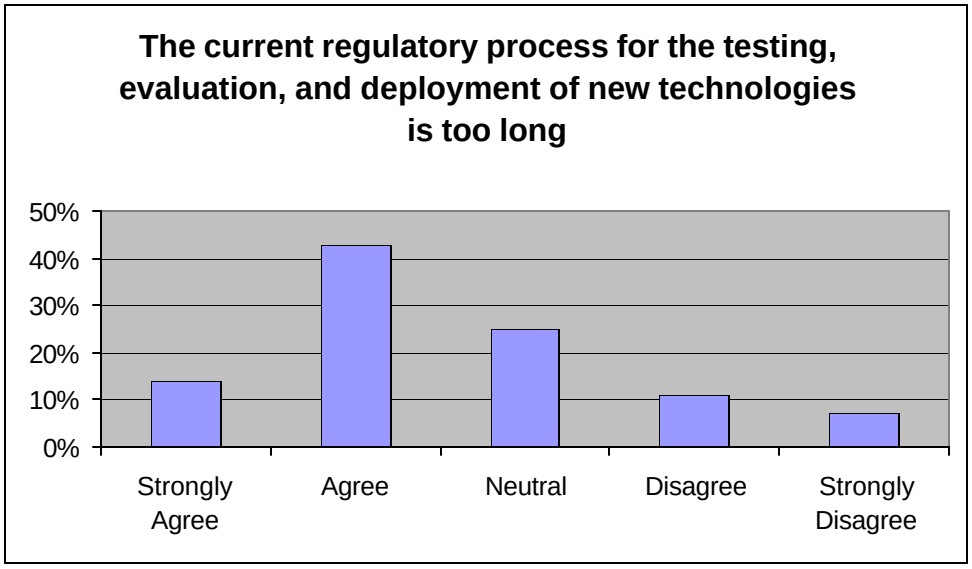
6.


Standardized interference measurement techniques should be required
60%
50%
40%
30%
20%
10%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

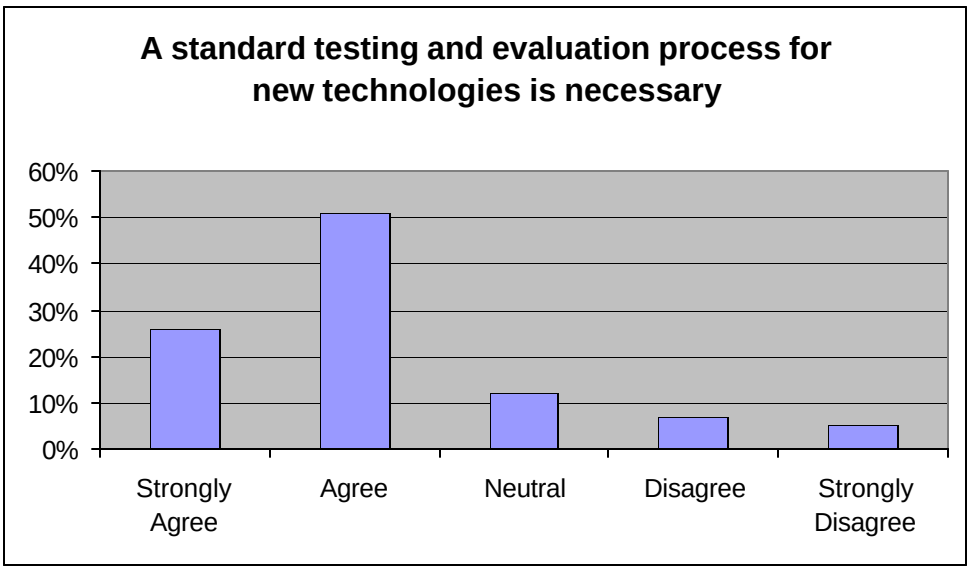
OBJECTIVE 4: Develop policy tools to streamline the deployment of new and expanded services and technologies, while preserving national and homeland security and public safety, and encouraging scientific research

Evaluation and Testing Criteria

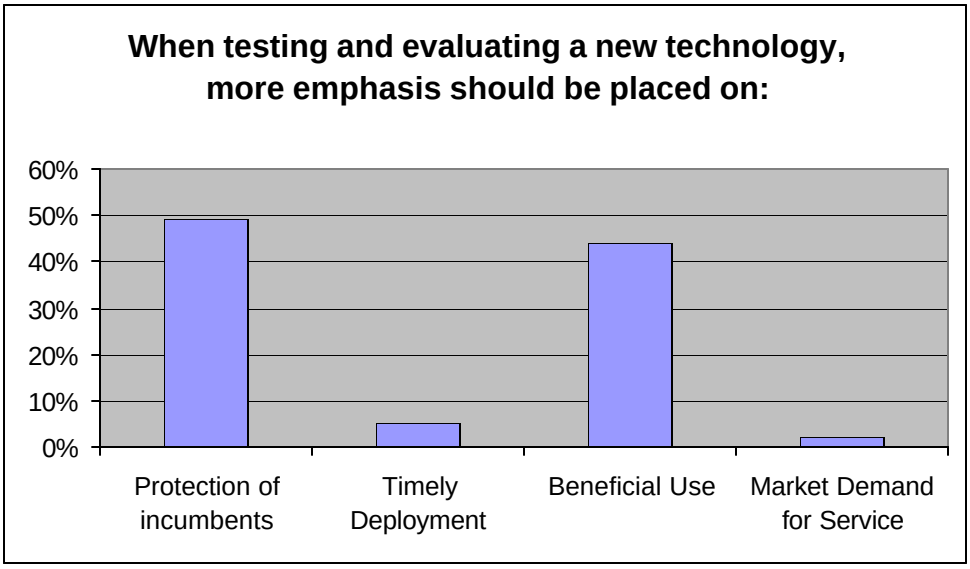
1.



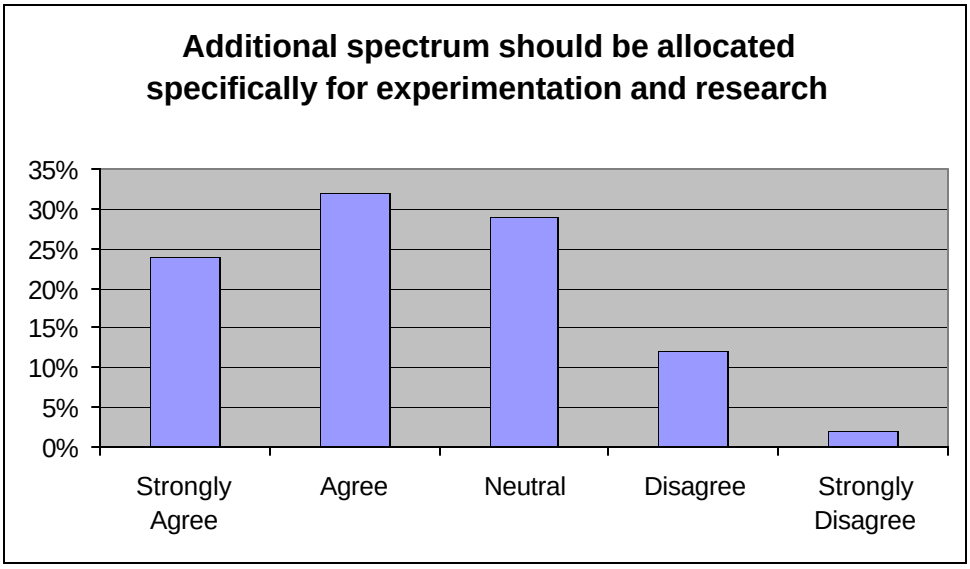
2.



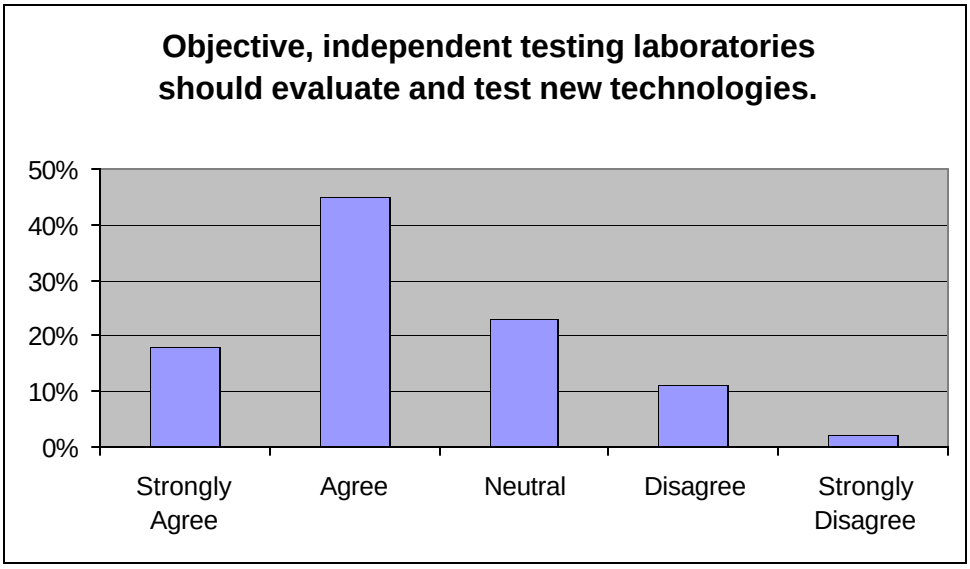
3.


When testing and evaluating a new technology, more emphasis should be placed on:
60%
50%
40%
30%
20%
10%
0%
Protection of incumbents
Timely Deployment
Beneficial Use
Market Demand for Service

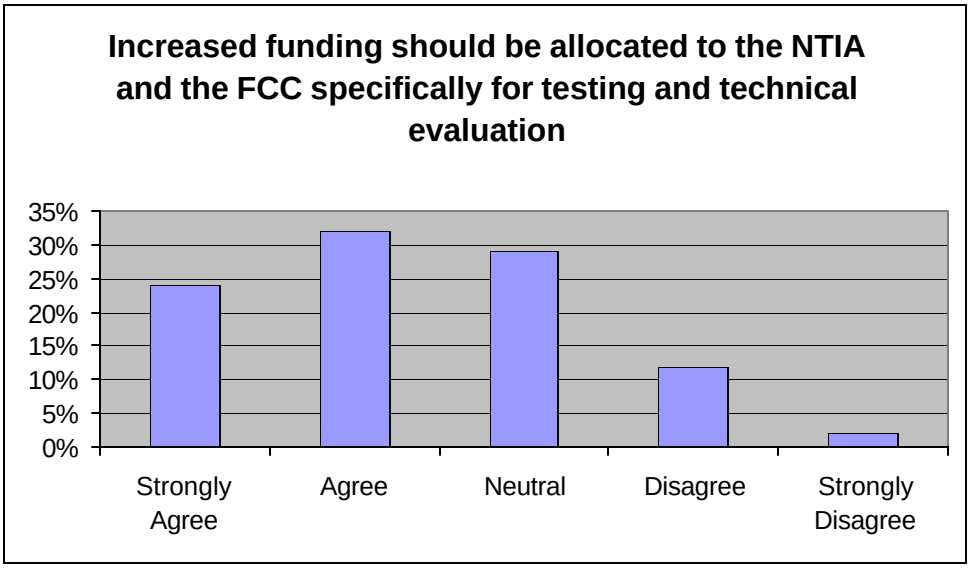
4.


Additional spectrum should be allocated specifically for experimentation and research
35%
30%
25%
20%
15%
10%
5%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

5.

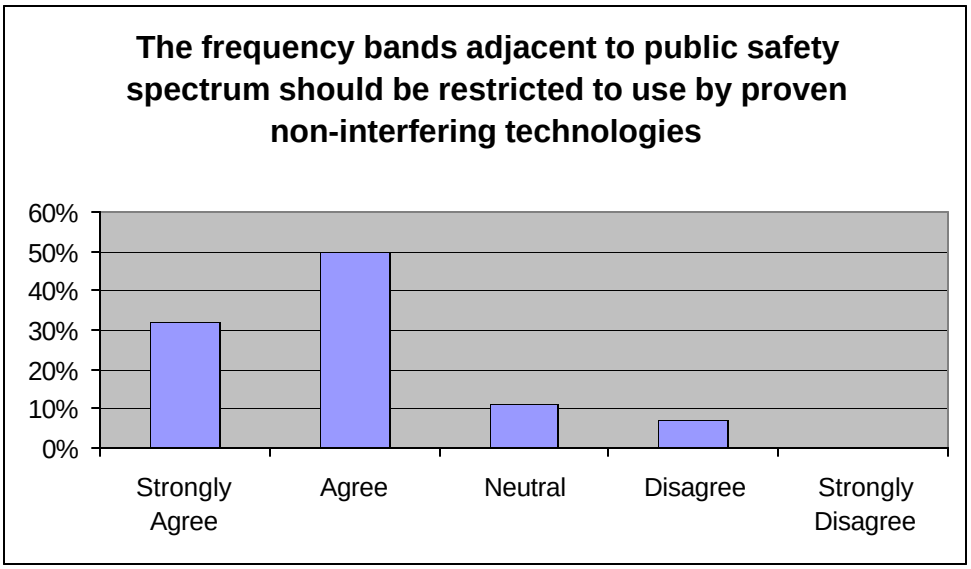

Objective, independent testing laboratories should evaluate and test new technologies.
50%
40%
30%
20%
10%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

6.

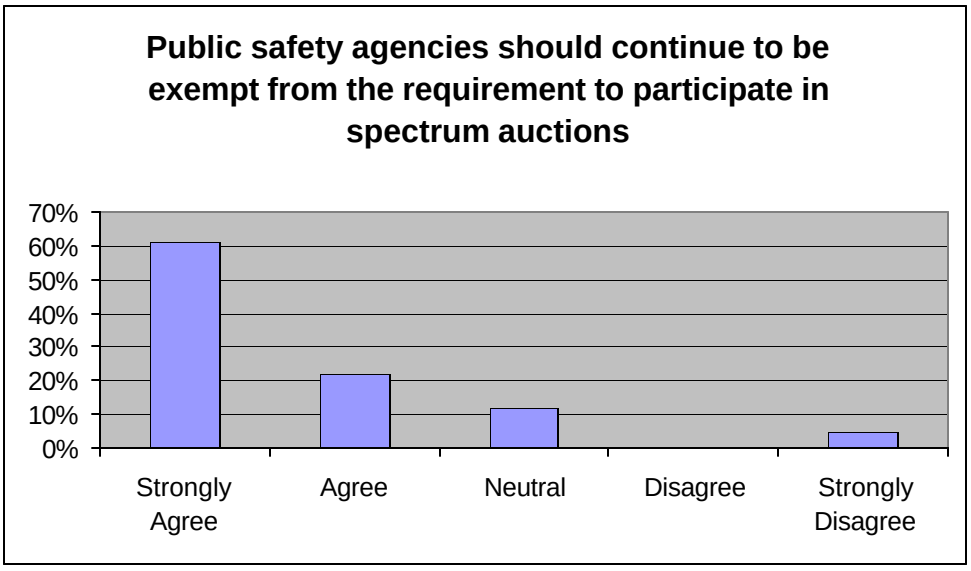

Increased funding should be allocated to the NTIA and the FCC specifically for testing and technical evaluation
35%
30%
25%
20%
15%
10%
5%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

Spectrum Management Models

1.



2.



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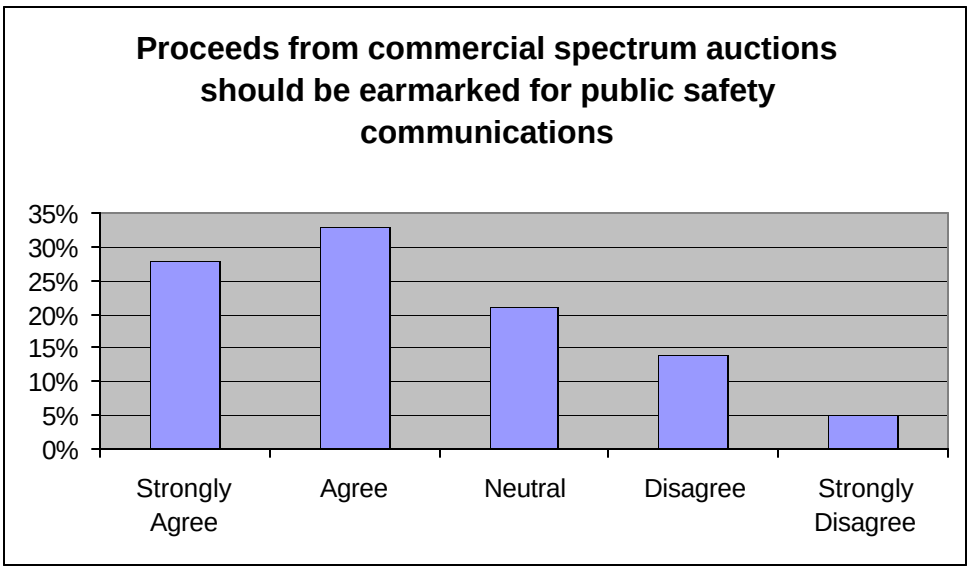
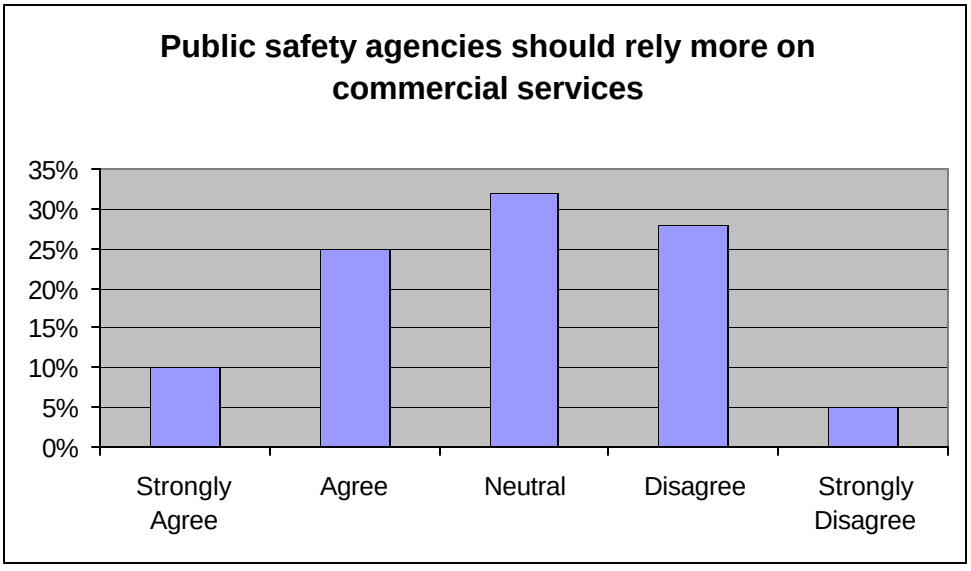
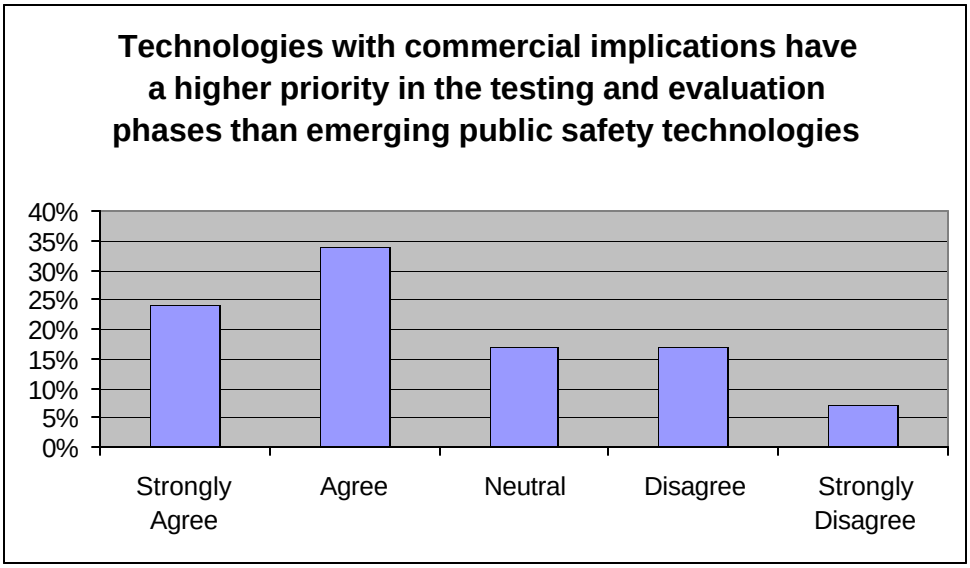


Commercial Services

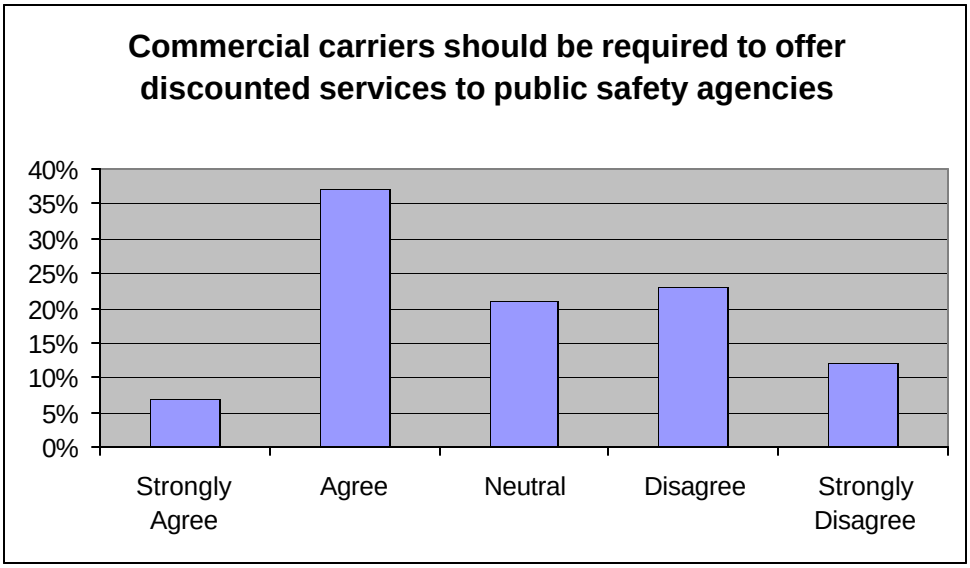
1.



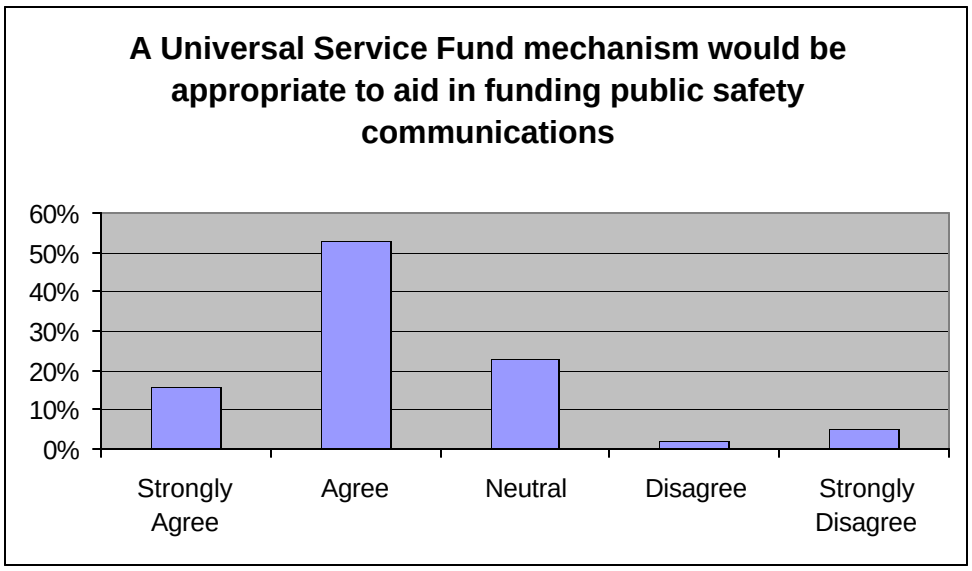
2.


Technologies with commercial implications have a higher priority in the testing and evaluation phases than emerging public safety technologies
40%
35%
30%
25%
20%
15%
10%
5%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

3.


Commercial carriers should be required to offer discounted services to public safety agencies
40%
35%
30%
25%
20%
15%
10%
5%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

4.


A Universal Service Fund mechanism would be appropriate to aid in funding public safety communications
60%
50%
40%
30%
20%
10%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

APPENDIX F

Meeting Notes
National Forum on Public Safety Spectrum Management
February 10–11, 2004

In response to the President's Executive Memorandum on Spectrum Policy, the National Telecommunications and Information Administration (NTIA) hosted the National Forum on Public Safety Spectrum Management on February 10–11, 2004, at the Omni Shoreham Hotel in Washington, DC.

I. Plenary Session, Tuesday, February 10, 2004

Key Note Addresses

On Tuesday, February 10, attendees were addressed by two keynote speakers who were introduced by Acting Assistant Secretary of Commerce Michael Gallagher. Deputy Secretary of Commerce Sam Bodman and Federal Communications Commission (FCC) Commissioner Kathleen Abernathy provided brief remarks regarding the goal of the forum and the current state of public safety spectrum management, respectively.

Mr. Bodman welcomed the audience, noting the diversity of experience and knowledge represented within the group. He acknowledged the expertise of the forum's facilitators and pointed out that through their leadership and the audience's input, the forum's goal of discussing methods to improve the public safety spectrum management process would be achieved. Mr. Bodman stated that the forum was the second in a series of public meetings to address the President's Memorandum and to examine the following four objectives:

Objective 1	Develop means to address critical spectrum needs of national and homeland security, public safety, federal transportation infrastructure, and science
Objective 2	Facilitate a modernized and improved spectrum management system
Objective 3	Facilitate policy changes to create incentives for more efficient and beneficial use of spectrum and to provide a higher degree of predictability and certainty in the spectrum management process
Objective 4	Develop policy tools to streamline the deployment of new and expanded services and technologies, while preserving national and homeland security and public safety, and encouraging scientific research.

Mr. Bodman went on to describe the relationships between commercial interests and those of national security, pointing out that the forum was an opportunity for audience members to contribute ideas on how to better protect the latter, while encouraging the former. Mr. Bodman noted several recent examples of how that had been accomplished, including public safety's new allocation in the 4.9 gigahertz (GHz) band and the adoption of rules permitting the use of ultra wideband technology for both life-saving and commercial applications.

Mr. Bodman stated that with technological development came the responsibility for the public safety community to remain active in encouraging beneficial uses of those technologies, while preserving national and homeland security. He thanked the audience for its attention to such an important matter and encouraged participation in the forum.

Ms. Abernathy began her talk by recognizing the cooperative relationship that the FCC maintains with the NTIA, led by Mr. Gallagher and FCC Chairman Michael Powell. She stated her support of the President's Memorandum on Spectrum Policy and pointed out the critical role that the forum would play in gathering information to further the President's goals.

Ms. Abernathy explained the role of the FCC with regard to state and local public safety agencies and outlined the FCC's relationships with various federal agencies and offices. She noted the creation of the Office of Homeland Security within the FCC's Enforcement Bureau and described its areas of responsibility with respect to public safety and national security. She went on to highlight several ways in which the FCC had attempted to increase public safety agencies' access to spectrum, most notably the use of ultra wideband communications and wireless Priority Access Service.

Ms. Abernathy mentioned the FCC's examination of interference to public safety communications in the 800 megahertz (MHz) band and pointed out her support for a quick resolution. She noted, however, that such an important issue deserved close scrutiny by the FCC and that the Commissioners and their staff would closely examine the proposed solutions.

Ms. Abernathy also commented on the FCC's efforts to aid public safety agencies by allocating 50 MHz of spectrum specifically for broadband public safety communications in the 4.9 GHz band, adopting rules to facilitate the development of Dedicated Short-Range Communications systems in the 5.9 GHz band, and promoting increased resource sharing between local, tribal, state, and federal entities.

In conclusion, Ms. Abernathy urged the audience to work together to identify ways to increase public safety agency access to spectrum, promote interoperability, and foster sharing between and among government and non-government entities.

Overview of Memorandum and Department of Commerce's Approach

Following the keynote addresses, Fred Wentland, Associate Administrator of the NTIA's Office of Spectrum Management, outlined the President's Memorandum on Spectrum Policy and described the approach taken by the U.S. Department of Commerce (DoC) in addressing its directives. He highlighted the current spectrum management system in the United States, noting that federal use of spectrum was managed by the NTIA, with the help of the Interdepartment Radio Advisory Committee, while non-federal government and commercial use of spectrum was managed by the FCC.

Mr. Wentland reviewed the history of spectrum management, noting that the current system had been created in 1934. He pointed out the technological development in wireless communications since that time and remarked that the system might need to be changed to adapt to some of those developments.

He raised several concerns about spectrum use related to rapid technological advancement and an increased demand for wireless services. Those issues included—

Timely access to spectrum
Spectrum sharing
Spectral efficiency
Protection of incumbent licensees
Timely introduction of new technologies
Balancing economic needs with government needs
Cooperation between and among regulators and users
Sufficient regulatory personnel.

Mr. Wentland outlined several goals of the President's Spectrum Policy initiative, which detailed regulatory responsibilities with respect to not only spectrum management, but the economic interests of the United States. He mentioned the duty of regulators to ensure national and homeland security by satisfying the spectral needs of public safety and the Federal Government, and the economic responsibility of the United States to keep pace with technological developments and remain a global leader in wireless communications.

Mr. Wentland detailed the responsibilities of the DoC in response to the President's Memorandum, which included establishing an interagency task force to examine the spectrum requirements of federal users and holding a series of public meetings to analyze the needs of state and local public safety agencies, as well as commercial spectrum users. Two reports were to be developed for the President by May 29, 2004—one from the task force's efforts and a second based on the outcomes of the public meetings.

Mr. Wentland described several topics for discussion during the forum, including the possibility of combining FCC and NTIA authority under a single agency, the effects of FCC regulations on national security, possible implementation of an overarching strategic plan for spectrum use, and better technical and engineering analysis techniques. He also noted that current regulatory activities examined areas to increase the use of technology within the spectrum management process, new measures of efficiency and effectiveness, and radio receiver technology.

Jeff Silva (RCR Wireless News) questioned the reality of addressing such a broad scope of issues prior to submitting a report to the President on May 29, 2004. Mr. Wentland pointed out that it might be more important to address issues that would be more common in the future, as opposed to analyzing every problem that currently existed. He also noted that specific strategic initiatives within the wireless arena had been progressing for several years and that those efforts might be underscored by the findings of the DoC within the task force and public meetings.

Doug Rollender (Lucent Technologies) raised the issue of interoperability with Mr. Wentland, questioning the level of attention paid to it by the NTIA. Mr. Wentland stated that interoperability was a serious consideration of the NTIA. He noted that difficult questions were being pondered within the NTIA regarding the most efficient level of interoperability, cost issues associated with solutions, and the issue of requirements definition across interoperable agencies.

CAG Briefing and Forum Activities

Don Speights, Chief of the NTIA's Public Safety Division, briefed participants on the structure and format of the forum. He reiterated Mr. Wentland's description of the goals and expected outcomes of the forum, and requested that participants provide objective, actionable ideas and input. Mr. Speights described the meeting of public safety agency leaders that was held on November 12, 2003, to gather initial input on the first two objectives of the President's Memorandum. He noted that the outcomes of the meeting were key drivers in the development of the current 2-day forum's format and discussion topics. Mr. Speights also outlined the agenda for the forum, highlighting the Town Hall discussion with Mr. Gallagher and Ed Thomas, Chief of the FCC's Office of Engineering and Technology (OET), and the OptionFinder survey, using an unlicensed wireless polling device for gathering participants responses to a series of forum-related questions.

Mr. Speights explained the layout of the breakout sessions, where, over the course of the 2-day forum, participants would have the opportunity to address each of the four objectives. Each breakout session would address one objective at a time through a series of discussion-driving presentation slides. The participants were assigned to one of the two tracks, each of which would address all of objectives in different order. He also noted that participants had the opportunity to provide further input by responding to the NTIA's Notice of Inquiry (NOI). Mr. Speights explained that each session would be led by two subject matter expert facilitators and moderated by one government staff member. He introduced the facilitators and moderator teams (see Table F-1).

Table F-1
Facilitator and Moderator Teams

Objective	Facilitators	Moderator
Objective 1	John Powell, National Public Safety Telecommunications Council (NPSTC) Ron Haraseth, Association of Public-Safety Communications Officials—International (APCO)	Rich Orsulak, NTIA Public Safety Division (Day 1) Tom Chirhart, NTIA Public Safety Division (Day 2)
Objective 2	Steve Proctor, Utah Communications Agency Network (UCAN) Ralph Haller, Forestry Conservation Communications Association (FCCA)	Jeng Mao, NTIA Public Safety Division
Objective 3	Dave Buchanan, San Bernardino County, California Network Services Sean O'Hara, Syracuse Research Corporation (SRC)	Charlie Hoffman, NTIA Public Safety Division
Objective 4	Glen Nash, State of California, Department of General Services, Telecommunications Division Tom Tolman, National Institute for Justice (NIJ), National Law Enforcement and Corrections Technology Center–Rocky Mountain	Rich Orsulak, NTIA Public Safety Division (Day 1) Tom Chirhart, NTIA Public Safety Division (Day 2)

II. Breakout Sessions

Although each objective was addressed in two separate meetings, the documentation of these breakouts has been consolidated in order to group related topics together for a more logical and comprehensive discussion.

Objective 1: Identifying and Defining Spectrum Requirements

The facilitators for the two discussions focused on Objective 1 were Mr. Powell (NPSTC) and Mr. Haraseth (APCO). Both brought decades of public safety user, communications, and spectrum management experience to the discussions. The moderator the first day was Mr. Orsulak (NTIA), and on the second day, it was Mr. Chirhart (NTIA).

At both sessions, the facilitators opened the meeting by introducing themselves and thanking the participants for their input and attendance. Mr. Powell proceeded to review the ground rules briefly and then pointed out the preliminary key findings from the November CAG event. He added that the state and local constituency supported these findings. During his initial discussions of the findings, he specifically noted that areas of successful coordination should be examined (e.g., State of Alaska and the Royal Canadian Mounted Police).

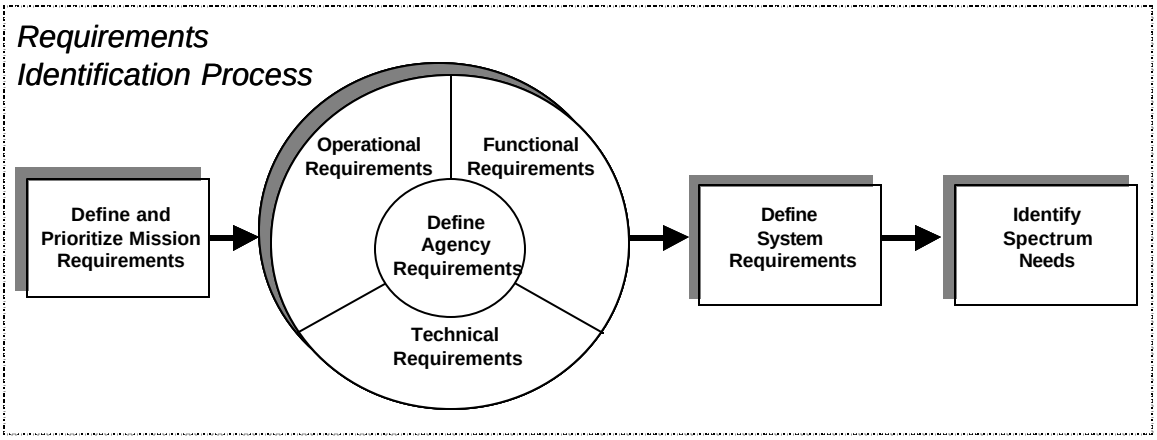


Figure F-1
Initial Requirements Identification Process

Mr. Haraseth proceeded to review the slides describing an agency's processes of gathering spectrum requirements, as shown in Figure F-1. Before detailed discussions of the slides proceeded, Mr. Haraseth gave detailed accounts of the Public Safety Wireless Advisory Committee (PSWAC) history, processes, participants, and results. Mr. Haraseth and Mr. Powell noted that the PSWAC possibly represented a good model for national public safety communications requirements gathering and analysis. Mr. Haraseth pointed out that the results were still relevant today, and Mr. Powell verified it by noting that the PSWAC spectrum requirements modeling was accurate to within 5 percent when the NPSTC packing of the 700 MHz band occurred. As discussions ensued over the course of the two breakout sessions, the participants had several additions and adjustments to the diagram as reflected in Figure F-2.

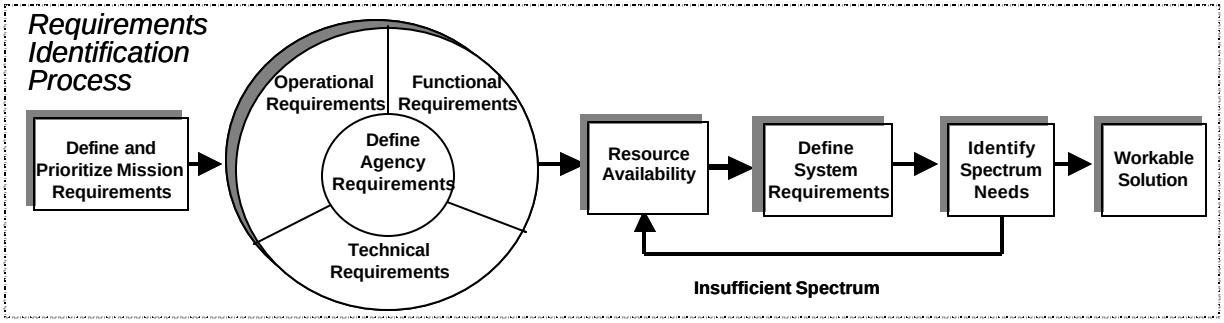


Figure F-2
Revised Requirements Identification Process

Mr. Haraseth noted that in some areas, particularly more congested regions, spectrum availability might drive the needs, and in some areas it might not. It was suggested that project managers continually analyze available resources and alternatives during the requirements and planning processes. Mr. Haraseth observed that small agencies barely had the understanding and resources to renew licenses, and their primary concern was that their system worked. Dominick Arcuri (RCC) noted that his company mostly assisted larger city or county agencies that had enough funding to afford the formal planning. He added that the processes of requirements gathering and planning needed to be ongoing.

Christopher Lewis (Department of the Interior) asked where agencies looked for opportunities for combined resource sharing to achieve better coverage and site sharing. He added that, "walls needed to be removed." Mr. Haraseth noted the successful use of waivers for such systems worked in Alaska and South Dakota. Mr. Speights mentioned that there might be a need to implement better regulations to allow better use of increased coordination. The group supported this idea.

The participants supported the idea of a requirements process best practices guide for small agencies to better prepare them. Mr. Powell noted that the NIJ had created a general guide, but that it might be too high level. Mr. Proctor (UCAN) noted that the Public Safety Wireless Network (PSWN) Program had created detailed documents that might also be useful. He also mentioned that a best practices guide for navigating the political process might be helpful, but thought the political process varied so greatly from region to region that it would be difficult to design an effectively guide. A participant noted that when agencies looked at each category of requirements (i.e., operational, technical, and functional), each agency should also specifically consider its critical, current, and future needs. Mr. Rollender noted that there needed to be a workable process for connecting the requirements directly to the users, possibly through a circular process. He added that it was important to clearly define what the "requirements" were for these agencies that were responding.

Mr. Rollender stated that the industry should consider adjusting its approach to marrying spectrum, user needs, and technology. Specifically, he thought that each available spectrum band should be examined and then managed to provide for expected future public need and technology. Mr. Haraseth asserted that the 4.9 GHz band was a prime example of this approach, but it was still too early to determine its success. Mr. Rollender asked that the 4.9 GHz band example be included in the CAG report as a proposed model.

Participants provided a series of specific recommendations concerning agency requirements—

First, there is a need to assign frequencies for interoperability and coordinate them in advance in order to avoid leaving the coordination up to the users.

Second, there is a distinct need for flexibility to be built into the channels regarding their assignment and use.

Third, the requirements should be prioritized based on the service segment (e.g., first responder versus investigation).

Fourth, narrowbanding mandates should be used to help better organize and use bands, for example, to create a master long-term plan to clean up the very high frequency (VHF) band.

Fifth, functional and technical requirements are relatively universal; however, operational requirements are not. The examination of requirements should focus on the operational requirements as the greatest variable in the equation.

The final discussion related to agency requirements that were considered for commercial services. It was noted that these services should be considered as an alternative. Mr. Powell pointed out that they were already used extensively for noncritical communications. Mr. Haraseth mentioned that frequently, the public safety requirements did not match the financial baseline and development timeline for the commercial services. Mr. Powell stated that more innovative thinking in this field was occurring through the SAFECOM Program Statement of Requirements that was examining applications and ideas that were never thought possible. He added that the next step might be a gap analysis between these "bleeding edge" ideas and the reality of state and local public safety.

Looking to the national perspective both sessions demonstrated that there was significant support for a national effort to evaluate and address state and local public safety requirements. Bob Lee (Nextel) noted that agencies' needs were not necessarily all within their own region. With that, Mr. Powell added that the federal needs should be accounted for also. Bob Gurss (APCO) noted that the aggregation suggested by the diagram (see Figure F-3) would be nearly impossible from a logistical standpoint considering that needs came from 50,000 separate agencies and had to be boiled down to 1 set of requirements. He commented that there were too many variations, unless evaluated based on a worst-case scenario. Mr. Powell asserted that therefore, the PSWAC model was the most appropriate. Dennis Hausman (State of Washington) noted that in the west they used a "Home Rule" that was not reflected in the diagram. The group supported Mr. Haraseth when he suggested that the information in this process should also flow from the national level to the local level.

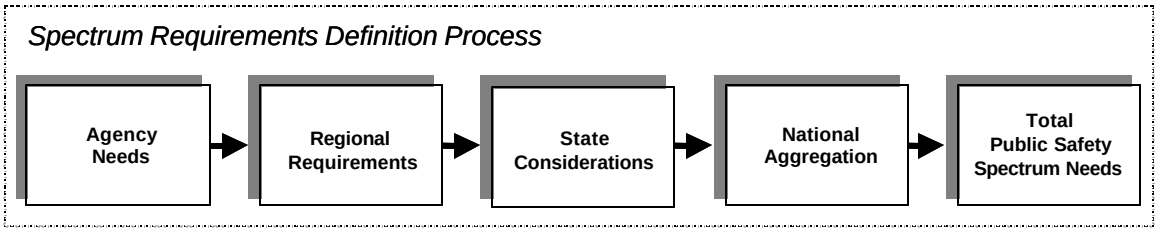


Figure F-3
The Spectrum Requirements Definition Process

The discussions then began to focus on the PSWAC and its viability as a model for the proposed requirements committee. The group noted that the proposed committee should not be a Federal Advisory Committee Act (FACA) committee because that would too restricting—all stakeholders should be involved including federal agencies, and it should meet regularly, with a funded smaller permanent committee that would work continually. Mr. Powell noted that the NPSTC had largely been acting in the stead of the PSWAC since the latter concluded its activities. Mr. Haraseth suggested that with the advent of the 700 and 800 MHz band regional planning committees (RPC) and the state interoperability executive committees (SIEC), their involvement would be key in this committee. Mr. Gurss pointed out that PSWAC was successful because it functioned from the bottom up as a "grassroots based effort," but was also unwieldy because of its size. Overall, the group supported a PSWAC-styled model rather than that of a local to national aggregation as suggested by the diagram.

On the second day, a portion of the session focused on additional models and characteristics for the proposed requirements committee. Phil Barsley (SMC) recommended that the Defense Systems Requirements be considered as a model. Mr. Haraseth thought it was important to incorporate characteristics such as common nomenclature as seen within the Incident Command System (ICS) model. He added that the RPCs and SIECs represented good opportunities for broad participation and effective avenues to gather requirements information. Mr. Rollender suggested that the model should be flexible and well defined, while considering technology as a variable in the requirements process. He concluded that planning needed to start immediately to address needs beyond 2010.

Mr. Hausman added that agency and regional needs should be addressed in parallel in a requirements assessment. Mr. Lee added that the Department of Homeland Security (DHS) Risk/Threat Assessment should be considered as part of the requirements analysis. Mr. Proctor recommended that some incentives for sharing should be built into the requirements process. Mr. Powell noted that the political process hindered those incentives; however, a planning requirement could be built into the grants process. Mr. Haraseth also stated that DHS could offer money in other ways to motivate planning and sharing. Mr. Powell added that the grants needed to address interoperability as part of the requirements process. Furthermore, he asserted that if done right, operability would naturally lead to interoperability. Mr. Haraseth mentioned that it was important to allow development and processing time for grants because this type of grant would require extensive agency planning and effort.

Larry Miller (American Association of State Highway Transportation Officials [AASHTO]) suggested that the greatest hurdle for a large-scale requirements process would be

local politics. He added that refarming would be a "nightmare" because there were no incentives, so loading criteria would need to be developed. Finally, he observed that one could not depend on "man" to forge memoranda of understanding (MOU) on his or her own.

Mr. Gurss stated that secondary markets can cause complications and requirements needed to address this possible reality. Mr. Haller pointed out that secondary leasing indirectly suggested that public safety had sufficient spectrum to risk having their spectrum sent to auction. He added that competition for spectrum would continue to grow, so the need for zero tolerance would increase in parallel. Mr. Powell suggested that channel assignments should be based on channel loading.

Tom Keller (American Association of Railroads) supported the idea that critical infrastructure (CI), such as railroads, should be considered as part of public safety. He contended that this was reflected by the creation of the new Public Safety and Critical Infrastructure Division of the FCC's Wireless Telecommunications Bureau. Mr. Powell recommended that the definitions of public safety and CI should be more clearly defined and that first responders' communications should receive a higher priority than other public safety or CI communications.

Objective 2: The Spectrum Management Process

Mr. Proctor and Mr. Haller were the SME facilitators for the Objective 2 breakout sessions, which were moderated by Mr. Mao (NTIA Public Safety Division). The SMEs brought a combined total of more than 55 years of public safety communications experience to the breakout session discussions.

At the beginning of each discussion session, the SMEs introduced themselves and provided a brief explanation of the breakout session format and ground rules. Mr. Haller then reviewed the key findings from the November 12, 2003, meeting conducted by the NTIA and provided examples illustrating each point. He noted that not all of the FCC Rules reflected the reality of the frequency coordination process in the field, citing the FCC's Safe Harbor Rules as an example. He pointed out that more responsibility could be delegated to the frequency coordinators to make decisions in the field, noting that the current conditional authority granted to them was very limited. Mr. Haller mentioned that the length of the rulemaking process might be unnecessarily protracted because of the FCC's move toward adopting legally airtight decisions. He also pointed out the general public safety community opinion that combining the authority of the FCC and the NTIA under a single agency was not a viable solution.

Mr. Proctor outlined the discussion slides, querying the audience on the accuracy of the diagrams represented within them. Figure F-4 below depicts the first diagram examined by the participants.

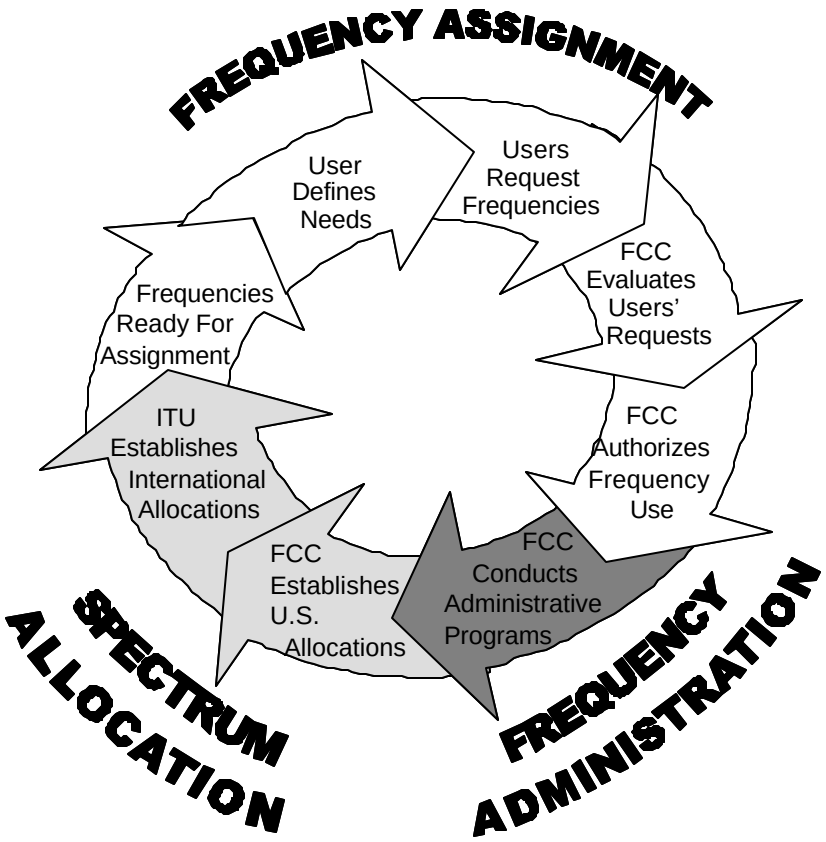


Figure F-4
Initial Frequency Management Process

During the first session, Mr. Powell pointed out that frequency coordinators were absent from the process and noted that they, in fact, evaluated users' requests, not the FCC. He also remarked that the International Telecommunications Union's (ITU) international frequency allocation occurred prior to the FCC's domestic allocation, which necessitated a reversal of the two processes within the diagram.

During the second session, Mr. Buchanan noted that the diagram lacked a description of the political processes involved with spectrum management, and Mr. O'Hara (SRC) pointed out that the engineering aspect of frequency planning and coordination was missing from the illustration. Participants agreed that the stage representing the FCC's evaluation of users' requests should be changed to note that frequency coordinators evaluated those requests. Mr. O'Hara later acknowledged that the process was accurate from a high level perspective but argued that the frequency administration process should include mention of rule enforcement measures. Colleen Apte (SAIC) commented that the diagram implied a continuous process and noted that it could possibly be broken into three separate cycles representing each of the major sections. Mr. Rollender also noted that the arrows depicting the flow of the process might not always point in one direction. They generally agreed that the most accurate version of the process could be presented as Figure F-5 below.

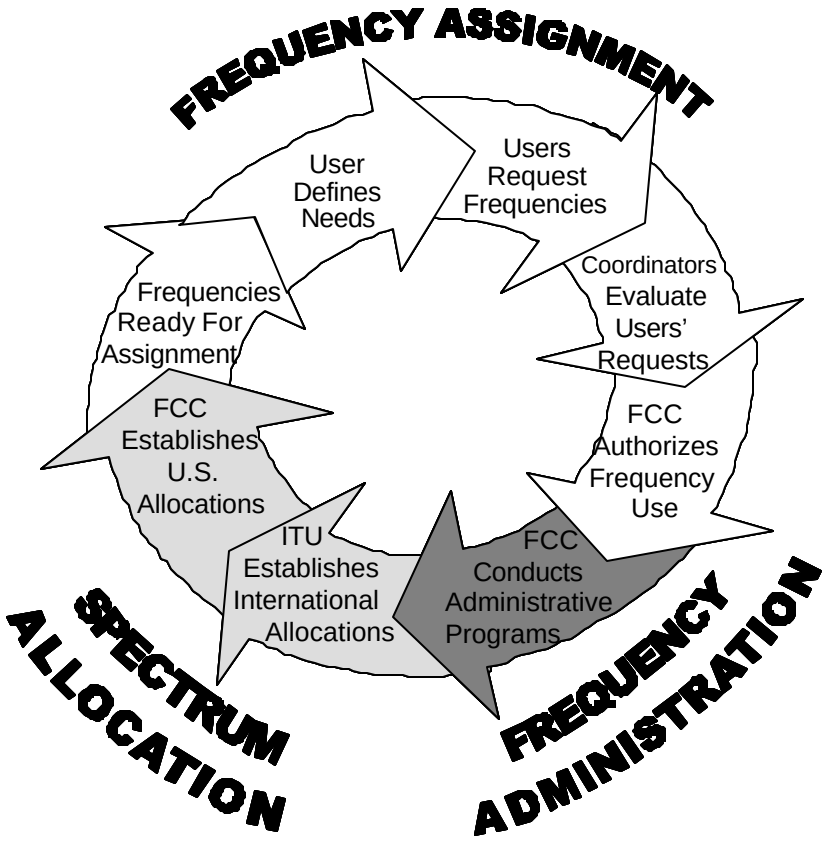


Figure F-5
Revised Frequency Management Process

When examining the user activities slide, participant comments in the first session noted that in addition to the National Public Safety Planning Advisory Committee's (NPSPAC) review of an application, the 700 MHz band RPCs also reviewed certain applications. Participants agreed that where NPSPAC was represented within the process, the 700 MHz band RPCs should also be included. The correction to the slide was made following the first session, as illustrated in Figure F-6 below, and participants in the second session had no additional changes.

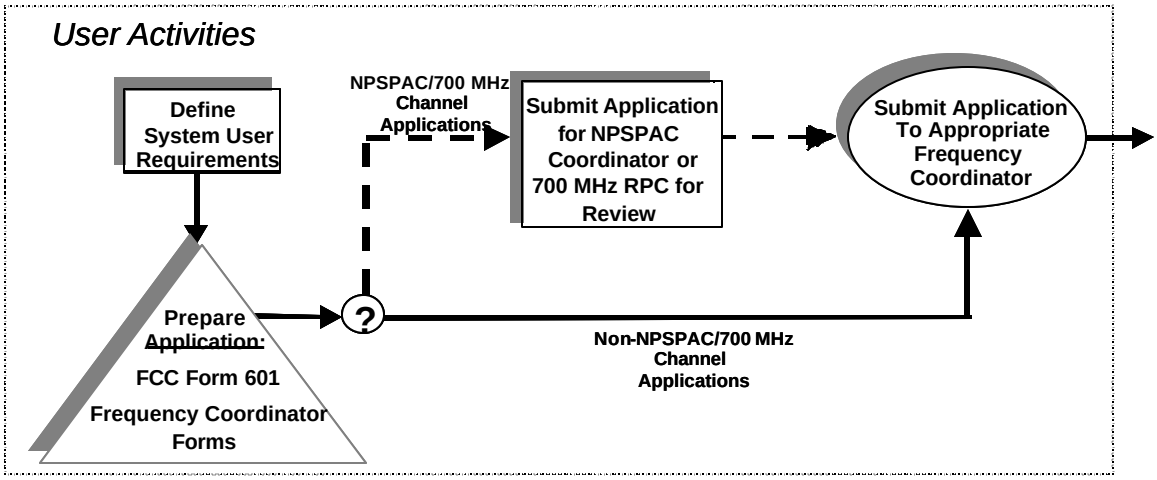


Figure F-6
User Activities

Discussion in the first session centered around the length of time involved with the FCC's application review process, while the second session commented mainly on the level of difficulty associated with completing the required forms to submit an application to the FCC. Mr. Haraseth mentioned Mr. Wentland's previous comment that the NTIA license application process could be completed within 14 days while noting that the most expeditious FCC application grant he was aware of had taken 30 days. Mr. Haraseth further commented that the FCC application review process typically took between 30–90 days, while some applications were not completed even within that time frame. When asked why he thought the process was so protracted, Mr. Haraseth pointed out that the human element was involved because not every step could be automated. He noted that the human factor added time to the process, particularly if the organization involved in the review process was understaffed.

Mr. Haraseth also noted that the FCC's license application Form 601 was 116 pages long. He pointed out that very few current public safety agencies had employees who could fill in the required information. During the second session, Mr. Buchanan echoed those comments, noting that small agencies, localities, and cities did not have the resources or personnel capable of completing the form. He also pointed out that not even some counties or states had the available resources. Mr. Haller explained that, as time had passed, the complexity of the application had increased, requiring detailed engineering analysis and studies. Doug Gurin (National Highway Transportation Safety Administration [NHTSA]) questioned the availability of knowledgeable personnel on whom states could rely to aid in the application process. Mr. Haller stated that the available pool of qualified spectrum managers and engineers was dwindling.

During the first session, Mr. Haraseth commented on the FCC's Universal Licensing System (ULS), the automated license application database used to store and process information on frequency requests. He specifically noted that the database had limitations in terms of the number of geographic locations for which a frequency could be requested, as well as the requirement to coordinate with adjacent regions prior to the application being submitted. He pointed out that not all regions had coordinating committees, and for those that did, their meetings were often infrequent.

Mr. Haller noted that the FCC was often overly concerned with application of its Rules, particularly in cases as noted by Mr. Haraseth. Mr. Haller recommended that the 800 MHz RPC process be reexamined, especially with regard to regional plan disclosure. Mr. Haller pointed out that the Computer Assisted Precoordination Resource and Database (CAPRAD) was an open tool that provided planning information to interested parties, but noted that because submitting information to the database was not required by the FCC, its effectiveness was limited.

During discussion on the activities of the public safety frequency coordinators, it was noted that in many situations, those coordinators performed extensive analysis prior to submitting the application to the FCC. Participants questioned the amount of additional analysis required by the FCC. Mr. Haraseth noted the possibility of increasing the conditional authority of frequency coordinators. Mr. Powell recommended that coordinators should screen the technical aspects of the application prior to submitting it to the FCC; then the FCC would only have to approve or disapprove an application while performing minimal analysis. He suggested

that an FCC Rule compliance checklist be created to simplify the process from the FCC's perspective.

In conjunction with the discussion on increasing authority granted to frequency coordinators, questions were posed regarding the level of training that coordinators received. Mr. Haraseth noted that APCO's personnel were trained extensively and regularly, while Mr. Miller stated that AASHTO required its coordinators to attend a daylong training workshop on an annual basis. Mr. Haller noted that FCCA coordinators were trained twice a year.

When discussing the FCC's activities regarding the license application process, participants noted that the graphic representation of the process should be updated.

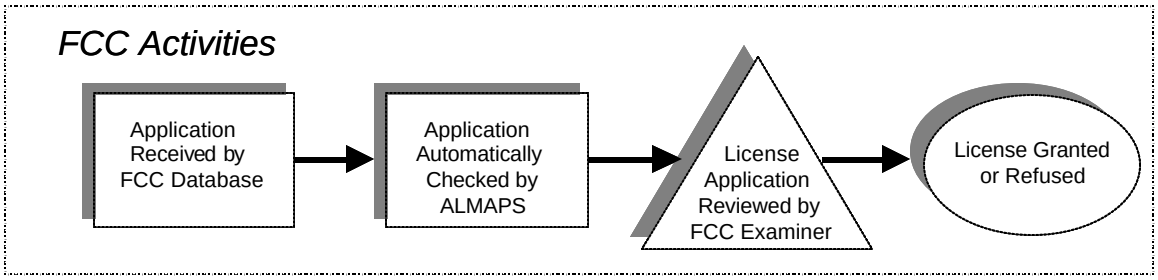


Figure F-7
Initial FCC Activities Diagram

In Figure F-7 above, participants noted that the Automated Land Mobile Application Processing System (ALMAPS) database had been replaced by the ULS database system. During the morning session, participants recommended that the graphic be updated to denote the application rejection process. During the second session, Mr. Buchanan pointed out that not all rejected applications were returned to the user, but that in many instances they were returned to the frequency coordinator. Figure F-8 below illustrates the changes made following the second session.

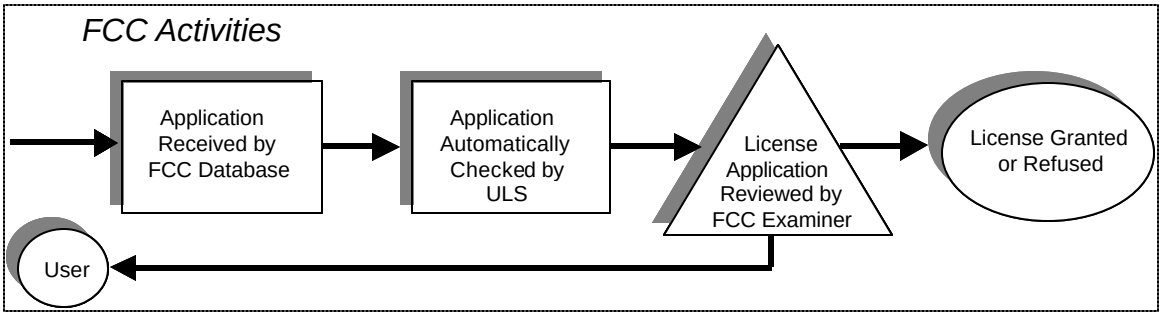


Figure F-8
Revised FCC Activities Diagram

Mr. Gurss described the process of requesting a waiver of the FCC's Rules as lengthy and unnecessary. He recommended that the amount of time for public comment regarding a Request for Waiver (RFW) of the FCC's Rules by a public safety agency be reduced. Mr. Haller noted that when a RFW was handled by the FCC's license application staff in Gettysburg,

Pennsylvania, the process was relatively quick. He pointed out, however, that should the RFW require review from FCC staff in Washington, DC, that the process often involved close legal scrutiny of the associated rules, thus increasing the amount of time necessary to complete the request. Mr. Haller stated that decision-making authority had been shifted from the staff in Gettysburg to the FCC's staff in Washington, DC. He remarked that some of that authority could be transferred back to Gettysburg personnel in order to improve the efficiency of the RFW process.

When asked to discuss the possibility of combining the authority of the FCC and the NTIA under a single spectrum management agency, participants responded both positively and negatively. Mr. Miller stated that AASHTO supported the concept on the premise that the current interaction between federal, state, and local public safety agencies would be improved under a single authority. Mr. Gurss stated APCO's opposition to the idea, pointing out that state and local interests would be secondary to federal interests under an Executive Branch agency. He also noted that the opposite would hold true should governance of federal spectrum use be removed from the NTIA's exclusive control. Mr. Keller stated that his organization supported APCO's position. Mr. Gurss also mentioned that national security interests limited the disclosure of information with regard to certain federal communications systems. During the second session, Mr. O'Hara pointed out that state and local public safety agencies supported the FCC's public comment process and would have difficulty working around the classification requirements of federal systems.

Jennifer Warren (Lockheed Martin) suggested a possible combination of the NTIA and FCC under an independent regulatory agency; one which was not beholden solely to either the Executive or Legislative branches. Discussion on that suggestion acknowledged that it was a possibility, but that many other issues would have to be resolved for it to be successful. During the second session, participants noted that such a hybrid spectrum management system might be an option, given that sufficient benefits of combined authority were made abundantly obvious.

Mr. Speights acknowledged the different points of view regarding a combined authority, but asked whether other ways for the FCC and NTIA to combine resources or efforts would be feasible, e.g., combining spectrum bands. He pointed out that efficiencies within the spectrum management process could be realized, but noted that such a change in process would be extremely costly and time consuming. Mr. Powell commented that if sufficient spectral resources could be identified to meet the needs of both the federal public safety community and the state and local public safety community, combining or sharing spectrum bands would be an acceptable situation.

During the second session, Mr. Buchanan pointed out that the benefits and drawbacks of a combined spectrum management agency should be clearly defined and articulated before such a measure was further examined.

Objective 3: Spectrum Efficiency and Beneficial Use

Mr. Buchanan and Mr. O'Hara facilitated the session focused on Objective 3. Mr. Hoffman served as the moderator.

Mr. Buchanan opened the session by introducing the topic of narrowbanding. The timeline for narrowbanding, he stated, had been put on hold because the public safety community had requested additional time to meet the mandate's requirements. He also stated that while many viewed narrowbanding as an example of spectrum efficiency, others questioned its real efficiency gains, especially in the area of data transmission. Mr. Buchanan spurred discussion by questioning the efficient application of narrowbanding mandates.

Joseph Hanna (Directions) stated that data communications had become more important to the public safety community. He remarked that the narrowbanding mandate confined public safety agencies to limited technology options. Andy Seybold (Outlook 4 Mobility) suggested that aggregating channels, as opposed to narrowbanding, would provide better spectrum efficiency. Mr. O'Hara agreed, pointing out that because of narrowbanding efforts, trunking capabilities were not possible in some instances because of the band plans (e.g., very high frequency [VHF] channels). Mr. Buchanan asked participants whether public safety should support a rebanding effort.

Bill Finn (Joint Tactical Radio System Joint Program Office and MITRE) and Mr. Nash both acknowledged that narrowbanding was good for voice transmission. Mr. Finn stated generally that compliance with APCO's specifications and the 12.5 kilohertz (kHz) transmission channel requirement would not be a problem. However, Mr. Nash echoed concerns that narrowbanding limited the amount of data that could be transmitted. He noted, that the public safety community had a finite amount of time to transmit information to an officer in the field. Mr. Buchanan also pointed out that because narrowbanding reduced the data throughput rate, agencies might need to request additional channels to meet their spectrum requirements.

Mr. Miller stated that "refarming" was intended only to improve the current situation, not perfect it. He went on to comment that the FCC had made a mistake by slowing down the migration schedule. Mr. Miller suggested that the best option would be to reband the high band VHF channels. However, he pointed out the inherent difficulties of rebanding, which included significant migration and transition issues. He also noted that the success of trunked systems in metropolitan areas was largely dependent on the relationships between various agencies. Mr. Miller stated that an FCC mandate and defined time frame would reduce confusion and uncertainty within the rebanding process.

Linda Moore (Congressional Research Services/LOC) stated that additional consideration should be given to the costs associated with rebanding. A Project-25 (P25) radio, she pointed out, was significantly more expensive than radios currently in use. Jim Lundsted (Missouri Department of Conservation and FCCA) remarked that the narrowbanding mandate was an unfunded mandate, which created budgetary difficulties for public safety agencies. Mr. Buchanan and Mr. Proctor countered that reprogramming or replacing system infrastructure was much more costly than purchasing new radios.

Mr. Nash also stated that in Montana, public safety spectrum was no longer available because everyone wanted to use the VHF band. If agencies moved to the unused spectrum in other bands, then agencies would not be able to interoperate with one another. Bill Curry (Washington, DC, Emergency Management Agency [EMA]) said that Washington, DC, had

state, local, federal, and DoD spectrum users. To make these various agencies interoperable Washington, DC, built an 800 MHz trunked simulcast system; however, the city's problem was not the system, but the lack of available 800 MHz spectrum.

Mr. Wentland brought up the issue of leadership and responsibility. He stated that responsibility for leading a drive for change was too dispersed. David Warner (Virginia Information Technologies Agency) pointed out that partnerships were helpful, but the bigger issue was the challenge of moving the public safety community's mindset away from ownership of spectrum to the use of spectrum. He added that the current rules were not keeping pace with the trends in technology. He suggested that the rulemaking processes should include procedures for new technologies and ways to grandfather other technologies that had to catch up, such as data. Dorothy Spears-Dean (Virginia Information Technologies Agency) and Mr. Gurin both suggested that the public safety community should be more proactive in providing incentive for its various groups to come to the table and develop a 10–15 year plan.

Mr. O'Hara introduced the next topic for discussion, spectrum efficiency metrics. He began the discussion by asking participants whether there were better metrics for determining spectrum efficiency and use. He asked how these metrics could be included in the rulemaking process and how they could take into account the differences in voice and data transmissions.

Mr. Gurss began by saying that because the public safety community was not paying for spectrum, the community had to determine ways to ensure it was used most efficiently. Mr. Nash added that the community had not yet defined what he meant by spectrum efficiency. For example, he asked whether it was inefficient to set aside a nationwide channel for the President of the United States. Mr. Nash said, in this case, it would be great to use spectrum for other purposes, so long as public safety could clear that spectrum when it needed the spectrum and for as long as it needed it.

Participants suggested several components to be included in an effective spectrum efficiency metric. Greg Meacham (Nextel) suggested that a measure of efficiency had to account for the downtime inherent in a public safety communications system. Mr. O'Hara added that quality of service should be included. Mr. Warner added that the metric should take into account how best the resource could be best used. Mr. Haller suggested that the metric should measure how much throughput was achieved with the available bandwidth.

Mr. Nash suggested that the efficiency metric could include a priority scheme. However, he questioned how such a scheme could work and how such priorities could be established. He asked, as an example, whether all police and all fire calls were priorities. If not, he questioned whether public safety relied on situational analysis to determine which calls gained priority. Mr. Moore disagreed with Mr. Nash stating that humans could not always be trusted to make the priority decisions. She stated that artificial intelligence and credentialing could be used to establish the priorities. Mr. O'Hara agreed that advanced technologies were good but cautioned against allowing public safety community to serve as a test bed for these unproven technologies.

Mr. Barsley said that before determining a metric, it would be necessary to understand the users' requirements. He said that the best way to measure spectrum efficiency would be

users per unit of frequency. Ms. Spears-Dean agreed and said that the public safety community should begin with a needs assessment and then help develop the technology necessary to meet those needs. Mr. Nash agreed that user needs had yet to be defined. Mr. Wentland also agreed, stating that while different places might have different requirements, there might be some that were applicable to all. He suggested that the incentive for participation would be an audit of public safety's current spectrum efficiency.

Mr. Buchanan introduced the topic of predictability and certainty in spectrum efficiency by asking whether better predictability needed to incorporated into the process. He noted that the process needed to be simple enough that a public safety agency would not need to hire a consultant each time it applied for spectrum.

Mr. Haller suggested a provision be added to the rules that would take into account the power of each station, for example when stations had over-licensed spectrum, that would indicate that the spectrum was used inefficiently. Mr. O'Hara agreed. He said that current rules required a town's licenses to cover a wider area than was necessary.

Mr. Buchanan stated that regional planning could help to combat that situation. Mr. Miller disagreed, stating that regional planning was great in theory, but was just politics in practice. He went on to say that not all users' groups were represented in the process and unless that issue could be resolved, the process would not work well. Mr. Lunsted argued that regional planning was successful because of partnerships, though not as successful as it could be because one group usually dominated the process.

Mr. Hausman stated that Spokane still did not participate because it had limited time, money, and staff. However, he went on to say, Washington really needed tribal representation because Washington had 30 tribes and no one had joined with the state's interoperability efforts. Mr. Buchanan said that California had the same problem.

Mr. Nash and Mr. Haller both suggested that public safety should stop relying on carry curves to define interference rates. They argued that better models for measuring interference now existed and should be implemented. Mr. Nash went on to say that while carry curves might be useless, the spacing rules were based on that metric.

Mr. Nash continued by stating that NPSTC's assumptions behind tight packing might not apply now. He argued that the public safety community could not re-do all allocations each time the technology improved. Public safety, he said, operated on a 10-year replacement cycle, and technology development operated on an 18-month cycle. It would be too costly, he said, to implement these new technologies. Mr. O'Hara suggested that a license could take into account the sophistication of an agency's technology.

Frank Box (MITRE) disagreed. He stated that repacking would not have to occur because a great deal could be accomplished by changing just a small number of the frequencies.

Mr. O'Hara introduced the topic of spectrum assignment and "maintenance" by asking whether the spectrum should be periodically "repacked" for optimal use and efficiency. He stated that if this were to occur, there would be significant associated costs.

Gary Anderson (Uraxs Communications) said that "re-packing" spectrum would be a good solution in the short run, but a long-term approach would be needed as well. He went on to say that public safety should use unlicensed spectrum more frequently, especially ultra wideband technology. Jennifer Wharram (Industry Canada) stated that periodic rebanding might create instability in the market that could result in less investment in research and design by firms.

Mr. Lee said that the Government could consider providing local agencies with financial incentives to return unused spectrum and allow them to use those revenues in other ways. He went on to say that for such a plan to work, the Government would need to determine the financial savings realized through spectrum efficiency. Mr. Buchanan countered by saying that government and industry could subsidize public safety agencies to keep them efficient because it would cost the public safety community to "repack." If public safety was subsidized to be made efficient, perhaps it would stop asking for additional spectrum (thereby reducing the competition with commercial sector).

Mr. Buchanan said that he was not opposed to commercial services. However, he stated that there were two problems with commercial services: 1) lack of coverage because commercial services did not cover everywhere, and 2) commercial networks became overloaded during emergencies.

Mr. O'Hara began discussion on the topic of advanced technologies by asking how new technologies could enhance spectrum efficiency. For example, the Defense Advanced Research Projects Agency (DARPA) and others had been working on techniques that could increase spectrum efficiency through the use of time-sharing technology. He asked whether this method would be safe and whether there were other options available. He also asked whether there other requirements to consider because public safety does not use its spectrum at the same rate all the time.

Edwin Kelley (Interoperable Wireless) said that new technology was not necessarily spectrum efficient. He said that public safety needed to look at what it could do with what it already had available (e.g., simulcast technology). He said his research had indicated that for the most part, commercial technology was spectrally inefficient. P25 standards, on the other hand, Mr. Kelley said, were more spectrum efficient than most commercial technologies, and the public safety community got by with less hardware than commercial technology.

Ms. Moore argued that the public safety community should look for ways of merging commercial technologies with public safety land mobile radio (LMR) systems. The TETRA standard, she said, was more efficient than P25. Mr. Buchanan disagreed, stating that TETRA was not cost effective for a county like his with 20,000 square miles because TETRA equipment covered only a small radius around each base station, making it expensive to deploy in large areas.

Mr. Nash asked whether there were unmet needs that existing technology was preventing the public safety community from meeting. Mr. Hanna said that the public safety community would never have the resources to cover all possible commercial scenarios. He suggested public safety should instead try to use new technologies without building new infrastructure and should consider partnering with commercial providers for additional capacity.

Ms. Apte mentioned that DARPA was researching spectrum agility with underutilized spectrum. Given public safety's increased need for interoperability, she suggested that perhaps it should consider these technologies as they became available—especially for data.

Mr. Seybold said that he was concerned about advanced technologies and found that vendors with no radio frequency (RF) background brought many of these technologies to the public safety community, and their assumptions were often very wrong. He said that the public safety community was not doing enough to educate these companies about the specific needs of the community.

Jim Marshall (MITRE) said that when public safety agencies needed spectrum, it had to be available. Mr. Nash asserted that the public safety community could not afford to build systems for the peak situations. He went on to suggest that a slice of "green spectrum" should be set aside to support overflow (i.e., in cases of large emergencies).

Mr. Meacham said that the public safety community could rent public safety spectrum to the public safety community. Mr. Buchanan said that he had two problems with commercial solutions—cost and reliability.

Ms. Spears-Dean wondered at what point the public safety community would be willing to stake lives on these new technologies. Liability, she said, also had its own costs. Mr. Lee said that the human element should not be forgotten.

Mr. Marshall suggested that two kinds of tests should be conducted —1) a test for spectrum efficiency in terms of modulation, and 2) a test for spectrum utilization (how well it was used). He stated his belief that there was more to be gained from the later than the former.

Objective 4: New Technology

The discussion of objective 4 opened with the moderators, Mr. Tolman and Mr. Nash, facilitating a general discussion on the deployment of new technologies within the public safety community. Mr. Nash saw a distinct need for instant messaging (IM) for public safety, pointing out that the Transportation Security Administration (TSA) was already using the technology. The facilitators discussed a recent television show, which documented a "day in the life" of U.S. Air Marshals. The marshals traveled with personal digital assistant (PDA) devices and communicated with other agents and their home offices via e-mail and IM. Tom Arnold (Capital Wireless Integrated Network [CapWIN]) added that his organization had already instituted IM technology because it did not want to fall behind.

Mr. Tolman then changed the topic of discussion by stating that the public safety community clearly had not historically been the "sacred cow" of commercial services because

the industry did not actively work to introduce new technologies for public safety. He asked whether, given this information, the public safety community should continue to wait for new technologies to be "pushed" onto the market or should it "pull" for these services and technologies. Mr. Buchanan responded by stating that public safety would be in a dilemma if personnel had to rely on commercial technologies. These technologies often were not available for public safety use and then the technologies were obsolete shortly after becoming available. Rural areas would not receive service coverage because there was not enough demand in remote areas.

Mr. Gurin stated that he had explored gathering information from end users to assist in the development of new technology and found it to be very difficult to get practitioners to agree on what they would like or need to have. A major problem was that public safety standards were much higher for interception and counterfeiting than their commercial counterparts. This created built-in barriers to the system. Mr. Arnold added that CapWIN was pushing to develop standards for requests for proposals (RFP) to raise standards of development for public safety LMR equipment. Mr. O'Hara commented that organizations such as the NPSTC were taking a proactive approach to developing new technologies in order to identify gaps between requirements and what was being developed.

Mr. Nash moved the topic of discussion to cognitive radios. He commented that he had some serious concerns about the technology because the end users would not be trained radio engineers but might be required to configure the radio out in the field.

Mr. Barsley commented on the public safety market by asking whether radio equipment manufacturers realized how big the market would be if all of the public safety users operated together. However, it was pointed that because the public safety market was currently fragmented, it might be too small for most manufacturers, and the public safety community might have to work with smaller companies who could fill the niche for public safety needs.

Prudence Parks (United Telecom Council) discussed the commonality of the needs of CI and the public safety community. There had been a big push at the FCC for utilities personnel to use commercial radios for response, but they experienced the same problems in emergencies as public safety personnel. CI personnel needed coverage in unique locations (e.g., underground). She added that Nextel was moving in the right direction, but the utilities would not rely on the newest technology until it had been tested and considered reliable. She noted that there would be resistance until reliability could be confirmed. In many cases, the utilities must be able to shut off power or gas before public safety personnel could enter a building. One solution was to use cellular technology, but if utilities were using cellular telephones, they would not be able to interoperate easily with public safety.

Steven Ward (Secretary of the Navy Office of the Chief Information Officer [CIO]) discussed the introduction of new technologies in general by adding that public safety needed to push new technologies out into the market to bring the cost down. For example, he stated that people thought that Geographic Position System (GPS) and Internet security would be a problem, but they were not an issue.

Mr. Nash commented that cognitive radios possessed the potential to answer many problems for public safety interoperability.

The conversation moved to discussion on the 4.9 GHz safety band. Mr. Powell noted that the licensing process for the 4.9 GHz band worked well, but it was incomprehensible that the FCC released this large piece of spectrum with no mandate for interoperability. Mr. Buchanan added that crowding would not be an issue in this band, but agencies would have to share spectrum because the counties and cities overlaid each other geographically. Peer pressure would be enough to enforce sharing, but only if the FCC backed up the peer pressure. Mr. O'Hara commented that it should be a requirement for license applications to go to a regional board and that board should then require MOUs for spectrum sharing. He then went on to state that, even in this new band, congestion would eventually occur, forcing practitioners to seek out newer technologies.

Mr. Powell stated that a time division multiple access (TDMA) system (TETRA) was up and running in Missouri. It was important for other agencies to monitor progress and learn from Missouri's experiences. He also commented that the Northrop Grumman proposal would be worth investigating. Mr. Buchanan joined the conversation by adding that M/A-COM used TDMA and that agencies would have to "wait and see" if this would be a feasible solution. He also noted that, while the data portion of code division multiple access (CDMA) was a great application, there were no usable bands where this technology would fit. He ended his comments by stating that the Northrop Grumman proposal would allow access to data that public safety personnel could not get by other means. Mr. Barsley noted that XM Satellite Radio used Universal Serial Data Monitor (USDM) for its mobile data broadcasts and obtained unbelievable results.

Mr. Powell revisited the spectrum testing idea by stating that public safety must implement the new technologies out in the field and that a spectrum testing area was required for new systems. Mr. Barsley said that XM Satellite Radio tested its new technologies at night on its regular channels when there were fewer listeners.

Marv Storey (FCCA) continued the discussion on cognitive radio by stating that, from a logistics standpoint, cognitive radio would need lots of dollars behind its introduction. He then raised the question, "Are we really running out of frequencies or are we running out of the ability to switch frequencies and get repeaters into the area?" Mr. Nash agreed with Mr. Storey, adding that, during the Southern California fires, there was plenty of spectrum available, but the responders ran out of ultra high frequency (UHF) high bands where fire departments normally operated. Cognitive radio would alleviate this problem because it would allow responders to operate over all bands. Mr. Hanna noted that cognitive radio would be a Godsend, but if agencies could not afford it, its effectiveness would be limited.

Mr. Tolman cited a study showing that most public safety agencies consisted of 75 or fewer individuals and noted that these small numbers did not give agencies the leverage to exert influence over product manufacturers. Mr. Nash noted that technology was not the only limiting factor. Cost, operational requirements, politics, and the American culture were also influencing factors. Mr. Hanna added that, in the public safety market, there had been no economies of

scale. Mr. Powell joined the discussion to state that the real cost of equipment (incorporating inflation) was much cheaper and required less maintenance than in years past.

Mr. Orsulak posed the question, "If you had an infinite amount of money, would cognitive radios be a good solution?" Mr. Nash responded by stating that the answer was unclear. Cognitive radios had so much capability that end users could not use it (e.g., user might find the proper channel among 230). When considering new technologies, agencies should consider the end user's needs, such as operating a small radio with buttons while wearing large gloves. Mr. Arcuri noted that most technology advancements come from the commercial side and that public safety should look at blending commercial technologies into public safety applications. Ms. Warren added that the public safety community had a very fractionalized procurement process. If public safety was truly interested in using commercial technologies for public safety applications, they would need to look at ways to bring their buying power together. Mr. Nash responded to Ms. Warren that there were cultural barriers to implementing this buying power. If the United States had a single nationwide communication system with one police force and one fire department as in other countries it would be possible, but that was not the case.

As the discussion moved to the 4.9 GHz band, Mr. Haraseth commented that, because of the way that the new spectrum was being laid out, it would be difficult to coordinate in the future. Mr. Nash agreed that an agency had to be licensed in the 4.9 GHz band, but could use it as if it were unlicensed because the agency could operate on any bandwidth or channel. Mr. Tolman commented that, at some point, there would be problems with this freedom. Al Ittner (Motorola) suggested that there should be some sort of command center to figure out how everything worked together (i.e., someone had to be in charge). He then commented on the question of standards in this band by stating that the decision was being made through Telecommunications Industry Association (TIA), and perhaps there would be an adoption of an existing standard that would be filtered and adjusted to meet the needs of this band.

Mr. Nash opened the discussion on "Other Technologies" by restating that the public safety users had historically been leery of new technologies because they did not want to be the testers and did not want to depend on an untested technology in a life-threatening situation. Finally, he questioned how do a public safety agency found the spectrum when an agency was ready to test.

Mr. Hanna attributed the problems with adopting new technologies to culture, noting that users were concerned about adopting new technologies before the FCC policies had been established completely and tested. Public safety did not want to go through another situation like the one currently evolving in the 800 MHz band.

Mr. Seybold added that the CDMA standard was moving toward Global System for Mobile Communications (GSM), and that moving into the TDMA standard now would not be smart when commercial services were abandoning the technology.

Mr. Arcuri closed the conversation by stating that the public safety community missed an opportunity to introduce new technologies when developing its use of 700 MHz band. He was

encouraged by the deployment of spectrum for 4.9 GHz band and hoped that public safety would be able to properly use the 4.9 GHz band.

III. Plenary Session, Wednesday, February 11, 2004

Town Hall Discussion

After returning from lunch, the group reconvened in the Blue Room. Mr. Wentland called the attendees to order at 1:30 p.m. and then briefly introduced Mr. Gallagher and Mr. Thomas. Mr. Gallagher and Mr. Thomas scheduled a Town Hall discussion on topics of interest to public safety including the CAG, interference, and the FCC's Spectrum Policy Task Force (SPTF) Report. Before they began with the formal town hall discussion, Mr. Speights assisted Mr. Gallagher in recognizing the facilitators by handing out certificates that recognized their contributions to the National Forum on Public Safety Spectrum Management.

Mr. Gallagher then formally introduced Mr. Thomas noting his extensive experience in the telecommunications field and the good collaborative relationship between the NTIA and FCC. Mr. Thomas immediately pointed out that, in his view, the FCC's mission was to allow the public sector and public safety access to innovative technology while protecting incumbents. He then pointed out that the FCC continued to focus on modernization to meet the demands of new technologies including cognitive radios and unlicensed use.

Mr. Gallagher then reviewed the role of the NTIA. He stated that NTIA was the President's advisor on "macro" telecommunications policy, which did overlap the responsibilities of the FCC, and that NTIA must consider the protection of both economic and security concerns in its policy. He continued that the NTIA also had exclusive domain over the federal users. Mr. Gallagher pointed out that the FCC's main policy initiatives currently centered on the recommendations of the SPTF. He specifically mentioned that the NTIA and FCC were working jointly on issues such as Wi-Fi "to get the job done."

Mr. Gallagher asserted that the spectrum policy work in the Nation was innovative, and that spectrum represented the "rocket fuel" for future technology. He explained that NTIA and the FCC created policy through a partnership with the interested stakeholders and that they operated in a consensus environment. He asked that the participants in the forum provide action plans to help develop the "play book" for the future.

The first set of questions was from Mr. O'Hara and was directed to Mr. Thomas. Mr. O'Hara described the results of the SPTF Report as surprising and asked why the report did not mention public safety communications as a priority. Mr. Thomas noted that public safety was, in fact, a priority; however, the record on many items had not been complete and that the final Rules would more accurately reflect that prioritization. Mr. Powell then asked whether the FCC was considering sharing public safety spectrum, and did that imply that public safety had excess spectrum. Mr. Thomas responded that, if passed, individual agencies would have the ability to lease out their idle spectrum during down time and reclaim it instantly when needed, but that this topic was still in the questioning phase at the FCC.

Mr. Thomas asked the audience why the public safety community had not considered commercial services as a more viable interoperability solution. He continued that it seemed

reasonable for public safety and commercial services to work out some sharing arrangements and reliability standards to satisfy both parties. He also asked that the public safety community view the secondary markets as another option for public safety, not a mandate.

Mr. Powell then noted that public safety had significant reservations about the repercussions of interference temperature and related technologies on public safety bands. Mr. Thomas stated that the FCC intended to be very protective of public safety operations and might never allow such devices on the public safety bands. To be sure, he added, concerned parties should voice their opinion on the record. Mr. Thomas mentioned that, in general, innovative regulations, even if they were not passed, still encouraged manufacturers to be innovative and continue to develop new technologies. Mr. Powell concluded his remarks by asking that the NTIA and FCC help to better define software defined radio related items and concepts.

Mr. Thomas stated his belief that there was a need to address the differences between public safety and private industry while upholding the public safety requirements to help spur innovation and newer technology. Mr. Gallagher added that all radio spectrum was a public–private partnership, but it was easier to achieve a partnership when the stakeholder group was small and known. He asserted that public safety needed to harness "the greater whole." He noted that the commercial sector desired to create nationwide networks and had other innovative ideas for the public safety market; however, the appropriate policy to support it did not exist.

Mr. Haraseth noted that there was an inherent gap between public safety requirements and commercial capabilities. Mr. Thomas suggested that there should be forums to discuss these options. Through these forums, the ideas might be possible to implement, especially if the forums were supported by public safety, FCC, and NTIA.

At that point, time had run out, and the speakers thanked the audience for its participation.

Option Finder Survey

After a short break, participants returned, and Mr. Speights introduced OptionFinder. This wireless polling device allowed the audience members to answer a series of questions related to the forum's objectives and issues in real time. The audience showed significant interest and was able to see the net results of its responses immediately after answering. At the end of the survey, Mr. Speights noted that the results would be eventually posted on the NTIA Web site.

Conclusion

Mr. Speights announced the end of the 2-day forum and thanked everyone for his/her participation. He described it as a successful event and encouraged all parties to continue to submit their input through such devices as the NTIA's NOI.