



## ***NPSTC Public Safety Communications Report***

***The National Public Safety Telecommunications Council is a federation of organizations whose mission is to improve public safety communications and interoperability through collaborative leadership.***

# **4.9 GHz National Plan Recommendations**

## **Final Report**

**October 24, 2013**

***The member organizations of the National Public Safety Telecommunications Council are grateful to the Department of Homeland Security's Science and Technology Directorate, Office for Interoperability and Compatibility (OIC) and the National Protection and Programs Directorate, Office of Emergency Communications (OEC) for their support.***

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# NPSTC 4.9 GHz National Plan

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## 1 Introduction

On June 12, 2013, the FCC released the Fourth Report and Order and Fifth Further Notice of Proposed Rulemaking (NPRM)<sup>2</sup> proposing to modify the rules for the 4.9 GHz spectrum (4940 MHz – 4990 MHz) in order to increase utilization of this band by Public Safety and potentially other entities. This NPRM is partially in response to public safety agency requests for changes in the rules to allow better frequency coordination, provide better protection from interference, and create dedicated channels for specific uses.

Public Safety agencies have expressed frustration with the 4.9 GHz band because current rules allow geographically based licensing with little documentation on system design and transmitter location. Public Safety agencies contemplating new service in this band cannot determine if other agencies in their area might cause harmful interference today or in the future. While the licensing rules provide for geographical sharing of the band between different agencies, the lack of licensing detail invites the potential for conflict and interference.

Critical Infrastructure Industries (CII) have also been looking for additional spectrum and have been able to operate in the 4.9 GHz on a secondary basis after being sponsored by a public safety agency who holds the FCC license. CII entities have expressed concern over a cumbersome licensing process, especially for utility systems and other organizations whose service areas span across multiple public safety jurisdictions. Finally, CII entities are concerned that a public safety agency can revoke their access to the band and cause disruptions to their operations.

Law enforcement and fire/rescue agencies have also expressed an urgent need for dedicated channels to support unmanned aerial devices (UAVs), bomb robots and other specialized applications, all of which require broadband channels for video and data.

This report is designed to examine all of these issues and make appropriate recommendations which will enhance access and utilization of the 4.9 GHz band.

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<sup>2</sup> Fourth Report and Order and Fifth Further Notice of Proposed Rulemaking, WP Docket No. 07-100, PS Docket No. 06-229 and WT Docket No. 06-150, released June 13, 2012

## 2 Executive Summary

On March 15, 2013, the National Public Safety Telecommunications Council (NPSTC) formed a 4.9 GHz National Plan working group to examine the current use of this spectrum and to develop recommended FCC rule changes that would enhance use of the band by the public safety community. More than 90 volunteers were assigned to five task teams to examine specific areas and issues. The task teams focused on the following areas:

- Band Plan
- Point to Point
- Frequency Coordination, Database, Registration
- Critical Infrastructure
- Air to Ground and other specialized uses

More than 30 conference calls were held to coordinate input and assessment of various options and issues regarding potential changes to the 4.9 GHz spectrum.

Despite the various technical and licensing problems identified in the 4.9 GHz band, the working group found that it is used for many different and varied applications. The Working Group members identified multiple licensed uses including Hot Spots, Mesh Networks (primarily video surveillance), Point to Point backhaul, and limited use for bomb robot communications. There is also anecdotal information indicating that some public safety users are deploying the 4.9 GHz band without a license. These users apparently are confusing the 4.9 GHz band with the nearby and similar 5 GHz unlicensed band. The varied uses and lack of license structure all point to the need to modify the rules and bring more structure to the band.

On July 10, 2013 NPSTC sponsored a meeting in Houston, Texas to bring public safety, industry and critical infrastructure representatives together in an attempt to reach consensus on the various proposals generated by each of the task teams. On August 21, 2013 another meeting was held during the APCO International Conference in Anaheim, California which allowed a broad range of participation from any interested party who was attending the conference.

The intent of this Report and National Plan is to document the current problems with the existing rules and processes that are restricting more effective use of the band and to propose new rules that will facilitate increased use of the band to promote safety of life and property. As part of this plan, the potential to share with other compatible user groups was examined and rules that protect public safety users while allowing the other non-public safety users to effectively use the band will be proposed.

The final report was reviewed by the NPSTC Governing Board to ensure that it contained sufficient recommendations and proposals to meet the needs of all public safety and first responder entities. The report is also designed to promote access and sharing with critical infrastructure entities who frequently work closely with public safety agencies including the provision of shared networks and services.

On October 15, 2013, the report was approved by NPSTC for transmittal to the Federal Communications Commission.

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## 3 Background

The FCC reallocated the 4.9 GHz band spectrum (4.94-4.99 GHz) from Federal Government use in 2002 and adopted rules designating the band for public safety services in 2003.<sup>3</sup> Based on the information submitted in that original proceeding, the FCC concluded that the 4.9 GHz band would accommodate a variety of broadband applications, including technologies and operations requiring varying bandwidths and operations that are both temporary and permanent in nature. Consequently, in adopting licensing rules, the FCC indicated its desire to provide public safety with the maximum operational flexibility practicable and encourage effective and efficient utilization of the spectrum.

For example, the original rules adopted in 2003 permitted broadband mobile operations, fixed hotspot use, and temporary fixed links all on a primary basis in the band, as well as fixed point to point operations on a secondary basis. The FCC established a “jurisdictional” geographical licensing approach for operations in the band, whereby licensees are authorized to operate in those geographic areas over which they have jurisdiction and are required to cooperate in use of the spectrum. Regional plans and frequency coordination for the 4.9 GHz band were allowed, but they were not required under the rules.

The jurisdictional licensing approach provides flexibility that helps minimize the licensing burden for temporary operations. However, public safety’s experience in using the 4.9 GHz band over the last ten years indicates that the associated lack of required regional planning or frequency coordination also imposes uncertainty that is not helpful in optimizing use of the band to meet public safety needs, or the needs of other critical users with whom public safety needs to communicate. Some public safety entities even hesitate to use the 4.9 GHz band because they view the structure to be too close to that of an unlicensed band and are concerned they will receive interference.

In April 2009, the FCC modified the original rules to allow permanent fixed point to point broadband operations on a co-primary basis with other uses in the 4.9 GHz band.<sup>4</sup> The resultant increase in licensing and deployments highlighted the concerns with the lack of a more structured approach to frequency coordination and planning in the band. While permanent fixed licenses do require site-based information, current and new temporary fixed, hotspot or “mobile” operations in the 4.9 GHz band do not. Furthermore, permanent fixed operation is the only use of the band that has a set construction deadline and a requirement for construction notification.<sup>5</sup>

There is active use of the 4.9 GHz band. Analysis of FCC licensing data indicates that as of August 31, 2013, there are 2738 active licenses in the band, spanning fixed and mobile uses. Previous NPSTC comments three years ago indicated that as of June 2009, there were only about 1800 licenses in the 4.9 GHz spectrum. This information indicates significant growth in the band. Unfortunately, as the band sees more use, the resulting lack of detail on current operations in the FCC’s universal licensing system

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<sup>3</sup> In the Matter of 4.9 GHz Band Transferred from Federal Government Use, WT Docket No. 00-32: Second Report and Order and Further Notice of Proposed Rulemaking, released February 27, 2002 and Memorandum Opinion and Order, released May 2, 2003.

<sup>4</sup> Report and Order and Further Notice of Proposed Rulemaking in WP Docket No. 07-100, released April 9, 2009.

<sup>5</sup> Permanent fixed point to point stations at 4.9 GHz must complete construction within 18 months of licensing.

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database reduces the ability of public safety users and frequency coordinators to help improve efficiency and/or minimize interference. Given the jurisdictional licensing, there is a lack of clarity on where channels in the 4.9 GHz band are actually being used and where they could be assigned to additional eligible licensees who may need to use the spectrum. While the multiple types of uses allowed in the 4.9 GHz band are all important to public safety, the lack of a required regional plan or frequency coordination, and the lack of more detailed licensing information required to implement such planning or coordination, can also result in incompatible uses of the spectrum all being mixed together in a less than optimal manner in a given area.

In 2012, the FCC issued a follow-up Fourth Report and Order and Fifth Further Notice of Proposed Rulemaking regarding the 4.9 GHz spectrum.<sup>6</sup> This latest NPRM sought additional comments and recommendations on coordination, eligibility, licensing, band plan, power and antenna gain, aeronautical mobile use, standard, and the potential role of the 4.9 GHz band in relationship to the 700 MHz nationwide public safety broadband network being planned by FirstNet. NPSTC submitted comments in that proceeding recommending an initiative to develop a “National Plan” for the 4.9 GHz band. At that time, NPSTC found the issues to be complex and could not respond in detail without a planning effort that brought all the players together to discuss and attempt to work out solutions.

Accordingly, on March 15, 2013, NPSTC formed a 4.9 GHz National Plan working group to examine the current use of this spectrum and to develop recommended FCC rule changes that would enhance use of the band by the public safety community. More than 90 volunteers from NPSTC, various Regional Planning Committees (RPC), public safety frequency coordinators, public safety users, the Enterprise Wireless Alliance (EWA) and the Utilities Telecommunications Council (UTC) were assigned to five task teams to examine specific areas and issues. These areas included the 4.9 GHz band plan, efficiency of point-to-point operations, frequency coordination and associated database and registration issues, potential access to the band by critical infrastructure and air-to-ground/other specialized uses. Air-to-ground and other specialized uses are increasingly of interest to public safety given unmanned aircraft and robotic operations in bomb situations.

The remainder of this report is the output of that effort. It discusses a recommended change from jurisdictional to site-based licensing, the need for frequency coordination and regional planning that can be enforced, what 4.9 GHz regional plans should cover that is different from plans at 700 MHz and 800 MHz, the need for more extensive data collection on applications and reasons the FCC ULS should store that data. The report also includes a discussion of critical infrastructure use of the band, which sets forth the concerns of both public safety and critical infrastructure representatives participating in the working group, as well as an attempt on a compromise to address those concerns. Given this is a compromise, NPSTC notes that the recommendations herein do not totally conform to the input from the EWA and CII representatives who participated in the 4.9 GHz working group.

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<sup>6</sup> Fourth Report and Order and Fifth Further Notice of Proposed Rulemaking, WP Docket No. 07-100, PS Docket No. 06-229 and WT Docket No. 06-150, released June 13, 2012.

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## 4 Band Plan

The current band plan for the 4.9 GHz spectrum is structured with 18 channels of varying width. The current rules also specify channel centers for aggregated channel bandwidths. This configuration is shown in Figure 1.

*Figure 1: Current Band Plan Frequencies*

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Center Frequency MHz	Channel Number
4940.5	1
4941.5	2
4942.5	3
4943.5	4
4944.5	5
4947.5	6
4952.5	7
4957.5	8
4962.5	9
4967.5	10
4972.5	11
4977.5	12
4982.5	13
4985.5	14
4986.5	15
4987.5	16
4988.5	17
4989.5	18

The existing rules allow channel center frequencies to be aggregated into channel bandwidths of 5, 10, 15 or 20 MHz as described in paragraph (b) of this section. Channel numbers 1 through 5 and 14 through 18 are 1 MHz bandwidth channels, and channel numbers 6 through 13 are 5 MHz bandwidth channels.<sup>7</sup>

This band plan is flexible and allows for a mix of technologies using varying bandwidths. While the current band plan works well for an uncoordinated licensing approach, the recommended NPSTC plan proposes some modifications to better fit the proposed coordination as explained in Section 9 Frequency Coordination. The current numbering plan in 90.1213 does not need to change but we recommend designating some channels for specific use.

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<sup>7</sup> See Title 47 90.1213 for the complete band plan rules.

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We propose to use channels 1 through 5 for air-to-ground and robotic use. We recommend these to normally be aggregated as a 5 MHz channel bandwidth with a center frequency of 4942.5 MHz. Channels 6 and 7 (each with a 5 plus 5 MHz bandwidth) are designated for shared public safety and CII use. Channels 14 through 18 would be available for PTP use as 1 MHz bandwidth channels to support narrowband backhaul on a primary basis. Channels 14 through 18 are also available as a 5 MHz channel assignment for general broadband use.

We recommend primary status for two reasons. First, these backhaul links typically support mission critical voice traffic that normally operates with primary status on public safety land mobile radio spectrum. A typical use for the links would be to link voice traffic from a radio site to a dispatch center. Second, with the recommendation to implement frequency coordination with the recommendation to use the above specific channels, there is no need for secondary status for this use.

## 5 Point to Point Links

Point-to-Point (PTP) use for backhaul supporting both broadband and narrowband applications is a popular use of the 4.9 GHz band. Unlike the Part 101 rules, the rules for the 4.9 GHz band allow PTP links with fewer documented technical requirements much like that for an unlicensed band.

As of August 30, 2013, the following Point-to-Point utilization was documented in the FCC database:

4.9 Point to Point	Licensed	Constructed
Primary	1480	1249
Secondary	644	486
Totals	2124	1735

The current rules make it very easy to quickly file for a license, purchase equipment and be operational using small, easy-to-mount antennas. While that is all positive, the downside is that spectrum efficient reuse suffers compared to that for channels regulated under Part 101 of the rules. After discussions, the consensus of the planning group was that incorporating some elements of the Part 101 rules and adding frequency coordination could be blended with the simplicity of the current rules to achieve better spectrum reuse and still maintain a relatively simple quick process for users to become operational.

Because this band supports a wide variety of technologies that support a variety of public safety uses, we recommend that PTP links be coordinated as recommended in Section 9. Section 7 lists the application information that will be needed by the coordinators to do the coordination.

Under current rules<sup>8</sup>, PTP links are limited to using a directional antenna with a maximum gain of 26 dBi with no reduction in transmitter-conducted power. The antenna must also have a minimum directional gain of 9 dBi. This rule encourages use of low gain broad beamwidth antennas that can limit channel reuse compared to higher gain narrow beamwidth antennas. Part 101 rules use the approach of

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<sup>8</sup> See Title 47 Part 90.1215

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specifying a maximum beamwidth allowed. For example the 3.7 to 4.2 GHz band requires a maximum 2.7 degree beamwidth antenna with a minimum gain of 36 dBi. We recommend that for PTP links an antenna with a minimum gain of 26 dBi, maximum 5.5 degree beamwidth and 25 dB front to back ratio be required. These specifications will require an approximately 2 ft. diameter antenna size. A search of antenna suppliers found several low cost antennas that would meet the above requirements. We also recommend that the frequency coordinators be allowed to recommend a tighter specification for the antennas if that allows assignment of a channel that otherwise would cause interference.

Some of the newer equipment uses multiple modulation rates and/or MIMO antenna technologies to operate over non-line of sight paths. The group believes these technologies result in an inefficient use of the spectrum and proposes they not normally be allowed in this band.

Part 101 rules<sup>9</sup> also specify a minimum path length for maximum EIRP and a formula for reduction in EIRP for shorter path lengths. The formula is  $EIRP = MAXEIRP - 40 * \log(A/B)$  dBW with A = to the minimum path length and B = to the actual path length. We propose that the frequency coordinators use a similar reduction in maximum EIRP for short path lengths with formulas developed based on transmit powers allowed in this band.

PTP links can, under current rules, be in operation for up to one year without specific licensing as a PTP link. These temporary links operate under the blanket 4.9 GHz call sign of the agency. We recommend this be changed as follows. Temporary PTP links would be licensed as temporary with a defined geographical area of operation using the frequency coordination process. A temporary link could only be operated for 30 days maximum over a given path in a one-year time frame. Any longer operation would require an STA with a showing of why longer duration is needed and how the link is supporting public safety protection of life and property operations. The intent of this is to limit temporary links to truly temporary uses such as disaster operations, wildland fire operations or restoration of permanent PTP links on Part 101 bands that are damaged. This is not meant to be an exclusive list but only to illustrate temporary uses. The reason for these restrictions is to maximize use of the 4.9 GHz band in the most efficient manner while supporting temporary operations of public safety and CII users. All temporary PTP paths would remain secondary.

PTP links are an important use of the 4.9 GHz band. Yet these links have the potential to cause interference along the whole path of the link and therefore limit other uses in wide areas for the channels used by the link. Therefore, we recommend that applications include a showing as to the need for the bandwidth requested. We also recognize the need for greater than 10 MHz bandwidth aggregation and longer path links in rural areas using higher EIRP levels. We recommend those applications to only be granted under waiver and the application should go through the coordination

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<sup>9</sup> See Title 47 Part 90.101.143

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process so both the coordinators and RPC can comment on the impact to current and future users of the band plus recommend mitigation measures<sup>10</sup>.

### 6 Air to Ground, Robotic and Other Specialized Uses

Air to ground<sup>11</sup> use in the 4.9 GHz band is not allowed under current rules except by waiver. NPSTC is aware of at least one waiver granted to allow air to ground use in the Los Angeles metro area. Since those rules were adopted, advances in Unmanned Aerial Vehicles (UAV) technologies that incorporate video is driving interest in using this technology by law enforcement, fire agencies and other first responders. Also, many law enforcement agencies operate helicopters and small airplanes using video cameras. While public safety has shared access to broadcast spectrum used for studio links of video from broadcaster's aircraft, in major markets this spectrum is hard to use on an "immediate need" basis due to coordination requirements with the broadcasters. The 4.9 GHz spectrum is an ideal short range band with the bandwidth required to transmit video from the air to ground.

We recommend FCC modify the rules to allow use of the 4.9 GHz band for air to ground communications. We recommend that Channels 1 through 5 be aggregated as 5 MHz wide channel to be used for air to ground communications and as discussed below robotic communications. For UAV use, air to ground communications would be limited to 400 feet above ground (this is consistent with FAA rules for UAV use). Manned aircraft would also be permitted up to 400 feet above ground but would still require a waiver to operate at higher altitudes. We strongly oppose any air to ground operations above 1500 feet above ground because of the wide area of potential interference.

We recognize the need to protect radio astronomy sites from aircraft operations. The elevation limit of 400 feet is one measure to provide protection as it limits propagation of the 4.9 GHz signals. Also using the lowest 5 MHz of the band further attenuates out of band emissions above 4945 MHz that could cause interference to the astronomy sites. UAV operations are limited in time duration and we expect the vast majority of use will directly support safety of life and property. We further recommend that air to ground applications with an area of operation less than 80.5 km from the listed astronomy sites would need concurrence from the affected astronomy site for a waiver to be granted for air to ground communications. Those applications with area of operations greater than 80.5 km from the nearest radio astronomy site would not need concurrence providing the height limit is not exceeded. The 80.5 km distance exclusion is based on comments by The National Academy of Sciences Committee on Radio Frequencies comments filed in these proceedings<sup>12</sup>.

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<sup>10</sup> Section 10 Regional Planning Committees also allows for plan-specific exceptions to allow greater EIRP and bandwidth in the Region. If a Region adopts those exceptions, a waiver would not be required as long as the application meets the rules for that region.

<sup>11</sup> While this document uses the term "air to Ground", it is meant to be inclusive of "ground to air" communications also as needed.

<sup>12</sup> The comments are available at <http://apps.fcc.gov/ecfs/document/view?id=7022026046>

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Robotic and other specialized uses are an area of growing use for public safety. Law enforcement has been using bomb robots for a number of years and the use is accelerating among law enforcement agencies. Older robots require two narrowband voice channels plus a wideband video channel to control the robot and feed video back from the robot to the control point. The public safety coordinators frequently have a hard time finding suitable narrow band voice channels and there is only one 2.4 GHz channel available for the video feed. Newer robots use the unlicensed bands for control and video feed. We recommend that any applications for robotic or other specialized operations be licensed on the 1 through 5 channels on a shared basis with air to ground operations.

We recommend channels 1 to 5 not be used for PTP links and the existing users be migrated to other channels using the process detailed in section 7.1 existing users.

### 7 Database

Currently, the Commission captures minimum data in the ULS application for 4.9 GHz licenses. For frequency coordination to be effective, much more data is needed. The range of technologies used in the band, from hot spots, mesh networks, PTP, and Air to Ground, will require complex interference modeling to ensure interference free operations. This modeling needs data similar to what is required for Part 101 and the other Part 90 services. Therefore, we believe the current ULS system is set up to gather and store the information needed to coordinate 4.9 GHz applications.

We looked at various options other than using ULS, such as a private database, and found serious problems with each option. The problems primarily are cost focused. Any database other than ULS would require the applicants to fund the entire cost of capturing, storing and making data available to the coordinators. Given the relatively small size of the applicant pool, we believe private databases would impose significant costs to the application process. ULS is already funded and the data required for coordination is already collected and stored by ULS in the application process. ULS will be used for submitting applications regardless if a separate database was used. Given all of this, we recommend that the ULS system be used to capture and store all information required to coordinate applications in the 4.9 GHz band.

There are three fundamental types of use in the 4.9 GHz band. There is PTP for backhaul, either for narrowband data or broadband data. Another type is Point to Multi-Point (PTMP). Both PTP and PTMP will require the information used for Part 101 application which is ULS schedule I. Other types of use are related to base and mobile use such as hot spots and air to ground. These other types of uses require the data that is captured in schedules D and H.

#### 7.1 Existing Licensees

One of the major problems today is the lack of data for current licensees. Because licensees currently get license authority over an entire geographic area to operate fixed or mobile sites and multiple entities can be licensed for operations in the same geographical area, the lack of specific data of how a

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licensee uses the 4.9 band hinders use by others. The recommended use of frequency coordination will rectify this problem going forward. However, data on the current use of the band is needed by the coordinators to properly recommend appropriate channels for new applicants.

We recommend that all existing licensees relicense using the recommended frequency coordination process and appropriate ULS schedules. We recommend that all existing licensees will have one year to relicense from when ULS is ready to accept applications using the new process. We realize this is a burden and cost to existing licensees but see no other viable option to collect the necessary data from those licensees. In fact, until that data is collected, coordinators will have additional burdens to reach out to existing licensees to manually gather data in order to process new applications.

In some cases, existing licensees use may not conform to the proposed new band plan. This would for example be for aggregation of channels to greater than 10 MHz or the need to relicense and move narrowband PTP links to the top five channels to gain primary status. We propose that existing licensees that do not conform to the new band plan (including any region specific variations) be required to modify their license within five years of the adoption of this plan by the Commission. Most, if not all, equipment used in the 4.9 GHz band is very flexible for channel use and bandwidth, so we believe the cost will be low to reconfigure systems. Licensees would have the option to request a time extension waiver if the cost burden would be too high or the operational impacts would greatly impact the licensee.

### 8 Critical Infrastructure Industries

The work on this national plan included Critical Infrastructure Industries (CII) representatives in the CII planning group. All parties agreed CII plays a vital role in incident response to protect life and property. It was recognized that this 4.9 GHz band could enhance the delivery of public safety services by CII. CII representatives argued for few licensing restrictions and broad access to the band. Public Safety representatives argued that the band is intended primarily for public safety users and were worried the band could become a primarily CII band with little or no room for public safety users if opened up for unrestricted CII licensing. Given those somewhat opposing positions, the planning group worked hard to craft a compromise solution that considers the concerns of both public safety and CII parties.

First the group agreed on a definition for CII as shown below:

*Critical Infrastructure Industries (CII)* State, local government and non-government entities, including utilities, railroads, metropolitan transit systems, pipelines, private ambulances, volunteer fire departments, and not-for-profit organizations that offer emergency road services, providing private internal radio services provided these private internal radio services are used to protect safety of life, health, or property; and are not made commercially available to the public<sup>13, 14</sup>.

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<sup>13</sup> See 47 CFR 90.7

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This is simply the FCC definition of CII and is recommended to determine eligibility to license CII in the 4.9 GHz band.

The planning group extensively discussed the CII access to the 4.9 GHz spectrum, in terms of how much to share plus primary or secondary status. There was general agreement that a CII licensee needs assurance that, once licensed and having invested in implementing a system that supports critical public safety related business needs, they cannot be considered secondary. So the planning group proposed that CII licensees will have co-primary status with public safety licensees. The greatest discussion concerned the amount of spectrum that a CII entity could license.

This discussion led to the compromise position by the planning group that CII would have access to license two (5MHz wide) channels<sup>15</sup> on a shared co-primary basis with public safety agencies. CII entities may also license the other channels but only with a 30 calendar day notice period. This notice period serves two purposes. It alerts public safety entities in the same geographical area that a CII entity is planning a system. The public safety entity and the CII entity then have a chance to explore sharing opportunities to enhance communications. If sharing is not possible, it will allow the public safety entity that is close to licensing a new system the opportunity to declare their need for the 4.9 GHz channels and file an application. To have priority over the CII application, the public safety entity must declare their intent to file an application within 60 days of the notice. When the application is received by a coordinator, the coordinator will determine if both the public safety and the CII applications can be assigned available channels. If so, the coordinator can submit both applications to the Commission for licensing. If both applications cannot receive channel assignments, then the public safety application will have priority. If the public safety entity fails to file an application within 60 days or construct their system within one year, the coordinator can then file the CII application with the commission.

This above procedure is intended to be a short-term measure to allow public safety access to the band on a priority basis, so public safety is not excluded from the band due to lead time issues or long funding timeframes. This process will end three years after Commission adoption of this plan. After that, both public safety and CII will have equal access to the band. The Commission should always encourage sharing arrangements in a geographical area to promote protection of life and property and to maximize use of the band.

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<sup>14</sup> There was an alternative definition submitted but the consensus of the planning group was to use the FCC definition because of its more narrow focus. The alternative definition is:

“Application for and use of the 4.9 GHz band shall be made available to CII and those entities whose use of the spectrum shall directly benefit public safety or activities that enhance the ability to protect property, the environment, and the American public, which shall include the safety and security of the American workforce.”

<sup>15</sup> The planning group determined those channels should be 6 and 7. See Section 4

## 9 Frequency Coordination

One of the issues identified that inhibits wider use of the 4.9 GHz band is lack of frequency coordination. This plan proposes that all applications must go through the frequency coordination process. All applications would be submitted to one of the public safety coordinators<sup>16</sup>.

Another issue that inhibits wider use of the 4.9 GHz band is blanket geographical licensing for fixed and mobile operations on any channel across the band. This plan recommends that all fixed locations be identified and be licensed for a specific channel or channels with aggregation to no more than two channels (10 MHz of bandwidth). This aggregation limit also would apply to mobile and point to point uses<sup>17</sup>.

There is a coordinator process to send an application from a public safety coordinator to all other public safety coordinators for a five-business day review prior to sending to the Commission. This process would be extended to send the application to the 700 MHz Regional Planning Committee (RPC) of the region the licensee is located in. We recommend to the coordinators that any application where the signal level into an adjacent Region border exceeds  $-109 \text{ dBW/M}^2$  would be flagged to be sent to the adjacent Region for review. This will give the RPC(s) an opportunity to review and comment that the application meets all national plan criteria and any Region criteria contained in the Regional Appendix. The coordinators will send the applications to the National Regional Planning Council to distribute to RPCs concurrently with distribution to the other coordinators. This review by the regions will also, at first, provide another check that all existing licensees were considered in the coordination process. At this time, there is little data available as to how and to what extent existing licensees are using the 4.9 GHz band.

This coordination process will require very complex interference prediction tools to coordinate assignment of channels. The coordinators will need to exchange information on a regular basis. The coordinators will need to reach out to existing licensees to gather information that is not in the databases. Because of these factors, we recommend that only the public safety coordinators be used for coordination of the band. They have the best understanding of public safety needs and the importance of protecting public safety licensees from harmful interference.

## 10 Regional Planning Committees

Different areas of the country have different needs and challenges in providing public safety communications. The Commission recognizes this by establishing the 700 and 800 MHz Regional Planning Committees to establish plans to guide licensing in their respective regions for those two public safety bands. In looking at those models, the planning group felt in the case of the 4.9 GHz that a single

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<sup>16</sup> Enterprise Wireless Association expressed desire to also be a coordinator for the band but the planning group consensus is that it is best to limit to public safety coordinators only for reasons given in the text.

<sup>17</sup> Section 5 Point to Point links has details on a waiver process to allow greater bandwidth aggregation and higher EIRP levels.

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national plan that will meet most regions needs is appropriate. However, some regions will need some different parameters to better meet the needs of public safety entities in their regions. Therefore, we propose that the 700 MHz Regional Planning Committees have an opportunity to submit specific planning items to be used by coordinators to coordinate applications in those regions.

We recommend regions be allowed to file amended regional plans specific to 4.9 GHz to reflect regional considerations. We recommend the regions have 120 calendar days after the Commission adopts this plan to file the amendments.

The Regional plans would be able to make changes to this national plan in the following areas:

1. Additional channel aggregation.
2. An additional channel designated for specialized use such as Air to Ground or for robotic control and communications.
3. Place limits on the use of PTP links in urban areas or more stringent antenna or other technical parameters to allow greater reuse of the channels within the region.
4. Allow higher ERP for longer path lengths in rural areas or allow use of non-line of sight paths in rural areas.

These changes should be based on demonstrated needs specific to the regions. They should not be blanket changes. Rather, a showing as to need must be included with the plan change.

We recommend waiving the usual requirement to obtain concurrence from adjacent regions for these plan amendments. The short-range nature of this band, plus the review of applications by adjacent regions of operations near their borders, will mitigate most cross border problems. Some regions are not formed and others may not be able to respond in the time frame recommended. If this is the case, a Region may ask the NRPC to review and provide concurrence to the plan amendment. If the Region cannot get a response or concurrence in the time frame allowed for filing, the Region should be allowed to file an amendment explaining what steps were taken to get concurrence from adjacent regions. This recommendation will speed the process of amending the regional plans and allow quicker implementation by coordinators of the region specific changes.

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## 11 Proposed Rule Changes

This section lists the FCC rule section(s) that will need to be changed to implement the recommendations contained in this plan. This list is not intended to be inclusive of all required changes. It is only intended to point out where broad changes would be needed.

This Plan Document Section	FCC Rule Section impacted
Section 4 - Channels 1 to 5 for air to ground and robotic use – These need to be designated as primary for air to ground use as a 5 MHz wide channel	90.1213, 90.1205 (C)
Section 5 PTP– individual license required for all PTP and Point to multipoint links – Antenna Gain and front to back ratio required for PTP links	90.1207
Section 6 Air to Ground and specialized uses – permit air communications up to 400 feet and within 25 km of a radio astronomy site	90.1205 (C)
Section 8 CII use	90.1203, 90.1207, 90.1209
Section 9 Frequency Coordination	90.1207
Section 10 Regional Planning	90.1211

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### APPENDIX A - National Plan Group Members

First Name	Last Name	Organization
Jenny	Adkins	EMR Consulting
Doug	Aiken	IMSA Representative
Mahesh	Balagangadhar	BAH, supporting DHS OEC
Jim	Bitting	Mission Critical Partners
Sandra	Black	EMR Consultants
Dr. David	Boyd	DHS OIC Representative
Jeff	Bratcher	PSCR Operations Manager
Michael	Britt	State of AZ, PS Interoperable Communications
Bill	Brownlow	AASHTO Representative
David	Buchanan	Chair, National 4.9 Plan
Vic	Buisset	Virginia Emergency Management
Alan	Bull	Knoxville, TN 911
David	Campbell	DHS Spectrum Manager
Billy	Carter	Region 13 chair
Ferdinand	Cedeno	PE, Puerto Rico
Carolyn	Cobb	PM, Dept. of Innovation & Technology
Patrick	Cox	Virginia Emergency Management
Mark	Crosby	President, Enterprise Wireless Alliance, VA
Nick	Curran	City of Houston, Radio
Steve	Devine	SWIC, Official NRPC representative
Tewfik	Doumi	Alcatel-Lucent
Danielle	DuMerer	IT Director, City of Chicago
David	Eierman	Motorola Solutions
Barry	Einsig	CISCO
Jay	English	Director, APCO 9-1-1 & Comm. Services
Adam	Epstein	Radio System Coordinator, Westchester, NY
Michelle	Fink	FCCA/IMSA National Frequency Coordinator
Brent	Finster	Cayman Islands Government
Commissioner Brett	Goldstein	Commissioner, Innovation and Technology
Commissioner Lydia	Gonzales D'Ross	National Hispanic Disaster Relief Network
Ralph	Haller	FCCA Representative
Phillip	Harris	Engility Corporation/National Institute of Justice
Dave	Helm	Motorola Solutions
Lee	Hollingsworth	Monterey County, CA, Wireless Comm Mgr
Neil	Horden	Chief Consultant, Federal Engineering
Michael	Janes	Industry Canada
Joe	Jarrett	Texas Department of Public Safety
Wendy	Jeffres	APCO Frequency Coordination Office

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Chuck	Kummer	State of Oregon, Senior Wireless Systems
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Farokh	Latif	APCO Director, Spectrum Management
John	Lemmon	California Technology Agency
Barry	Luke	NPSTC Support Office
Steven	Mallory	State of Maine SWIC
Bob	Malmquist	Nebraska Departments of Roads
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Stephen	Nichols	Thales, Public Safety
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Stu	Overby	Motorola Solutions
Matthew	Plache	Catalano & Plache, PLLC, Washington DC
Norm	Poe	Radio System Administrator, City of Orlando, FL
Gary	Poon	Los Angeles County, ISD
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Don	Root	CPRA, San Diego County Sheriff's Office
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Paul "Allan"	Sadowski	North Carolina DPS
Sergeant David	Sanford	Huntington Park Police Department
David	Saffel	Chief Engineer, WV State Police
Brian	Scarpelli	TIA
Lance	Schine	Deputy CTO, DC Government
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Bob	Simmons	CDX Wireless Technologies
Conroy	Smith	New York Dept. of Information Technology
Darrell	Smith	One DHS

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Michael	Terkildsen	Nebraska Department of Road
Gabriel	Torres	AeroVironment Drone/UAV provider
David	Vander Staay	Thales, Staff Engineer
Donald	Vasek	UTC Corporation
Joseph	Vega	West Coast RF
Rubin	Walker	Radio Manager, Somerset County Public Health
William "Bill"	Walter	Federal Rep to State of Wyoming PSC
Marilyn	Ward	NPSTC Executive Director
David	Warner	Virginia Information Technologies Agency
Scott	Wilder	Director of Technology, Brookline Police
Brett	Williams	SAFECOM, Michigan DOH/EMS/Trauma
Jeffrey	Wobbleton	DC SWIC
Joseph	Yurman	NYC Transit Authority, RPC Region 8
Brian	Zastoupil	Red River Regional Dispatch Center, Fargo, ND
John	Wright	APCO 2nd Vice President

### **APPENDIX B - Task Team Reports**

The original task team reports which were used to develop this final report and recommendations are available from the NPSTC support office and are not included in this document due to their size and, in some cases, conflicting content representing original positions prior to the final consensus process.