Region 24 700 MHz
Regional Planning Committee

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Federal Communications Commission
Wireless Telecommunications Bureau
Chief, Public Safety and Critical Infrastructure Division
445 12th Street, SW
Washington, DC 20554

Subject: WTB Docket No. 00-32 Region 24 plan for 4940-4990 MHz

Dear Sirs:

Attached is the Region 24 4.9 GHz MHz Regional Plan for your review. This document is the result of over a year of work by the Region 24 Regional Planning Committee and we feel it best represents the needs of the public safety community of the State of Missouri. In this new "Public Safety commons" environment utilized with the 4.9 GHz band, Region 24 hopes to serve public safety users in Missouri as an advocate for the use of the band.

We anticipate utilizing the CAPRAD database to document the 4940-4990 MHz implementation within Region 24, and updating this plan as necessary to ensure it is a "living document" and, as accurately as possible, provides documentation on the use of the band within the region.

It is our hope the implementation of this plan meets your approval and the recommendations herein enable the spectrum to be utilized efficiently in the region. Please feel free to contact me if there are any questions at 573 526 6105 or steve.devine@mshp.dps.mo.gov

Regards

Stephen T. Devine, Chairperson
Region 24 700 MHz Regional Planning Committee

REGION 24 (Missouri) Regional Guidelines and Recommendations for the 4940-4990 MHz band

Introduction

On May 2, 2003, the Federal Communications Commission released a Memorandum Opinion and Order and Third Report and Order (FCC 03-99) on FCC Docket 00-32. Within this proceeding, that allocates spectrum from 4940-4990 MHz to the public safety community and outlines operational and technical parameters for its usage, the FCC has issued several documents outlining their rules for the use of this band. This guide is to be used as a tool to assist Missouri's public safety community in its broadband usage and implementation and is to be used as a guide for the Region 24 Regional Planning Committee to assist public safety in Missouri with spectrum management of this important band.

The Region 24 700 MHz regional planning committees, per Commissions rule, have a minimum of *authority* in the development of the 4940-4990 MHz public safety allocations within Missouri. This means that users are not required to obtain regional concurrence when utilizing 4940-4990 MHz. RPC's can, however, assist agencies in their region with implementation of the band and make users aware of the use of the band, both within their own community as well as in adjacent communities. The Region 24 700 MHz regional planning committee can also act as a *region wide clearinghouse* for documenting 4.9 GHz use in the region to enable future planning, while contributing to the development and maturity of the band within their region as a *community resource,* available to all eligible entities.

As demographics and population differ within Region 24, broadband applications using 4.9 GHz in the region will also vary accordingly. The applications and operational considerations addressed in these guidelines are to be reviewed to allow a Missouri community to utilize the 4.9 GHz band, as they deem necessary in meeting the needs of the public safety community in and around their jurisdiction. Users are strongly urged to review the many filed comments contained in the history of Docket 00-32 to better understand the use of the band, including orders issued by the FCC on the allocation of 4940-4990 MHz to public safety to

provide Missouri agencies insight as to the Commissions perspective when developing its rules. We urge applicants to obtain as much information as possible on 4940-4990 MHz when implementing the band.

There are important issues regarding 4.9 GHz deployments that need to be acknowledged by the applicant to ensure effective, efficient operation of the band. The Region 24 700 MHz regional planning committee looks forward to supporting the deployment of broadband public safety applications within Region 24 in a role supported and defined by the region.

Indemnification of Region 24

As always, the services offered through Region 24 are free and are influenced and performed by representatives of member public safety agencies or their affiliates throughout the region. Representatives of Region 6 perform tasks to the best of their abilities. With regard to public safety implementation of the 4.9 GHz band, the effectiveness and timeliness of Region 24 representatives in providing these services is contingent upon (1) the validity and timeliness of information they are provided by other public safety users implementing 4940-4990 MHz, or are able to ascertain through searches, and (2) the time Region 24 representatives are allotted by their respective agencies to perform these ancillary services. Whereas the services are important - they are clearly incidental to the primary mission of each representative organization). In view of these limitations, Region 24 senses a need to indemnify itself by noting the following:

In no event shall Region 24 be liable for any direct, indirect, incidental, special, exemplary, or consequential damages (including, but not limited to procurement of substitute services; loss of use, data or profits; or business interruption) however caused and on any theory of liability, whether in contract, strict liability, or tort (including negligence or otherwise) arising in any way out of the use of these services, even if advised of the possibility of such damage.

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Indemnification of Region 24

Section 1

Jurisdictional Area License issued by the FCC or use in the 4940-4990 MHz band, its provisions, and how it differs from traditional public safety FCC licensing.

Personal Area Network (PAN) This network is centered on addressing the operational need of a public safety user in any application.

Incident Area Network (IAN) Created on an incident based need, this network is temporary in nature and exists for the duration of the particular incident it addresses.

Jurisdiction Area Network (JAN) The JAN is the main communications network for first responders. It is responsible for all non-IAN voice and data traffic. It handles any IAN traffic that needs access to the general network, as well as providing the necessary connectivity to a land-based WAN.

Jurisdictional characteristics outlined in the FCC's rules indicate that all public safety eligible entities are eligible to license 4940-4990 MHz. The license for 4.9 GHz is available via the FCC's Universal Licensing Service (ULS) on a jurisdictional basis, with each licensee being eligible to utilize all 50 MHz of the available band *within their jurisdiction*. Any eligible public safety entity within Region 24, as defined by the FCC, can obtain a license for a jurisdictional area 4940-4990 MHz license. The license allows use of *primary and secondary* applications of the entire band throughout each jurisdiction. Applications covered by the jurisdictional area license are primary mobile applications, primary "hotspot" access point development and temporary fixed point-point stations in use for less than one year. A fixed point-to-point station using 4.9 GHz, for use in traditional backhaul applications or access point connectivity in use for over 12 months, is *secondary* to *primary* applications in the band and must be separately licensed with the FCC.

Regional Planning Authority

Per FCC 03-99, Regional Planning Committees (RPC) can assist entities within the region in the administration and implementation of the 4.9 GHz public safety spectrum within their region. Per the Order, the RPC is required to have held a regional planning meeting for the expressed purpose of addressing the 4.9 GHz needs of the region. Region 24 held such a meeting on July 1, 2003 in St Louis, Missouri.

It should also be noted the FCC required all users of the spectrum to be bound by Rule Section 90.173(b), which will require 4.9 GHz applicants and licensees to cooperate in the selection and use of frequencies so as to reduce interference and maximize effective use of authorized facilities. The success of 4.9 GHz public safety implementation relies largely on the adherence to this one point; that the "public safety commons" environment, **where no one user**

or licensee has any more expectation of an interference free environment than any other, is accepted by the public safety community.

It is anticipated that community based public safety broadband development, utilizing the 4940-4990 MHz band, will be fostered and embellished by agencies working closely together by sharing hardware and spectrum in their respective communities.

In addition, the Region 24 RPC can file a regional plan for 4940-4990 MHz, should they desire to do so, by May 12, 2005. It is anticipated that plans reflecting 4940-4990 MHz use in Region 24 will be periodically updated and filed with the Commission to better reflect current 4.9 GHz broadband environments and use of the band within Region 24.

Obviously, this new licensing **"public safety commons"** environment, can lead to jurisdictional implementation "coordination of use" challenges. In areas where city, county, state and federal jurisdictions overlap, the coordination of the development of cooperative broadband applications between individual agencies as to their specific applications, including which channels are being used and resulting bandwidth offered to system subscribers, will be crucial to successful, community based 4940-4990 MHz deployment. In addition, the FCC order also indicated that a coordinated use of the band should include the sharing of 4.9 GHz public safety spectrum with the Critical Infrastructure community, in concert with public safety licensee within jurisdictions, as appropriate.

The FCC's issuance of a jurisdictional area license for a city, county or state enables each eligible applicant to utilize the 4940-4990 MHz band. The mechanism used in traditional public safety licensing, providing a legacy "priority of use" and a degree of protection for existing licensees, does not apply in the 4940-4990 MHz jurisdictional area license. Each licensee, in uncoordinated **"public safety commons"** environment, has the same low degree of expectation of operating within an interference-free environment is common to all users. As a user, an agency has to be aware of their surroundings and the use of the band in and around their community. This makes coordinated use and a broadband wireless dialogue within each community essential and can increase an agencies confidence in being assured that the end user applications will be dependable when needed.

Despite its complexities, this new jurisdictional area license can also have its advantages. The structure of the band and its anticipated technologies can allow a greater degree of sharing between adjacent jurisdictions or jurisdictions with overlapping areas of coverage. Users from multiple agencies can access broadband applications and databases utilizing hardware shared by multiple agencies can access using 4.9 GHz. Region 24 4.9 GHz licensees and potential users should consider the 50 MHz of 4.9 GHz between 4940-4990 MHz as a community resource, utilized in the same fashion as the roads and highways located within, and running through, each jurisdiction. The first responder community utilizes roads and highways common to their jurisdictions in completing their mission, and the 50 MHz at 4.9 GHz should be viewed as a similar resources. With cooperation, a broadband multi-agency environment can be created in a community, successfully providing broadband applications to its first responders.

Adjacent Region Coordination

Region 24 will establish and facilitate a dialogue between the 4.9 GHz user communities near its multiple regional borders. I t will promote discussion and a free exchange of information between regions while posting information on 4.9 GHZ deployment within the CAPRAD database. Unfortunately, since licensees will not be required to coordinate their 4.9 GHz deployment with the Region 24 regional planning committee, the only information that Region 24 can share with its neighboring regions is what it receives from the user community. If the user community does not provide details of its 4.9 GHz deployment to Region 24, the Region will be unable to share information it does not have access to, with neighboring regions.

Section 2
4940-4990 MHz Band Allocation-Structure of band plan

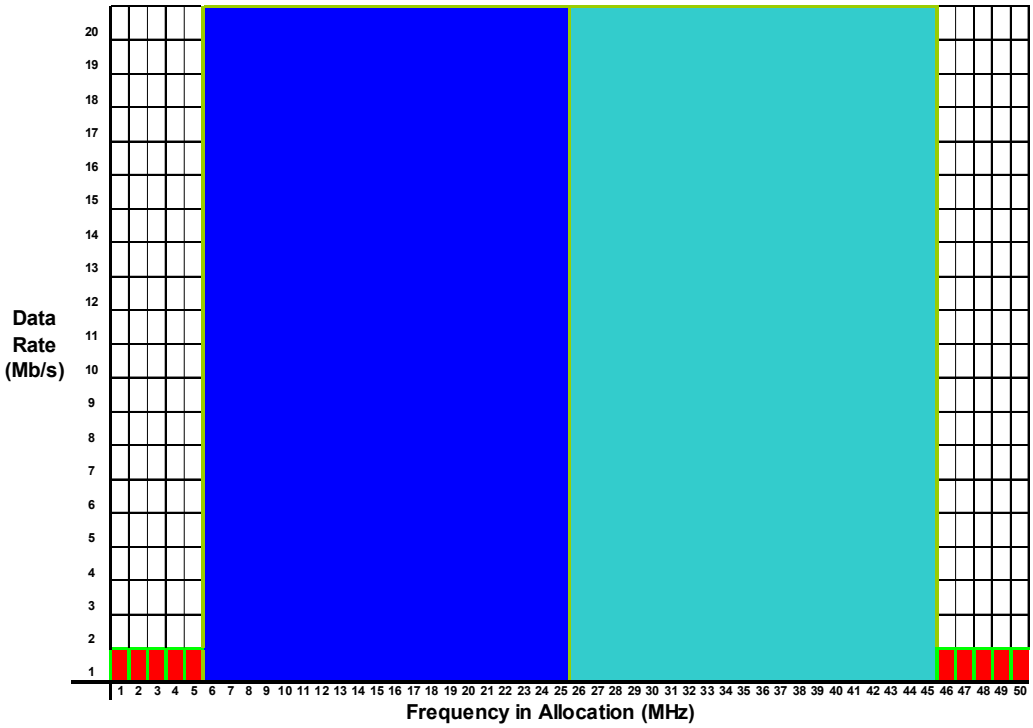
Band Plan

The following channel center frequencies are permitted, per FCC rules, to be aggregated to channel bandwidth of 5, 10, 15, or 20 MHz. Channel numbers 1-5 (yellow) and 14-18 (blue) are 1 MHz channels and channels numbers 6-14 (green) are 5 MHz channels. Band configurations and use should be directly proportional to the needs of the public safety broadband community in the area of concern. Different band configurations will be appropriate for different regions, or parts of regions, to achieve maximum efficiency. A maximum channel aggregation of 20 MHz is permitted per FCC rules.

Center Frequency (MHz)	Channel Nos.
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

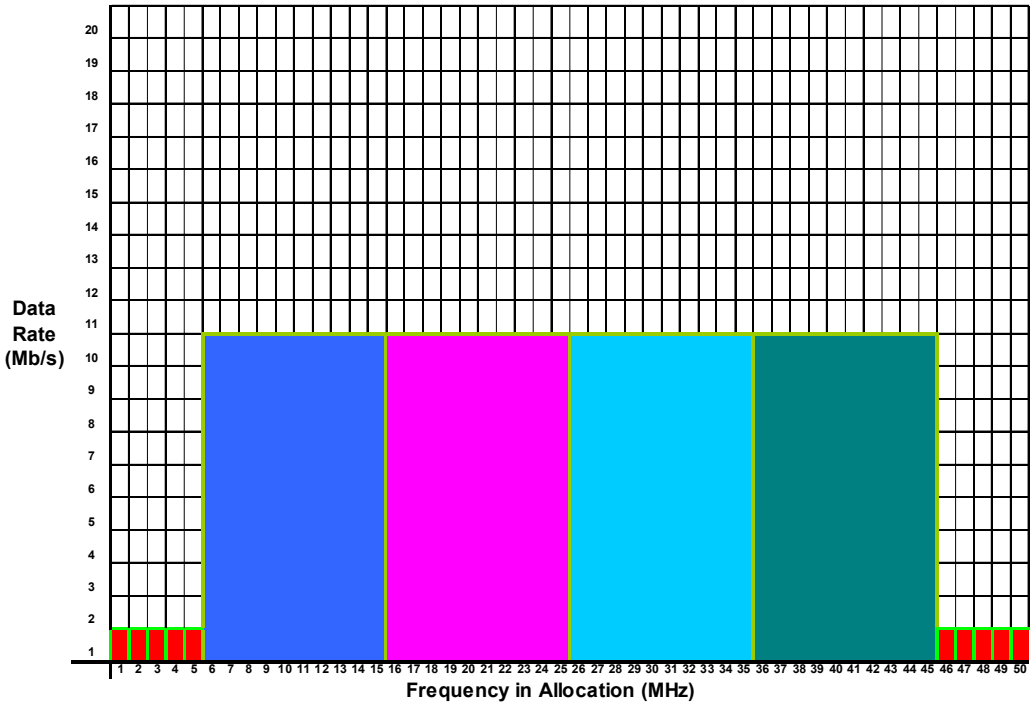
Below are channel configurations available within the 4.9 GHz band. Any combination or variance of these channels may be required to meet a community's broadband defined need. Agencies desiring to develop broadband capabilities in their jurisdiction using 4.9 GHz, or any other spectrum dedicated to broadband technologies, are encouraged to share their broadband needs and intentions with neighboring agencies, which may also be developing similar plans. Note the data rates associated with each channel bandwidth.

4940-4990 Channel potential channel designations (a)



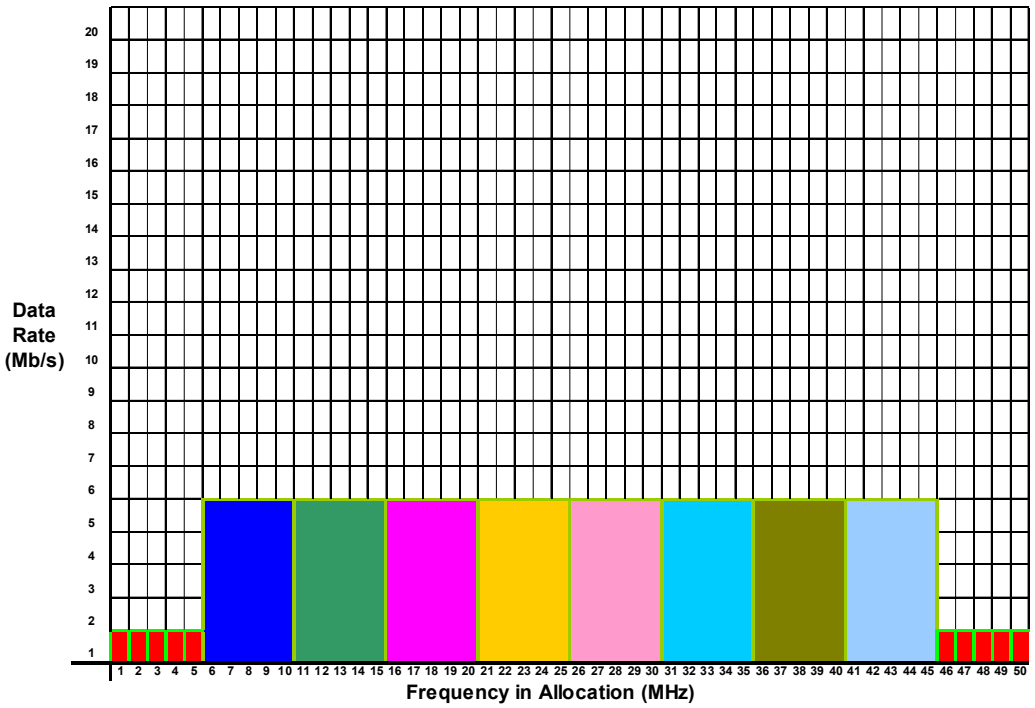
Two (2) Twenty (20) MHz channels, utilizing 40 MHz of the available 50 MHz at from 4940-4990 MHz, accompanied by two sets of 5 one (1) MHz channels above and below the allotment. Each set of five one (1) channels can be aggregated to a maximum of 5 MHz. 20 MHz channels @ 5 GHz are typical of channels utilized in IEEE 802.11A standards operating with unlicensed 5 GHz spectrum.

4940-4990 Channel potential channel designations (b)



Four (4) Ten (10) MHz channels, utilizing 40 MHz of the available 50 MHz at from 4940-4990 MHz, accompanied by two sets of 5 one (1) MHz channels above and below the allotment. Each set of five one (1) channels can be aggregated to a maximum of 5 MHz. 10 MHz channels @ 5 GHz are sized consistent with broadband radio spectrum utilized currently in Japan and the channel size currently projected in the developing IEEE 802.11J standard, designed to improved mobility within the 802.11 standard.

4940-4990 Channel potential channel designations (c)



Eight (8) Five (5) MHz channels, utilizing 40 MHz of the available 50 MHz at from 4940-4990 MHz, accompanied by two sets of 5 one (1) MHz channels above and below the allotment. Each set of five one (1) channels can be aggregated to a maximum of 5 MHz. While no IEEE 802.11 standards are in development currently for channels sized at 5 MHz of bandwidth, applications in IEEE 802.16 and IEEE 802.20, the use of 5 MHz channel bandwidths are expected to be developed and utilized in public safety 4.9 GHz applications.

Section 3
Applications in the 4940-4990 MHz Band

- **Personal Area Networks (PAN)**
  - PAN technologies will enable Bluetooth type broadband applications in a vehicle, thereby reducing the degree of wiring in a vehicle.
  - PAN technologies can offer public safety agencies alternatives in the design of in vehicle unit hardware placement, as 4.9 GHz wireless capabilities can change broadband access environments for the end user.

  - Peer to Peer Networking (ADHOC)
    Architecture works with Personnel Area Networks in developing self-healing, self-forming broadband networks. Particularly, this Technology can bring broadband connectivity to subscribers operating within an isolated incident scene. Ad-Hoc networking using 4.9 GHz is technology currently available from multiple vendors, utilizing in implementation multiple protocols.

    - Ad-Hoc solutions can be met with devices via proprietary hardware and software or proprietary software only, freeing the end user to purchase subscriber devices from multiple vendors.

    - On a small scale, these communications devices can interact and provide connectivity with public safety users other devices.

- **Incident Area Networks (IAN):**
  - Defined as a designated coverage area around a vehicle where broadband access is accomplished both in a vehicle and a distance around it. This application is a short-range type application, which extends the capabilities of the vehicle to a limited area around the vehicle.
  - Within 50 ft of a vehicle, a LAN can be deployed to manage/monitor life critical functions, such as pulse, heartbeat, blood pressure, and oxygen level in First Responders and connect the end user to a vehicle for management access.

- **Hotspots**
  - The most commonly assumed public safety application. Nodes will be placed in strategic areas in a community, shared by multiple agencies/disciplines, which will enable seamless high capacity download of video and other large files. These *base stations* are covered under the jurisdictional area license issued to the agency.
  - Communities will develop single site areas and connect them together to develop seamless wider area broadband environments where necessary. It is anticipated that broadband access will grow incrementally within an agency and, to a gradual rate, throughout a community.
  - Hardware for use in the 4.9 GHz band will be COTS based (Commercial Off The Shelf) capable of utilizing widely utilized 802.11A chipsets. Expected technology is tolerant to adjacent/co-channel interference as throughput reduction occurs as a result of adjacent/co-channel interference, rather than the entire operation becoming inoperative. It is important to stress that *interference* in broadband data applications can result, in some cases, in a reduction in data throughput to the end user. It does not, in many cases, cause the device to stop working entirely. The coordination of channel use within and around a community between agencies and users will contribute to the development of consistent broadband data capabilities for all users.

- **Fixed Point-Point**

  - Permanent fixed point-point @ 4.9 GHz has to be licensed site by site. Band not intended for dedicated point-point use. "Permanent" is defined as in the ground and used for over 1 year. Permanent fixed point-point is secondary to the previously mentioned primary uses of the band.
  - Fixed point-point temporary @ 4.9 GHz is primary in the band for up to one year. Command post/emergency response usage and remote connectivity is assumed for periods of up to one year. Longer than that, must license by site and it will become secondary to other applications. Permanent fixed operations must be licensed separately.

It is anticipated that wide area users in rural areas of Region 24 will utilize 1 or 2 MHz 4.9 GHz bandwidths "links" to distribute voice between remote receive sites and dispatch centers. These permanent "links", while secondary per the FCC's rules, might be an appropriate use of the band in areas where established primary applications might not be appropriate or available. Remote "links" between receivers and dispatch centers might be a more cost effective alternative to supplant existing dedicated circuits used for that purpose.

Some regional recommendations for the usage of fixed links are:

- Whenever possible, use channels 1-5 or 14-18 for low bandwidth voice links in 1 MHz bandwidth or some aggregated value of 1 MHz channels.
- Fixed links should be sufficiently fixed Above Ground Level (AGL) to minimized
- For fixed operations requiring a greater throughput (such as those providing connectivity between a remote access point and land based connectivity) aggregated bandwidths of 5 MHz channels up to the maximum of 20 MHz wide channels should be utilized. Keep in mind that bandwidth used to promote connectivity from access points might limit that same spectrum from being utilized within the access point to serve subscribers on the system.
- Channel bandwidth management has to recognize access point, Ad-Hoc use and access point capabilities to provide the community the ability to meet its required applications.

Air-Ground Video Links

- Air to Car video links using public safety 4940-4990 MHz requires a waiver from the FCC. Traditionally, video utilizes channels up to 6 MHz, which would require an aggregation of channels within a region. Applicants that desire to utilize 4.9 GHz for Air-Ground video links should work with manufacturers on the channel bandwidths required to affect video and file for the appropriate waiver with the FCC.
- Licensees requesting such a waiver, operating within a particular jurisdictional area, should ensure their use of a portion of 4.9 GHz in their application does not conflict with other nearby agencies adjacent or co-channel use of the band.

Section 4

Region 24 administrative support approaches to providing regional assistance (Notes and recommendations on usage of 4940-4990 MHz).

- Region 24 consists of Missouri's 114 counties and the City of St Louis. 4940-4990 MHz is available to all eligible entities within the region.
- The Region 24 700 MHz Regional Planning Committee (RPC) will support the implementation of 4.9 GHz throughout Missouri through education and outreach. The Regional Planning Committee looks forward to acting as a "clearinghouse" for the use of 4.9 GHz, acting as an advocate for the development of the band within Missouri's communities. The RPC hopes to utilize the CAPRAD database to document 4.9 GHz use in Missouri. Details such as which licensees are participating in 4.9 GHz development in a community, what channels are utilized, locations of where shared access points are located, where fixed applications are used and the monitoring of the progress of the evolving broadband community will be kept in the CAPRAD database.
- The RPC will also provide information on areas of Region 24 where multiple jurisdictions overlap and provide contact information for other licensees in an area when inquiries from the area are received.
- Agencies should familiarize themselves the public safety applications anticipated in the 4940-4990 MHz band along with suggestions that promote cost effective, multi-agency connectivity and improve access to spectrum. Eligible users should also explore the potential of broadband applications with spectrum located in the adjacent unlicensed 5 GHz band and the public safety/Intelligent Transportation Service (ITS) spectrum in the Dedicated Short Range Communications (DSRC) band between 5850-5925 MHz.

The use of Incident Command type management practices in the implementation of 4.9GHz will improve the band's effectiveness.

The CAPRAD (Computer Assisted Pre-coordination Resource And Database) system will be utilized by the Region 24 regional planning committee to document 4.9 GHz use and how the band, within the region, can be best utilized. This database can assist regional planners in recommendations to new applicants. Multiple channel bandwidths used by multiple agencies can be documented and managed at the regional level, if local users forward their channel plans to the regional planning administrators.

Agencies will be encouraged to purchase equipment based on open standards and which will operate between different vendors. Due to the unique jurisdictional area licenses being issued for use in the 4940-4990 MHz band, agencies are encouraged to develop multi-agency systems to operate in Jurisdictional Area Networks (JAN).

SAMPLE

4940-4945 MHz	4945-4955 MHz	4955-4965 MHz	4965-4975 MHz	4975-4985 MHz	4985-4990 MHz
5 MHz block For multiple/ aggregate 1 MHz applications Air Video Link PAN	**10 MHz block useful in secondary or primary fixed application to promote connectivity or Hotspot deployment**	**10 MHz block useful in secondary or primary fixed application to promote connectivity or Hotspot deployment**	**10 MHz block useful in secondary or primary fixed application to promote connectivity or Hotspot deployment**	**10 MHz block useful in secondary or primary fixed application to promote connectivity or Hotspot deployment**	**5 MHz block For multiple/ aggregate 1 MHz applications Air Video Link PAN**

A community's individual preference of channel implementation, which matches channel bandwidth with the number of channels needed for the implementation of specific identified applications within each region or sub-region, should be consistent with regional conclusions. It is anticipated a region will determine the best solution for broadband public safety access in their community. Regions may have multiple channel assignments in different areas of the region to best provide for end user applications in the 4940-4990 MHz band.

Part 5

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