

**700 MHz Regional Plan for  
Region 44  
West Virginia**



Draft Version 1.1 April 2010

Table of Contents

1. Scope .....	3
1.1 Introduction .....	3
1.2 Regional Plan Summary .....	3
2.0 Regional Planning Committee Leadership .....	4
3.0 Regional Planning Committee Membership .....	5
4.0 Regional Profile .....	5
5.0 Notification Process .....	7
6.0 Regional Plan Administration .....	7
7.0 System Design/Efficiency Requirements.....	14
8.0 Allocation of Narrowband General Use Spectrum .....	17
9.0 Interoperability Channels .....	23
10. Application Requirements and Evaluation.....	24
11. Future Planning .....	28
12. Certification.....	29
Appendix B .....	35
Membership List.....	35
Appendix C .....	39
Adjacent Region Concurrence Letters .....	39
Appendix D .....	40
Interoperability Frequencies/Common Nomenclature .....	40
Appendix E .....	43
Sample Interoperability Memorandum of Understanding .....	43
Appendix F .....	46
Summary of Minutes/Copies of notifications .....	46
Appendix G .....	48
Frequency Allotments.....	48
Appendix H.....	57
Pre-Coordination Procedures .....	57
Simplified 700 MHz Pre-assignment Rules.....	57
Introduction.....	57
Appendix I .....	77
Inter-Regional Dispute Resolution Agreements .....	77
Appendix J.....	79
Low Power Pool Frequencies .....	79

## **1. Scope**

### **1.1 Introduction**

This is the 700 MHz Plan for Region 44 (West Virginia). The purpose of the Regional Plan is to ensure that maximum public benefit is derived from use of the 700 MHz spectrum by eligible entities. Further, the plan was developed to guide eligible entities through the application process and provide an equitable means of setting disputes concerning frequency allocations should they arise.

### **1.2 Regional Plan Summary**

First, Region 44 is defined as the entire State of West Virginia. The broad classifications of entities eligible to apply for spectrum are defined in accord with NCC definitions. Next, to garner the participation in and support of the planning process, an attempt was made to contact all eligible agencies. These attempts are documented. A discussion follows by the process by which the initial spectrum allocations were made. Finally, a detailed discussion of the application process is given. This includes guidelines for spectrum use, application requirements, the application review process and dispute resolution. Also included is a discussion of the future planning process.

The Region 44 Committee accepts the Computer Assisted Pre-Coordination Resource and Database (CAPRAD) database initial allocation based on population density and call volume by county. It has been noted by the committee that this allocation closely matches the description of Designated Statistical Areas by the US Department of Management and Budget Bulletin. The Committee will use the CAPRAD database when allocating frequency resources in Region 44.

Interoperability guidelines and usage must be in accordance with the requirements of the State Interoperability Executive Committee (SIEC). Any conflicts between the interoperability rules for National Calling and Tactical channels in this plan and SIEC guidelines, the SIEC guidelines will prevail.

After the initial Region 44 meeting, a Writing Group was established. The Writing Group developed a draft 700 MHz Regional Plan using resources developed by the National Coordination Committee (NCC)

## 700 MHz Regional Plan for West Virginia

and by reviewing other, FCC-approved 700 MHz Regional Plans. The draft 700 MHz Plan was presented to the membership at a meeting held in Snowshoe, WV in October, 2009. Members reviewed and discussed the draft Plan. Suggested changes were noted and incorporated into the Plan.

The draft 700 MHz Plan was then posted onto the West Virginia State Police Website. Members of Region 44 were notified via email that the draft Plan was available for review and comment. Any comments or suggestions were to be shared with the entire Region 44 list serve. Those comments and suggestions that were adopted by the membership were incorporated into the Plan.

The draft was formally adopted at the Spring APCO/NENA meeting held in Morgantown, WV at the Lakeview resort in April, 2010. The Plan was then circulated to all adjacent 700 MHz Regional Planning Committee for review and written consent.

### **2.0 Regional Planning Committee Leadership**

At the time of the transmittal of this Plan to the FCC, the following individuals serve in leadership roles in the Region 44, Regional Planning Committee (RPC):

Regional Chairperson:	David W. Saffel West Virginia State Police 1300 Harrison Ave. Elkins, WV 26241 Phone: 304-637-0200 office 304-389-8715 cell Email: <a href="mailto:dsaffel@wvsp.state.wv.us">dsaffel@wvsp.state.wv.us</a>
Vice Chairperson:	Name: OPEN Agency: Address: City/State: Phone: Email:
Secretary:	Gary Steve Lipscomb Summers County OES Director PO Box 97 Hinton, WV 25951 Phone: 304-466-5613 office 304-575-3010 cell Email: <a href="mailto:Summerscounty@verizon.net">Summerscounty@verizon.net</a>

From time to time, as described in the RPC By-Laws (Appendix A), these positions will be subject to re-election. At any such time that one of these four positions changes, the Chair will be responsible for taking the following actions:

- Providing notice to the FCC of the changes
- Providing notice to the National Regional Planning Council (NRPC) of the changes
- Providing notice to the NPSTC Support Office of the changes

Such changes will not be considered Plan modifications, and will not require that this document be reissued to the FCC for public notice and comment cycles.

### ***3.0 Regional Planning Committee Membership***

Membership in the Region 44 Regional Planning Committee is open to any interested party. Committee Officer requirements, voting procedures, and membership attendance requirements are listed in the Regional Planning Committee's Bylaws, which can be found in Appendix A. Appendix B of this plan lists all of Region 44's initial members, their agency/affiliation and voting status. While Region 44's membership isn't large, it is fairly broadly representative of public safety entities within the state.

### ***4.0 Regional Profile***

Region 44 encompasses the entire state of West Virginia, consisting of fifty-five counties. The state is bordered on the west by the Ohio River, the Potomac River on the northeast and the Allegheny Mountains in the east and south east. West Virginia has diverse topography and a varied population base. Ground elevations in West Virginia range from 4,863 feet AMSL at Spruce Knob, the highest point to the lowest at Harpers Ferry at 340 feet AMSL. The average elevation of West Virginia is 1,500 feet, the highest of any state east of the Mississippi River. The state is very rugged in most areas which provides a challenging topography over which to provide communications.

## 700 MHz Regional Plan for West Virginia

The state ranks 41st in land size with 24,230 square miles. The 2000 census revealed a population of 1,808,350. The major cities in West Virginia are:

- Charleston
- Huntington
- Parkersburg
- Morgantown
- Wheeling

Wheeling and Morgantown are on the state borders with Ohio and Pennsylvania respectively and applications in those areas will require coordination with the adjacent regions.

West Virginia's major economic product is coal. It is the second largest producer of coal. West Virginia also exports coal-generated electricity to neighboring states. Other major industries include chemical manufacturing, glass products and tourism. Major industrial areas are the Kanawha, Ohio and Monongahela valleys and the eastern panhandle. Because of the mountainous topography, farming is not a major economic activity.

There are forty eight state parks and seven National Parks including portions of the Appalachian Trail, Bluestone National Scenic River, the C & O Canal National Historic Park, Harpers Ferry National Historic Park and New River Gorge National River.

Federal facilities in the state include the US Navy's Allegheny Ballistics Laboratory in Mineral County and the Army's West Virginia Ordnance in Point Pleasant.

West Virginia has five adjacent Regions

- Region 17 (Kentucky)
- Region 20 (Maryland/DC)
- Region 33 (Ohio)
- Region 36 (Western Pennsylvania)
- Region 42 (Virginia)

County allotments for 700 MHz frequencies have been developed based on population densities relative to adjacent Regions.

## **5.0 Notification Process**

Region 44 held its first 700 MHz meeting on June 16, 2005. Notice of the first meeting was accomplished via ads in trade magazines, posting on websites within the public safety community, email notifications to fire, police, emergency management and federal agencies within the state. There are no federally recognized Native American tribes in West Virginia. Sixty days notice was given prior to the first meeting.

## **6.0 Regional Plan Administration**

### **6.1 Operations of the Regional Planning Committee**

This committee will use Robert's Rules of Order to conduct meetings. All decisions will be by clear consensus vote with each Public Safety Agency having one vote. The meetings are open to all persons and a public input time is given for anyone to express a viewpoint or to have input to the planning.

Workgroups may be formed as needed to work on specific issues. For the initial planning three workgroups were formed – writing group, spectrum planning group and operations group. Workgroups are intended to work on details of specific issues and make recommendations to the full committee. Any changes to the Regional plan must be voted and approved by the full Regional Plan Committee. Workgroups are open to any who want to participate. The Chair of the Regional Plan Committee appoints the Chair for each workgroup.

A minimum of one meeting per year will be held of the full committee. This will be announced and advertised by the Committee Chair. Normal time for this meeting will be in conjunction with the West Virginia APCO/NENA conference..

Beginning two years after Federal Communications Commission approval of this Regional Plan, the Chair shall call a meeting of the Committee to elect a Chair, Vice Chair and Secretary to serve for two years. There is no limit to the number of terms that may be served.

If the Chair is unable to serve a complete term the Vice Chair will serve as Chair until the next election meeting. If both the Chair and Vice Chair are unable to serve their full terms one or the other should strive to call a special meeting of the Committee to elect replacements. If for some reason, neither the Chair nor the Vice Chair can call the special meeting;

the State or any County within the region may call for a special meeting to elect replacements.

## **6.2 Technical Subcommittee**

The primary responsibility of the Technical Subcommittee will be to review applications from agencies within the region for conformance to plan requirements. The Technical subcommittee will have access to the Computer Assisted Pre-coordination and Resource Database System (CAPRAD) pre-coordination database system, and will review and recommend approval of applications, as they are received in the system. Applications approved by the RPC will be forwarded to the selected coordinator, then to the FCC. The membership of this committee will consist of the Technical Subcommittee chairperson, the Interoperability Subcommittee chairperson and three other members of the RPC selected by the RPC chair. Membership of the Technical subcommittee will be determined at the annual meeting.

The Technical subcommittee duties are as follows:

- Review applications for compliance to the Region 44 Plan,
- Review appeals, applicant clarifications and applicant presentations,
- Recommend approval or denial to the RPC Chair,
- Maintain coordination with FCC certified frequency coordinators and advisors,
- Update CAPRAD

## **6.3 Interoperability Subcommittee**

West Virginia has created a State Interoperability Executive Committee (SIEC) to oversee interoperability channels. The West Virginia SIEC intends to include at least one member of the Region 44 RPC on its committee. The Region 44 Interoperability Subcommittee will serve as liaison with the SIEC and assist in the statewide interoperability planning process.

The Interoperability subcommittee duties are as follows:

- Work with the SIEC in the development of a statewide interoperability plan,
- Load interoperability channel assignments in CAPRAD,
- Review application interoperability plans for conformance to the SIEC plan.

## **6.4 Administrative Subcommittee**

The Administrative Subcommittee is responsible for monitoring adherence to the Region 44 Plan. The membership of this committee shall consist of the Interoperability Subcommittee chairperson and three other members of the RPC selected by the RPC chairperson. Membership of the committee will be determined at the annual meeting. The committee will remain in place permanently to resolve inter-regional issues and recommend regional plan changes to the FCC.

The Administrative Subcommittee duties are as follows:

- Annually review and update the Region 44 Plan as necessary,
- Monitor various system(s) implementation progress,
- Communicate with applicants to determine if implementation of their systems is in accordance with provisions of their applications,
- Make recommendations to the RPC on applicants that fail to implement systems,
- Make recommendations to resolve inter-regional issues,
- Maintain coordination with neighboring RPC's.

## **6.5 Procedure for Requesting Spectrum Allotments**

Upon FCC approval of this Plan, Region 44 will announce to the Region that 700 MHz public safety channels are available in the Region and that channels have been assigned to pool allotments to counties within the Region. All available methods will be used to notify public safety entities of channel availability in the Region. All requests will be considered on a first come, first served basis. Region 44 supports the National Coordination Committee Pre-Assignment Rules and Recommendations, and will use these guidelines as a template to determine if an application submitted to the Regional Planning Committee meets Regional Planning standards. It is recommended that applicants familiarize themselves with these recommendations prior to submitting applications for Region 44 700 MHz public safety system implementation.

Other consideration taken into consideration for determination of priority of application will be:

- Users who are involved in the protection of life and property,
- Multi-agency shared systems that multiple agencies agree to construct a common infrastructure (i.e. State, City, County, and others),

## 700 MHz Regional Plan for West Virginia

- Large agencies with multiple divisions constructing a common system for all to use (i.e. a large city or county with multiple divisions),
- Trunked use of the frequencies,
- Approved funding to construct the system using the 700 MHz frequencies,
- A statement of the future intentional actions of any currently licensed channels that will be replaced by a new 700 MHz system, and how it may benefit other agencies in the State by releasing these channels back into the Public Safety pool.

Agencies will need to fully document technical information, sites, tower heights, area of coverage, ERP of transmitter sites, along with any other technical information required for RPC subcommittee review and coordinator review. Agencies are expected to construct systems with maximum signal levels in their coverage area and minimum signal levels in co-channel user's coverage areas. Coverage area in the context of this plan will be defined as the geographical boundaries of agency(s) served by the system plus eight miles. The RPC realizes that radio signals don't stop at political borders. Our attempt is to maximize the use of the frequencies by packing as many users as possible per channel.

In order to maintain accurate records in the CAPRAD database, applicants will provide Region 44 with copies of their application along with associated documentation for Regional Planning Committee review.

In general and unless otherwise noted, the Region 44 Regional Planning Committee will adhere to the published National Coordination Committee Implementation Guidelines for 700 MHz Public Safety Regional Planning Committees.

### 6.5.1 Application Requirements

To request frequencies from Region 44 a full application package must be submitted to the Regional Planning Committee in electronic format for entry into the CAPRAD database <http://caprad.nlectc.du.edu/login/home>

The application must include:

- An FCC Form 601,
- A short description of the proposed system,
- A justification for the additional spectrum,
- Explanation of the systems future growth for all agencies involved in the system, including how the system will be

loaded and what equipment type and quantity is planned to be purchased to load the system

- An interference prediction map using the current version of TIA/EIA TSB 88 guidelines, Maps showing all interference predicted in the proposed system,
- Explanation of the budget commitment for the proposed system including documents indicating agency-funding commitments sufficient to fund the development of the proposed system(s)
- Statement that the applicant agency will conform with interoperability requirements of the SIEC.
- Any documentation that identifies the radio channels the applicant agency/entity will be abandoning after full implementation of the 700 MHz system, if applicable.
- Documentation that will assist in the evaluation of the application against the Point Matrix system identified in Section 10.2

### **6.5.2 Application Distribution/Coordination**

The Chair will distribute the application request to the Technical Committee for review. The Technical Committee must provide a recommendation to the Region 44 Chair within 10 working days of application receipt. If recommended by the Technical Committee and absent a protest, the Regional Planning Committee Chair will approve the application and (if applicable), submit it, through the CAPRAD database, to the applicant's preferred FCC-certified frequency coordinator for processing.

The CAPRAD database will reflect the approved application and place the channels for the proposed system in "pre-license" status.

### **6.5.3 Allocation Disputes**

An agency may protest a proposed system within 30 calendar days of the original distribution. Protests will only be considered if the allocation does not conform to plan criteria or objecting agency or the Chairperson can show harmful interference is likely based on the information submitted by the agency requesting the new allocation. If an agency with pre-licensed/Region approved co-channel or adjacent channel allocations objects to a proposed allocation due to concerns about potential interference, the objecting agency may request field tests be done to confirm or refute interference potential.

The completion of these field tests will be required for Regional application approval. Any costs associated with field tests or any other requirement to obtain Region 44 plan approval is the responsibility of the agency submitting application to Region 44.

The parties involved must resolve the allocation dispute and notify the Region Chair within 14 calendar days. If the parties involved cannot resolve the allocation dispute within that timeframe, then a special full Committee meeting will be scheduled to consider and vote on the protest. If approved, the application will be submitted through the CAPRAD database to the applicant's chosen FCC-certified frequency coordinator for processing.

#### **6.5.4 Lower Power "Campus Eligible" General Use Frequencies**

In the implementation of 700 MHz public safety spectrum throughout Region 44, there may be opportunities for increased channel reuse when developing radio systems for "campus" type operations. Examples of those who may capitalize on this opportunity include hospitals, stadiums, malls or places of public gathering, public universities, transit systems and ports. While these channels have been designated in county pool allotments with proper designations, they do not enjoy the benefits of countywide channels in that they are not cleared for usage over a wide area. In many instances, facilities require a smaller or more specific geographical coverage area than assumed in the initial channel packing plan and may be able to be reused more efficiently. These "campus" type systems also, in many cases, require in-building or confined space/tunnel radio coverage or communications along a linear pathway, such as a maintenance or right of way. Public safety channels can be allotted to this type operation in a region and can lead to effective system development, along with increased spectral efficiency, if power levels and Area of Protection (AOP) of the area are taken into account in system planning. These parameters must be established appropriate to the area of coverage. In order to facilitate this effective method of system implementation, channels have been identified in certain areas of Region 44 that may be utilized in a smaller service area. These channels are NOT eligible to be utilized throughout the county they are allotted to and the following criteria must be adhered to when requesting channels from Region 44 for operations of this type:

The 50dBu service contour of the proposed system must not exceed an area more than 2 miles from the proposed service area. When this 2-mile distance extends to an adjacent region, the applicant must obtain concurrence from the adjacent region. Reduced external antenna heights along with reduced ERP, directional antennae, distributed antenna systems, radiating “leaky coax,” are all tools that should be utilized in the development of these type systems. Region 44 will ensure the development of these type of systems will in no way interfere with co-channel or adjacent channel users within Region 44 or Region 44’s adjacent regions. The Chairperson, or a majority of the members of the region, has the authority to request and require engineering studies from the applicant that indicate no harmful interference will be introduced to any co-channel or adjacent channel existing user prior to application approval. For 12.5/25 kHz co-channel assignments, the 50dBu service contour of the proposed stations will be allowed to extend beyond the defined service area for a distance no greater than 2 miles. An adjacent/alternate 12.5/25 kHz channel shall be allowed to have 10 its 60 dB $\mu$  (50,50) contour touch, but not overlap the 40dB $\mu$  service (50,50) contour of an adjacent/alternate system being protected. Evaluations should be made in both directions to ensure compliance. The approval of systems utilizing county allotment channels labeled “Campus”, are subject to approval of the Region 44 700 MHz regional planning committee. They are the final authority on parameters associated with “campus” type operations.

If Region 44 receives an application for low power fixed use and the proposed service contour encroaches onto an adjacent Region prior to the channel allotted to the Region being implemented in a specific system, the application must be modified so the service contour does not encroach into the adjacent Region **or** the applicant must supply the Region 44 700 MHz Regional Planning Committee with written concurrence from the adjacent Region permitting the original design.

#### **6.5.5 Procedure for frequency coordination**

Before applicants submit an application to one of the FCC recognized frequency coordinators, the application must be reviewed by the Technical Subcommittee. The Subcommittee will review the application to ensure it complies with all elements of the Regional Plan. This will NOT be a review to ensure the application form meets FCC requirements for filing.

The applicants must submit a copy of the FCC application and supporting documents to the Regional Plan Chair. An interference prediction map must be included in the documentation. TIA/EIA TSB88-A (or latest version) guidelines will be used to produce the interference map. The map must show all interference predicted using TSB88-A guidelines. Any agency with co-channel or adjacent channel allotments may request field tests of signal levels to verify interference signal levels. Agencies must be prepared to conduct these field tests if a request is made.

### **6.5.6 Adjacent Region Spectrum Allocation and Coordination**

Region 44 shares borders with five adjacent Regions:

- Region 17 (Kentucky)
- Region 20 (Maryland/DC)
- Region 33 (Ohio)
- Region 36 (Western Pennsylvania)
- Region 42 (Virginia)

Region 44 will coordinate channel allocations with all its bordering Regions by using the CAPRAD database. This tool will ensure adjacent state notification as well as FCC Certified Frequency Coordinator notification.

The Chair has sent final draft copies of this plan to the Chairs of each adjacent Region. Adjacent Regions should be able to satisfy voice and narrowband data requests along their border areas with Region 44. If any Region has problems satisfying requests in an adjacent area, the West Virginia RPC pledges to work with that Region or any of the other surrounding Regions to resolve any issues on a case by case basis.

## **7.0 System Design/Efficiency Requirements**

### **7.1 Interference Protection**

The frequency allotment list will be based on an assumption that systems will be engineered on an interference-limited basis, not a noise floor-limited basis. Agencies are expected to design their systems for maximum signal levels within their coverage area and minimum levels in the coverage area of other co-channel users. Coverage area is normally the geographical boundaries of the Agency(s) served plus a three to five mile area beyond.

Systems should be designed for minimum signal strength of 40 dB $\mu$  in the system coverage area while minimizing signal power out of the coverage area. TIA/EIA TSB88-A (or latest version) will be used to determine harmful interference assuming 40 dB $\mu$ , or greater, signal in all systems coverage areas. This may require patterned antennas and extra sites compared to a design that assumes noise limited coverage.

## **7.2 Spectrum Efficiency Standards**

Initial county pool allotments have been made on the basis of 25 kHz channels. To maximize spectrum utilization, prudent engineering practices and receivers of the highest quality must be used in all systems. Given a choice of radios to choose from in a given technology family, agencies should use the units with the best specifications. This plan will not protect agencies from interference if their systems are under-constructed (i.e; areas with the established service area having minimum signal strength below 40 dB $\mu$ ), or the systems utilize low quality receivers. The applicant's implementation of prudent engineering practices will be encouraged by the Regional Planning Committee at all times.

It is the eventual goal of the FCC and the public safety community for radio equipment to meet the requirement of one voice channel per 6.25 KHz of spectrum. When applying for channels within Region 44, the applicants should acknowledge the deadline for converting all equipment to 6.25 kHz or 6.25 kHz equivalent technology is 12/31/2016. For narrowband mobile data requests, one mobile data channel will consist of four (4) 6.25 kHz channels/two (2) 12.5 kHz channels/one (1) 25 kHz channel. Narrowband 6.25 kHz channels can be aggregated for data use to a maximum bandwidth of 25 kHz. As 6.25 kHz migration evolves, an agency that creates any "orphaned" 6.25 kHz channels should realize that these channels would be allocated to nearby agencies requesting channels to maintain consistent grouping and utilization of 25 kHz blocks within the region.

Region 44 encourages small agencies to partner with other agencies in multi-agency or regional systems as they promote spectrum efficiency and both small and large agency capacity needs can be met. Loading criteria can also be achieved in multi-agency systems that will allow greater throughput for all agencies involved than that which could be achieved individually.

### 7.3 Orphaned Channels

The narrowband pool allotments with Region 44 will have a channel bandwidth of 25 kHz. These 25 kHz allotments have been characterized as “Technology Neutral” and flexible enough to accommodate multiple technologies utilizing multiple bandwidths. If agencies choose a technology that requires less than 25 kHz channel bandwidth for their system, there is the potential for residual, “orphaned channels” of 6.25 kHz or 12.5 kHz bandwidth immediately adjacent to the assigned channel within a given county area.

An orphan channel may be used at another location within the county area where it was originally approved, if it meets co- and adjacent channel interference criteria. Region 44 will utilize “**county areas**” as guidelines for channel implementation with the area of Region 44. The definition of “**county area**” in this plan is the geographical/political boundaries of a given county, plus a distance of up to 10 miles outside of the county.

If the channel, or a portion of a channel, is being moved into a “county area” that is within 30 miles of an adjacent Region, Region 44 will receive concurrence from the affected Region. By extending the “county area” by a designated distance, it is anticipated this will increase the possibility that orphaned channel remainders will still be able to be utilized within the “county area”, and reduce the potential for channel remainders to be forced to lay dormant and used with a county channel allotment. These movements will be documented on the CAPRAD database.

If the “orphaned channel” remainder does not meet co-channel and adjacent channel interference criteria by moving it within the “county area” as listed above, and it is determined by the Region that the “orphaned channel” cannot be utilized in the Region without exceeding the distance described in the “county area” listed above, Region 44 will submit a plan amendment to the FCC to repack the channel to a location where its potential use will maintain maximum spectral efficiency. This FCC plan amendment will require affected Region concurrence.

When in the best interest of public safety communications and efficient spectrum use within the Region, the Region 44 Regional Planning Committee shall have the authority to move orphan channel allotments, and/or co-/adjacent-channel allotments affected by the movement of orphan channels, within its “county areas”, which are defined above. This is to retain spectrum efficiency and/or minimize co-channel or adjacent channel interference between existing allotments within the region utilizing disparate bandwidths and technologies.

## **8.0 Allocation of Narrowband General Use Spectrum**

### **8.1 Introduction**

The Region 44 Technical Subcommittee recommends that allotments be made on the basis of one 12.5 KHz channel for every voice channel request and one 25 KHz channel for each narrowband data channel request. This recommendation is approved by the full Committee and is part of this plan. All agencies requesting spectrum during the initial filing window (see Section 6.5) will be allocated channels if plan requirements are met. Agencies using Frequency Division Multiplexing (FDMA) will be expected to maintain 12.5 KHz equivalency when developing systems and will be required to utilize BOTH 12.5 KHz portions of the 25 KHz block. In most cases, this will require the geographic separation of each 12.5 KHz adjacent channel. In order to promote spectrum efficiency, Region 44 will ensure that systems allocated 25 KHz channel blocks will utilize all of the channel and not “orphan” any portions of a system designated channel (See Section 7.3).

### **8.2 Low Power Secondary Operations**

To facilitate portable operation by any licensee, and to provide channels for such operation without impacting the use of primary channels, certain low power secondary use will be permitted. Any public safety entity otherwise licensed to use one or more channels under this Plan may receive authorization to license any additional channel for secondary use, subject to the following criteria:

- All operation of units on such authorized channels will be considered secondary to other licenses on both co-channel and adjacent channels,
- No channels on, or adjacent to, those designated in the Plan for wide area operation and/or mutual aid use will be authorized,
- Channels will be authorized for use in specific areas only, such areas to be within the licensees authorized operational area,
- Maximum power will be limited to 6 watts ERP,
- Use aboard aircraft is prohibited,
- Applications for channels may be submitted to the Committee for consideration at any time and must be accompanied by a showing of need. The Committee may select and authorize licensing of these secondary use channels after consideration of potential interference to co-channel and adjacent channel allotments, allocations and

licensees. Authorization may be granted for use of any suitable channel, without prior allotment or allocation to the requesting agency,

In the event the channels authorized for low power secondary operation are needed by others during any window opening for reassignment, no protection will be afforded to the licensed secondary user, and they may be required to change frequencies or surrender licenses to prevent interference to primary use channels.

### **8.3 Low Power Channels**

The FCC in the 700 MHz band plan set aside channels 1 - 8 paired with 961 – 968 and 949 – 958 paired with 1909 – 1918 for low power use for on-scene incident response purposes using mobiles and portables subject to Commission-approved regional planning committee regional plans. Transmitter power must not exceed 2 watts (ERP).

Channels 9 –12 paired with 969 – 972 and 959 – 960 paired with 1919 – 1920 are licensed nationwide for itinerant operation. Transmitter power must not exceed 2 watts (ERP).

These channels may operate using analog operation. To facilitate analog modulation this plan will allow aggregation of two channels for 12.5 kHz bandwidth. On scene temporary base and mobile relay stations are allowed (to the extent FCC rules allow) with an antenna height limit of 6.1 meter (20 feet) above the ground. However, users are encouraged to operate in simplex mode whenever possible. This plan does not limit use to only analog operations, these channels are intended for use in a wide variety of applications that may require digital modulation types.

In its dialog leading up to CFR §90.531 allocating the twenty-four low power 6.25 kHz frequency pairs (of which eighteen fall under RPC jurisdiction), the Federal Communications Commission (FCC) suggested that there is a potential for multiple low power applications, and absent a compelling showing, a sharing approach be employed rather than making exclusive assignments for each specific application because low power operations can co-exist [in relatively close proximity] on the same frequencies with minimal potential for interference due to the 2 watt power restriction.

Whereas advantages exist in not making assignments, the reverse is also true. If, for example, firefighters operate on a specific frequency or set of frequencies in one area, there is some logic in replicating that template

throughout the region for firefighter equipment. If there are no assignments, such a replication is unlikely.

In seeking the middle ground with positive attributes showing up both for assignments and no assignments, we recommend the following regarding assignments associated with the eighteen narrowband channels for which the RPCs have responsibility.

- Channel #'s 1-4 and 949-952 are set aside as generic channels for use by public safety agencies operating within Region 44, and the complementary channel #'s 961-964 and 1909-1912 are set aside as generic channels also for use by public safety agencies including GPS differential correction telemetry for channels 961-964 and 1909-1912 likewise operating within Region 44.
- Channel #'s 5-8 are designated as Fire Protection channels for licensing and exclusive use by the Fire Protection discipline, and the complementary channel #'s 965-968 are set aside as Law Enforcement channels also for licensing and exclusive use by the Law Enforcement discipline.
- Channel #'s 955-956 are set aside as Fire Protection channels for licensing and exclusive use by the Fire Protection discipline, and the complementary channel #'s 1915-1916 are set aside as Law Enforcement channels also for licensing and exclusive use by the Law Enforcement discipline.
- Channel #'s 957-958 are set aside as Fire Protection/Law Enforcement channels for licensing and use by the Fire Protection and Law Enforcement disciplines, and the complementary channel #'s 1917-1918 are set aside as Fire Protection/Law Enforcement.

Simplex operations may occur on either the base or mobile channels. Users are cautioned to coordinate on scene use among all agencies involved. Users should license multiple channels and be prepared to operate on alternate channels at any given operational area.

## 8.4 System Implementation

When an application has been approved a notification, in writing, will be to sent to secondary television station operators / licensees of the intended use of 700 MHz spectrum in West Virginia (APPENDIX "X"). This allows

affected low power TV stations enough time to prepare to move to TV channels outside the 700 MHz band.

After allocation of channels (Section 6.5) the agency must release a System RFP and sign a contract with a vendor within one year of the channel allocation. If an agency does not implement in the timeframes specified, that agency's allocation may be removed from the allocation list. An Agency may file a request with the Region Chair for an extension of time to implement. The request should include all details describing why the agency has not implemented and a new implementation schedule. The Committee Chair will advertise this request and set a date for the full committee to vote on the request. If no request for extension is received or the Committee votes not to extend implementation, the Committee Chair will advertise this action and set a filing window to give other agencies a chance to request an allotment of that spectrum.

Should system implementation not begin within two (2) years or if projected planned channel loading is not attained within four (4) years after granting of license, the channels will be returned for re-allocation to others. A one (1) year extension may be supported by the RPC, if it can be shown that circumstances are beyond the control of the applicant. The applicant will be responsible for contacting the FCC to request an extension. Applicants must be acting to the extent of their power to implement the project within their authority.

System implementation will be monitored by the RPC Administrative subcommittee who will be responsible for determining the progress being made on the implementation of a system. Monitoring of systems implementation by the subcommittee will take place on one (1) year intervals. If progress is made and the system is ultimately implemented the system can be determined "complete". If progress is not made, the licensee will be advised in writing that they are in default of their plan and the Region 44 plan and the consequences of their lack of progress. The Administrative subcommittee will inform the RPC and public safety frequency coordinators of the situation. The Administrative Subcommittee will continue to monitor the progress of any system determined in default and if progress is still not being made the subcommittee will inform the RPC and recommend informing the FCC of the lack of progress. The licensee in default can appeal this action or can allow the license to be withdrawn. If the authorized frequencies are withdrawn they will be returned to the frequency allotment pool for future use.

## **8.5 Priority for Receiving Spectrum Allocations**

Priority for channel allocations will be made on a first come first served basis. Cooperative multi-agency system implementations will be given priority over non-shared single agency systems.

When applying for the new 700 MHz channels, the RPC expects applicants to relinquish any amount of any currently used spectrum and make that spectrum available for use by other agencies in West Virginia upon beneficial use of an implemented 700 MHz radio system. This currently licensed spectrum may be in any public safety band.

Agencies with a primary voice communication system operating under a NPSPAC band 800 MHz license, which are requesting 700 MHz channels for system expansion, are not asked to relinquish this spectrum but will be asked to include this spectrum that is already licensed into the loading requirements for a radio system as defined in this plan. The reason for this requested inclusion is that most, if not all, radio equipment developed for the 700 MHz band is expected to be also capable of operation on any existing 800 MHz NPSPAC licensed systems already in use and will likely to be include in justification of the loading of NPSPAC channels. Without this inclusion, it would theoretically be possible for an agency to double its frequency spectrum allocations by applying for an equivalent number of 700 MHz channels, for each 800 MHz channel that it has already licensed and justified loading criteria for, and reuse the same mobile or portable users for both bands, to both planning committees, in West Virginia. Although separated in FCC rules and regulations, the Region 44 700 MHz RPC will work with its counterpart Region 44 NPSPAC planning committee to attempt to make the most efficient use of spectrum for Public Safety in the Region.

Agencies are encouraged to relinquish frequencies that will no longer be used as soon as possible in accordance with FCC rules and regulations.

The number of channels an applicant should retain would be an amount required to provide minimum interoperable communications to surrounding jurisdictions. In order to promote the interests of agencies that will benefit from an applicant submitting a request for 700 MHz spectrum, it is requested that the applicant submit a list of all channels and licenses held on existing public safety channels, and those channels that will be expected to be unlicensed when full beneficial use of 700 MHz channels are realized. The RPC will only distribute this information, and not decide if it is sufficient or not. It must be stressed that the Region 44 Regional Planning Committee supports and promotes multi-agency systems that allow for regional/wide area coverage within the region.

## 8.6 Channel Loading

The goal of the RPC is to encourage efficient utilization of each frequency and encourages the following loading requirements:

- Each applicant for a trunked system should design their system for a minimum of 70 mobile and portable radios for each 12.5 kHz voice channel that will be placed in service within five (5) years of the initial plan approval date.
- Single conventional channels should be designed for a minimum load of 70 radios per 12.5 kHz channel. Mobile, portable, data, and control stations will all be considered within this count.

Loading will eventually be required to change to 50 units per 6.25 kHz channel, when further narrowband technologies are available and when the FCC requires 6.25 kHz efficiencies, currently January 1, 2017.

## 8.7 Dispute Resolution – Intra-Regional

In the event an agency disputes the implementation of this Plan or the Federal Communications Commission approval of this Plan or parts of this Plan, the agency must notify the Chair of the dispute in writing. This section does not apply to protests over new spectrum allocations (see Section “6.5”). The Chair will attempt to resolve the dispute on an informal basis. If a party to the dispute employs the Chair, then the Vice Chair will attempt resolution. In such cases, the Chair shall be deemed to have a conflict of interest and will be precluded from voting on such matters. If after 30 days the dispute is not resolved, the Chair (or Vice Chair) will appoint a Dispute Resolution Committee consisting of two members from the State of West Virginia governmental agencies and at least five members from different counties in Region 44. That committee will select a Chair to head the committee and a secretary to document the proceedings.

The Regional Plan Chair (or Vice Chair) will represent the Region in presentations to the Dispute Resolution Committee. The Committee will hear input from the disputing agency, any effected agencies and the Region Chair. The Committee will then meet in executive session to prepare a recommendation to resolve the dispute. Should this recommendation not be acceptable to the disputing agency/agencies, the dispute and all written documentation from the dispute will be forwarded to the National Regional Planning Council (NRPC) for review. As a last resort, the dispute will be forwarded to the Federal Communications Commission for final resolution.

## **9.0 Interoperability Channels**

### **9.1 Introduction**

The ability for agencies to effectively respond to mutual aid requests directly depends on their ability to communicate with each other. West Virginia is subject to many natural disasters and mutual aid is common among agencies. This Plan seeks to facilitate the communications necessary for effective mutual aid.

The state of West Virginia will administer the 700 MHz interoperability channels via the State Interoperability Executive Committee (SIEC) under National Coordination Committee's (NCC) guidelines. The Region 44 700 MHz Regional Planning Committee will work with the West Virginia SIEC and members of the Region 44 - 700 MHz Regional Planning Committee will participate in the (SIEC) representing Region 44. If at any time the State SIEC is unable to function in the role of administering the interoperability channels in the 700 MHz band, then this committee will assume this role and notify the FCC in writing of the change in administrative duties.

### **9.2 Tactical Channels**

Region 44 will not set aside additional channels for interoperability use within the Region. It is anticipated the sixty-four FCC designated interoperability channels (6.25 KHz) will be sufficient to provide interoperability (voice and data) within Region 44.

All mobile and portable units operating under this Plan and utilizing 700 MHz channels must be programmed with the minimum number of channels called for either in NCC guidelines or as the West Virginia State Interoperability Executive Committee specifies. The channel display in these radios will be in accordance with the NCC guidelines that have common alphanumeric nomenclature to avoid any misinterpretation of use within Region 44. The SIEC is the final authority on the interpretation of the distribution of the 700 MHz interoperability channels. Appendix D lists the 700 MHz Interoperability frequencies and the NCC-approved common nomenclature.

### **9.3 Deployable Systems**

This Plan strongly supports use of deployable systems, both conventional and trunked. Deployable systems are prepackaged systems that can deploy by ground or air to an incident to provide additional coverage and capacity on interoperability channels. This will minimize the expense of installing extensive fixed infrastructure and recognizes the difficulty of providing complete coverage of the region due to environmental constraints.

Agencies should have conventional deployable systems capable of being tuned to any of the interoperability tactical channels. Those agencies that are part of a multi-agency trunked system and commonly provide mutual aid to each other are encouraged to have trunked deployable systems that operate on the tactical channels designated by the FCC for this use. The SIEC will develop the operational details for deploying these systems.

It is expected that the tactical channels set aside for trunked operation will be heavily used by deployable systems. Therefore, the tactical channels cannot be assigned to augment general use trunked systems.

### **9.4 Monitoring of Calling Channels**

700 MHz licensees will be responsible for monitoring the interoperability calling channels. The SIEC will develop operational guidelines for this function.

## ***10. Application Requirements and Evaluation***

### **10.1 Introduction**

The applicant evaluation criteria established in the NCC process, and as further defined in this plan, will be followed for approval. All requests will be considered on a first come, first served basis. In cases, where specific frequency allotments are required by numerous applicants at the same time, the applicant evaluation matrix point system will be utilized to determine the successful applicant. In all cases, area of coverage, technical requirements, and channel loading criteria will be applied. Exceptions may apply upon unique circumstances, after review and approval by the RPC. Deviations from FCC rules are not to be approved unless a fully justified waiver request has been presented to the RPC. The Region 44 Technical Subcommittee will evaluate and process applications within thirty (30) days after notified of receipt by CAPRAD.

The matrix has been prepared to enable consistent evaluation of plans and applications. Variations within the parameters of this plan and submitted applications and/or plans may require extensive evaluation. Therefore, it shall be responsibility of the RPC to evaluate each situation on its own merit.

Each applicant for a trunked system shall certify that a minimum of 70 field radios for each 12.5 kHz channel will be placed in service within five (5) years of the initial plan approval date. If that is not the case, then less than fully loaded channels shall be returned to the allotment pool and the licensee shall modify their license accordingly. Conventional channels shall be loaded to 70 mobile units per 12.5 kHz channel. Where an applicant does not load a channel to 70 radio/subscriber units, the frequency will be available for assignment to other licensees. Mobile, portable and control stations will be considered as mobile units.

## 10.2 Evaluation Matrix Point System

Region 44 will use a point system to determine approval priority of competing applications within the region. The maximum total points that can be achieved are 800 points. The applications receiving the highest point total will receive approval for the channels. Seven categories will be evaluated.

Where applicable, such as in multiple disciplines shared systems, the points for all agencies utilizing the system are included in the total.

### 1. ***Service and Use (Maximum score 300 points)***

<u>Service</u>	<u>Points</u>
<i>Local</i>	10
<i>County</i>	10
<i>State</i>	10
<i>Federal</i>	10
<u>Use</u>	<u>Points</u>
<i>Criminal Justice/Law Enforcement/Crisis Mgmt</i>	50
<i>Fire/EMS</i>	50
<i>Special Emergency</i>	40
<i>Emergency Management</i>	40
<i>Forestry Conservation</i>	30
<i>Highway Maintenance</i>	30

*General Government*

20

*Maximum Total 300*

Environmental protection will fall in the “Special Emergency” category and shall be considered for tasks that directly reduce contamination to the air, water or ground by chemicals or waste materials.

**2. *Interoperability Communications (Maximum score 100 points)***

The application is scored on the degree of interoperability that is demonstrated, with a range of points from 0 to 100. This category will not rate the application on the inclusion of interoperability channels, but on its proposed actual ability to communicate with different levels of government and services during a time of emergency.

Each applicant is encouraged to have direct mobile-to-mobile communications among these radio type functions; local, state and federal in the criminal justice, fire/EMS, special emergency, emergency management, forestry, highway maintenance and general government. All applicants will start with 100 points and points will be deducted based upon their lack of intersystem communications. No points will be deducted if a plan or system has not yet been developed within their areas of service.

- Ten (10) points will be deducted for each radio service type function in which the applicant lacks intersystem communication, if direct mobile-to-mobile does not exist.
- Five (5) points for each radio service that the applicant lacks direct mobile-to-mobile communications.

**3. *Loading (Maximum score 150 points)***

Those applicants who have demonstrated that they are part of or developing cooperative, multi-agency, systems will be scored on a range from 0 to 150 points depending upon the extent of the cooperative system.

<i>Multi-agency trunked, fully loaded, system</i>	<i>101–150 points</i>
<i>Trunked system, fully loaded, single agency</i>	<i>76–100 points</i>
<i>Mobile data channel fully loaded/channel</i>	<i>76–100 points</i>
<i>Conventional system fully loaded/channel</i>	<i>0– 75 points</i>

Expansion of existing systems will be evaluated as to the aforementioned category they are in. Any system less than fully loaded will have its score multiplied by the proportion:

Fully loaded/channel is a 12.5 kHz channel with 70 radio units. Control channels shall be considered as data channels. Plans submitted to the RPC shall stipulate the number of voice communication channels and the number of data channel(s). These points will only be assigned to fully loaded systems that are planned and identified with the application package submittal.

**4. Spectrum Efficiency (Maximum score 50 points)**

The applicant will be scored on the degree of spectrum efficient technology that the system demonstrates. A trunked system will be considered a spectrum efficient technology as well as any technological systems feature that is designed to enhance the efficiency of the system and improve the efficient use of spectrum.

Spectrum efficiency points

*Trunked or equally high efficient technology* 50 points  
*Conventional system using data* 50 points  
*Technologies that increases system throughput* 50 points

**5. System Implementation Factors (Maximum score 100 points)**

This category scores the applicant on two factors, budgetary commitment and plan completeness. The degree of budgetary commitment is scored on a range from 0 to 50 points based on the RPC's evaluation of commitment demonstrated through documentation by the applicant and its funding source entity. A high degree of funding commitment will receive a higher score. Applicants will also be scored on the degree of plan completeness on a range from 0 to 50 points. Applicants must submit a timetable for the implementation of the system. Applicants should be aware of the requirements outlined in "Slow Growth Plan" portion of this plan and the FCC rules.

*Multi phase project with funds committed to all phases* 50 points  
*Multi phase project plan completed for all phases* 50 points

Applicants with less than complete funding commitment and/or incomplete plans will have their point score reduced accordingly.

Resolutions, legislation, or other such documentation from governing entities shall be submitted with applications to support financial commitment.

**6. System Density (Maximum score 100 points)**

Each applicant's System will be scored on the level of geographic efficiency for requisite communications coverage, for the applicant's jurisdictional area served or regional area served under agreement with other Agencies and/or defined communication requirements. Scoring will be based upon the defined radio coverage area of the application, and the Entity's jurisdictional area or required communication support areas. Region 3 recognizes that each Entity may not be required (by System or network users) to provide radio System communication support for all jurisdictional boundaries or areas that are supported by that Entity. This evaluation is to only weigh the efficiency of the System being applied for, against the required areas for communication support based on System user requirements or other Entity Systems licensed or applied for. Scores are based on the ratio multiplied by 100 with the maximum not to exceed 100 points.

*Percentage of System operational area for applicant's jurisdictional area of responsibility for communications support x 100 = \_\_\_\_\_*

### **10.3 Application Processing**

All applications will be processed in the most expeditious manner possible by the RPC. After Region 44 approval, the applications will be sent to the coordinator requested by the applicant. All documentation required by the designated coordinator selected in this process will be available through the CAPRAD system.

## **11. Future Planning**

### **11.1 Database Maintenance**

Region 44 will continue to use and update the CAPRAD database as 700 MHz spectrum within the Region is assigned and licensed by eligible entities.

## **11.2 Inter-Regional Dispute Resolution Process**

Signed Inter-Regional Dispute Resolution Agreements from all five adjacent Regions are included in Appendix I.

## **11.3 Amendment Process**

Amendments to the Region 44 Plan will be made at Region 44 RPC meetings. All amendments will be voted on and passed or rejected by a simple majority vote. The Chairman or his designee will make the appropriate changes to the Plan and notify the adjacent Regions for their concurrence. Once the concurrences are received from the adjacent Regions, the Plan will be filed, by the Chairperson, with the FCC for approval. Electronic filing will be the preferred method.

## **11.4 Meeting Announcements**

Meeting announcements will be made per the Region 44 Bylaws. Region 44 will utilize its membership list, Public Notices issued by the FCC, fax notification, email to individual, associations, agencies and vendors, verbal announcements at meetings and/or appropriate publications.

## **12. Certification**

I hereby certify that all planning committee meetings, including subcommittee or executive committee meetings were open to the public.

David W. Saffel  
Chair, Region 44  
(Date)

**Appendix A – Region Bylaws**

THE BYLAWS OF REGION 44 West Virginia  
June 16, 2005

**ARTICLE 1**

**NAME & PURPOSE**

Name and purpose. The name of this Region shall be Region 44. Its primary purpose is to foster cooperation, planning, development of regional plans and the implementation of these plans in the 700 MHz Public Safety Band.

**ARTICLE II**

**MEMBERS**

For purposes of this Article, the term “member,” unless otherwise specified, refers to both voting and non-voting members.

2.1 Number, Election and Qualification. The Regional Committee shall have two classes of members, “voting members” and “non-voting members.” New members may be added at annual, special, or regular meetings.

Voting Members. Voting members shall consist of one representative from any single agency engaged in public safety eligible to hold a license under 47 CFR 90.20, 47 CFR 90.523 or 47 CFR 2.103. Except that a single agency shall be allowed no more than one vote for each distinct eligibility category (e.g. police, fire, EMS, highway) within the agency’s organization or political jurisdiction. In voting on any issue the individual must identify himself/herself and the agency and eligibility category which he or she represents. Voting members may not vote on issues involving their entity.

Non-Voting Members. Non-voting members are all others interested in furthering the goals of public safety communications.

2.2 Tenure. In general, each member shall hold MEMBERSHIP from the date of acceptance until resignation or removal.

2.3 Powers and Rights. In addition to such powers and rights as are vested in them by law, or these bylaws, the members shall have such other powers and rights as the membership may determine.

2.4 Suspension and Removal. A representative may be suspended or removed with cause by vote of a majority of members after reasonable notice and opportunity to be heard. Failure to attend 50% of meetings held in a calendar year shall be a specific cause for removal from the membership.

2.5 Resignation. A member may resign by delivering written resignation to the chairman, vice-chairman, treasurer or secretary of the Regional Committee or to a meeting of the members.

2.6 Annual Meetings. The annual meeting of the members shall be held at (location) on the (date) each year or if that date is a legal holiday in the place where the meeting is to be held, then at the same hour on the next succeeding day not a legal holiday.

If an annual meeting is not held as herein provided, a special meeting of the members may be held in place thereof with the same force and effect as the annual meeting, and in such case all references in these bylaws, except in this Section 2.6, to the annual meeting of the members shall be deemed to refer to such special meeting. Any such special meeting shall be called and notice shall be given as provided in Section 2.7 and 2.8.

2.7 Special Meetings. Special meetings of the members may be held at any time and at any place within the Regional Committee area. Special meetings of the members may be called by the chairman or by the vice-chairman, or in case of death, absence, incapacity, by any other officer or, upon written application of two or more members.

2.8 Call and Notice.

A. Annual meetings. Reasonable notice of the time and place of special meetings of the members shall be given to each member. Such notice need not specify the purposes of a meeting, unless otherwise required by law or these bylaws or unless there is to be considered at the meeting (i) amendments to these bylaws, (ii) an increase or decrease in the number of members, or (iii) removal or suspension of a member who is an officer.

B. Reasonable and sufficient notice. Except as otherwise expressly provided, it shall be reasonable and sufficient notice to a member to send notice by mail at least five days or by e-mail/facsimile at least three days before the meeting, addressed to such member at this or her usual or last known business address, or, to give notice to such member in person or by telephone at least three days before the meeting. (State notification requirements may differ.)

2.9 Quorum. At any meeting of the members, a majority of the officers and {either a minimum number of members or a minimum percentage of members} of the voting members shall constitute a quorum. Any meeting may be adjourned to such date or dates not more than ninety days after the first session of the meeting by a majority of the votes cast upon the question, whether or not a quorum is present, and the meeting may be held as adjourned without further notice.

2.10 Action by Vote. Each voting member, representing a particular agency (one vote per agency) shall have one vote; non-voting members have no right to vote. When a quorum is present at any meeting, a majority of the votes properly cast by voting members present shall decide any question, including election to any office, unless otherwise provided by law or these bylaws.

- 2.11 Action by Writing. Any action required or permitted to be taken at any meeting of the members may be taken without a meeting if all members entitled to vote on the matter consent to the action in writing and the written consents are filed with the records of the meetings of the members. Such consents shall be treated for all purposes as a vote at a meeting.
- 2.12 Proxies. Voting members may vote either in person or by written proxy dated not more than one month before the meeting named therein, which proxies shall be filed before being noted with the secretary or other person responsible for recording the proceedings of the meeting. Unless otherwise specifically limited by their terms, such proxies shall entitle the holders thereof to vote at any adjournment of the meeting by the proxy shall terminate after the final adjournment of such meeting.
- 2.13 Voting on One's Own Application. At no time can a voting member vote on his/her application.
- 2.14 Special Interest Voting. A voting member can **not** have a commercial interest in any of his/her region and/or adjacent regions application(s) on which he/she is reviewing, approving and/or voting.

### **ARTICLE III**

#### **OFFICERS AND AGENTS**

- 3.1 Number and qualification. The officers of the Regional Committee shall be a chairman, vice-chairman, treasurer, secretary and such other officers, if any, as the voting members may determine. All officers must be voting members of the Regional Committee.
- 3.2 Election. The officers shall be elected by the voting members at their first meeting and, thereafter, at the annual meeting of the members.
- 3.3 Tenure. The officers shall each hold office until the annual meeting of the members held within one year from the adoption of these bylaws, or until their successor, if any, is chosen, or in each case until he or she sooner dies, resigns, is removed or becomes disqualified.
- 3.4 Chairman and Vice Chairman. The chairman shall be the chief executive officer of the Regional Committee and, subject to the control of the voting members, shall have general charge and supervision of the affairs of the Regional Committee. The chairman shall preside at all meetings of the Regional Committee. The Chairman may define standing or ad hoc committees to conduct Region business as needed. An ad hoc committee may be formed to review and approve adjacent Regions Plans.  
The Vice Chairman, if any, shall have such duties and powers as the voting members shall determine. The vice-chairman shall have and may exercise all the powers and duties of the chairman during the absence of the chairman or in the event of his or her inability to act.
- 3.5 Treasurer. The treasurer shall be the chief financial officer and the chief accounting officer of the Regional Committee. The treasurer shall be in

charge of its financial affairs, funds, and valuable papers and shall keep full and accurate records thereof.

- 3.6 Secretary. The secretary shall record and maintain records of all proceedings of the members in a file or series of files kept for that purpose, which file or files shall be kept within the Region and shall be open at all reasonable times to the inspection of any member. Such file or files shall also contain records of all meetings and the original, or attested copies, of bylaws and names of all members and the address (including e-mail address, if available) of each. If the secretary is absent from any meeting of members, a temporary secretary chosen at the meeting shall exercise the duties of the secretary at the meeting.
- 3.7 Suspension or Removal. An officer may be suspended with cause by vote of a majority of the voting members.
- 3.8 Resignation. An officer may resign by delivering his or her written resignation to the chairman, vice-chairman, treasurer, or secretary of the Regional Committee. Such resignation shall be effective upon receipt (unless specified to be effective at some other time), and acceptance thereof shall not be necessary to make it effective unless it so states.
- 3.9 Vacancies. If the office of any officer becomes vacant, the voting members may elect a successor. Each such successor shall hold office for the remainder terms, and in the case of the chairman, vice chairman, treasurer and clerk until his or her successor is elected and qualified, or in each case until he or she sooner dies, resigns, is removed or become disqualified.

## **ARTICLE IV**

### **AMENDMENTS**

These bylaws may be altered, amended or repealed in whole or in part by vote. The voting members may by a two-thirds vote, alter, amend, or repeal any bylaws adopted by the Regional Committee members or otherwise adopt, alter, amend or repeal any provision which FCC regulation or these bylaws requires action by the voting members.

## **ARTICLE V**

### **DISSOLUTION**

This Regional Committee may be dissolved by the consent of two-thirds plus one of the members in good standing at a special meeting called for such purpose. The FCC shall be notified.

## **ARTICLE VI**

### **RULES OF PROCEDURES**

## 700 MHz Regional Plan for West Virginia

The Conduct of Regional Meetings including without limitation, debate and voting, shall be governed by Robert's Rules of Order, newly revised 1990 edition, ninth edition, Sarah Corbin Robert, Henry M. Robert III, and William J. Evans.

**Appendix B****Membership List**

Name	Agency/Affiliation	Address	Telephone	Email address	Voting
Paul Bump	Harrison County OES	420 Buckhannon Pike Nutter Fort, WV 26301			Y
David W. Saffel	West Virginia State Police	1300 Harrison Ave., Elkins, WV 26241	304-637-0200 work 304-389-8715 cell	dsaffel@wvsp.state.wv.us	Y
Gary Steve Lipscomb	Summers County OES/911	Box 97, Hinton, WV 25951			Y
Bill Raver	Lewis County OES	201 Orchard St., Weston, WV 26452			Y
Tom Burns	WVDHSEM	1900 Kanawha Blvd., Charleston, WV			Y
Steve Stewart	WV DNR Law Enforcement	696 Winfield Rd., St. Albans, WV25177			Y
Bill Wood	WVDHSEM	1900 Kanawha Blvd., Charleston, WV			Y
D. Sell Shaw	WV American Red Cross	PO Box 467, Huntington, WV			Y
Bette Rinehart	Motorola Inc.	28 Twin Lakes Dr., Gettysburg, PA 17325			N
Brenda Sears	Summers County E-911	Box 97, Hinton, WV 25951			Y
Kim Heater	Lewis-Gilmer E-911	201 Orchard St., Weston, WV 26452			Y
James Gum	Lewis-Gilmer E-911	201 Orchard St., Weston, WV 26452			Y
Dale Hall	Webster County 9-1-1	210 Backfork St., Webster Springs, WV 26277			Y

700 MHz Regional Plan for West Virginia

Name	Agency/Affiliation	Address	Telephone	Email address	Voting
Richard Rose	Webster County 9-1-1	210 Backfork St., Webster Springs, WV 26277			Y
Margaret Agee	Raleigh County E911	162 Industrial Park Rd., Beaver, WV 25813			Y
James Lewis	Greenbrier County 911	PO Box 218, Maxwelton, WV			Y
Don Gaus	Wheeling-Ohio County 911	138 Center Ave., Wheeling, WV 26003			Y
Mark Scherrer	Wheeling-Ohio County 911	138 Center Ave., Wheeling, WV 26003			Y
Allen Holder	Lincoln County 911	911 Marconi Dr., West Hamln, WV 25571			Y
David Posey	SBM	612 Schrader Ave., Wheeling, WV 26003			N
Joseph Schimpa	Positron Public Safety	2212 Richland Ave., Wheeling, WV 26003			N
Catherine Frye	Retired Director	70 S Kanawha St., Buckhannon, WV 26201			?
Randy Lowe	Wood County 911	911 Core Rd., Parkersburg, WV 26104			Y
Connie Thomaschek	Harrison-Taylor County 911	420 Buckhannon Pike, Nutter Fort, WV 26301			Y
Christ Cutright	Harrison-Taylor County 911	420 Buckhannon Pike, Nutter Fort, WV 26301			Y
Collet Crabill	Jefferson County 9-1-1	28 Industrial Blvd., Ste. 100, Kearneysville, WV 25430			Y
Beverly Crenshaw	Mercer County E-9-1-1	911 Shelter Rd., Princeton, WV 24720			Y

700 MHz Regional Plan for West Virginia

Name	Agency/Affiliation	Address	Telephone	Email address	Voting



700 MHz Regional Plan for West Virginia

***Appendix C***

**Adjacent Region Concurrence Letters**

## Appendix D

### Interoperability Frequencies/Common Nomenclature

**Table of 700 MHz Interoperability Channels**

<b>16 Channel Sets</b>	<b>Description</b>	<b>Label</b>
<i>Channel 23 &amp; 24</i>	<i>General Public Safety Services (secondary trunked)</i>	<i>7TAC51</i>
<i>Channel 103 &amp; 104</i>	<i>General Public Safety Services (secondary trunked)</i>	<i>7TAC52</i>
<i>Channel 183 &amp; 184</i>	<i>General Public Safety Services (secondary trunked)</i>	<i>7TAC53</i>
<i>Channel 263 &amp; 264</i>	<i>General Public Safety Services (secondary trunked)</i>	<i>7TAC54</i>
Channel 39 & 40	Calling Channel	7CALL50
Channel 119 & 120	General Public Safety Service	7TAC55
Channel 199 & 200	General Public Safety Service	7TAC56
Channel 279 & 280	Mobile Data	7DATA69
Channel 63 & 64	Emergency Medical Service	7MED65
Channel 143 & 144	Fire Service	7FIRE63
Channel 223 & 224	Law Enforcement Service	7LAW61
Channel 303 & 304	Mobile Repeater	7MOB59
Channel 79 & 80	Emergency Medical Service	7MED66
Channel 159 & 160	Fire Service	7FIRE64
Channel 239 & 240	Law Enforcement Service	7LAW62
Channel 319 & 320	Other Public Service	7GTAC57
<i>Channel 657 &amp; 658</i>	<i>General Public Safety Services (secondary trunked)</i>	<i>7TAC71</i>
<i>Channel 737 &amp; 738</i>	<i>General Public Safety Services (secondary trunked)</i>	<i>7TAC72</i>
<i>Channel 817 &amp; 818</i>	<i>General Public Safety Services (secondary trunked)</i>	<i>7TAC73</i>
<i>Channel 897 &amp; 898</i>	<i>General Public Safety Services (secondary trunked)</i>	<i>7TAC74</i>
Channel 681 & 682	Calling Channel	7CALL70
Channel 761 & 762	General Public Safety Service	7TAC75
Channel 841 & 842	General Public Safety Service	7TAC76
Channel 921 & 922	Mobile Data	7DATA89
Channel 641 & 642	Emergency Medical Service	7MED86
Channel 721 & 722	Fire Service	7FIRE83
Channel 801 & 802	Law Enforcement Service	7LAW81
Channel 881 & 882	Mobile Repeater	7MOB79
Channel 697 & 698	Emergency Medical Service	7MED87
Channel 777 & 778	Fire Service	7FIRE84
Channel 857 & 858	Law Enforcement Service	7LAW82
Channel 937 & 938	Other Public Services	7GTAC77

## **Project 25 Common Air Interface Interoperability Channel Technical Parameters**

Certain common P25 parameters need to be defined to ensure digital radios operating on the 700 MHz Interoperability Channels can communicate. This is analogous to defining the common CTCSS tone used on NPSPAC analog Interoperability channels.

### **Network Access Code**

In the Project 25 Common Air Interface definition, the Network Access Code (NAC) is analogous to the use of CTCSS and CDCSS signals in analog radio systems. It is a code transmitted in the pre-amble of the P25 signal and repeated periodically throughout the transmission. Its purpose is to provide selective access to and maintain access to a receiver. It is also used to block nuisance and other co-channel signals. There are up to 4096 of these NAC codes. For ease of migration in other frequency bands, a NAC code table was developed which shows a mapping of CTCSS and CDCSS signals into corresponding NAC codes. Document TIA/EIA TSB102.BAAC contains NAC code table and other Project 25 Common Air Interface Reserve Values.

The use of NAC code \$293 is required for the 700 MHz Interoperability Channel NAC code.

### **Talk group ID**

In the Project 25 Common Air Interface definition, the Talk group ID on conventional channels is analogous to the use of talk groups in trunking. In order to ensure that all users can communicate, all units should use a common Talk group ID.

Recommendation: Use P25 default value for Talk group ID = \$0001

### **Manufacturer's ID**

The Project 25 Common Air Interface allows the ability to define manufacturer specific functions. In order to ensure that all users can communicate, all units should not use a specific Manufacturer's ID, but should use the default value of \$00.

### **Message ID**

The Project 25 Common Air Interface allows the ability to define specific message functions. In order to ensure that all users can communicate, all units should use the default Message ID for unencrypted messages of \$00000000000000000000000000000000.

### **Encryption Algorithm ID and Key ID**

The Project 25 Common Air Interface allows the ability to define specific encryption algorithms and encryption keys. In order to ensure that all users can

## 700 MHz Regional Plan for West Virginia

communicate, encryption should not be used on the Interoperability Calling Channels, all units should use the default Algorithm ID for defaults may be used for the other Interoperability channels when encryption is not used.

Use of encryption is allowed on the other Interoperability channels. Regional Planning Committees need to define appropriate Message ID, Encryption Algorithm ID, and Encryption Key ID to be used in the encrypted mode on Interoperability channels.

**Appendix E**

**Sample Memorandum of Understanding Template  
To be Placed on State Interoperability Executive Committee or RPC  
Letterhead**

*Minimum Criteria Required in the MOU*

TO: (signer of application and title)  
(agency name)

FROM: (name), Chairman

DATE: (mm/dd/yyyy)

SUBJECT: Memorandum of Understanding for Operating the 700 MHz Interoperability Channels

This memorandum of understanding (hereafter referred to as MOU) shall be attached to the application when submitting it. By virtue of signing and submitting the application and this MOU, (agency name) (hereafter referred to as APPLICANT) affirms its willingness to comply with the proper operation of the Interoperability (interoperability) channels as dictated by the Region Planning Committee (here after referred to as RPC) as approved by the Federal Communications Commission (hereafter referred to as FCC) and by the conditions of this MOU.

The APPLICANT shall abide by the conditions of this MOU which are as follows:

- To operate by all applicable State, County, and City laws/ordinances.
- To utilize “plain language” for all transmissions.
- To monitor the Calling Channel(s) and coordinate the use of the Tactical Channels.
- To identify inappropriate use and mitigate the same from occurring in the future.
- To limit secondary Trunked operation to the interoperability channels specifically approved on the application and limited to channels listed below.
- To relinquish secondary Trunked operation of approved interoperability channels to requests for primary conventional access with same or higher priority.
- To mitigate contention for channels by exercising the Priority Levels identified in this MOU.

700 MHz Regional Plan for West Virginia

The preceding conditions are the primary, though not complete, requirements for operating in the interoperability channels. Refer to the Region Plan for the complete requirements list.

Priority Levels:

1. Disaster or extreme emergency operation for mutual aid and interagency communications;
2. Emergency or urgent operation involving imminent danger to life or property;
3. Special event control, generally of a preplanned nature (including Task Force operations)
4. Single agency secondary communications.

To resolve contention within the same priority, the channel should go to the organization with the wider span of control/authority. This shall be determined by the State Interoperability Executive Committee or RPC for the operation or by the levels of authority/government identified in the contention.

For clarification purposes and an aid to operate as authorized, any fixed base or mobile relay stations identified on the license for temporary locations (FCC station class FBT or FB2T, respectively) shall remain within the licensed area of operation. Similarly, vehicular/mobile repeater stations (FCC station class MO3) shall remain within the licensed area of operation. Federal agencies are permitted access to interoperability channels only as authorized by 47 CFR 2.102 (c) & 2.103 and Part 7.12 of the NTIA Manual.

Any violation of this MOU, the Region Plan, or FCC Rule shall be addressed immediately. The first level of resolution shall be between the parties involved, next the State Interoperability Executive Committee or RPC, and finally the FCC.

Secondary Trunked Channels

- |                            |                             |
|----------------------------|-----------------------------|
| 7TAC51 - Channel 23 & 24   | 7TMED65 - Channel 63 & 64   |
| 7TAC52 - Channel 103 & 104 | 7FIRE63 - Channel 143 & 144 |
| 7TAC53 - Channel 183 & 184 | 7LAW61 - Channel 223 & 224  |
| 7TAC54 - Channel 263 & 264 | 7MOB59 - Channel 303 & 304  |

\_\_\_\_\_ (typed or printed name of authorized signer)  
 \_\_\_\_\_ (authorized signer identified above and consistent with application)  
 \_\_\_\_\_ (date)  
 \_\_\_\_\_ (agency name)  
 \_\_\_\_\_ (agency address)  
 \_\_\_\_\_ (agency address)

700 MHz Regional Plan for West Virginia

\_\_\_\_\_ (agency address)  
\_\_\_\_\_ (signer's phone)  
\_\_\_\_\_ (signer's email address, if available)

***Appendix F***

**Summary of Minutes/Copies of notifications**

**Summary of Minutes of First Meeting  
May 19, 2005  
Charleston, WV**

The first meeting of the Region 44 (West Virginia) 700 MHz Regional Planning Committee was called to order on May 19, 2005 at 9 am by convener, Tom Burns, Director of Operations, West Virginia Office of Emergency Services.

After a brief explanation of the purpose of the meeting, Burns introduced Bette Rinehart, National Regulatory Affairs Manager, Motorola who gave a presentation on 700 MHz Regional Planning requirements and 700 MHz regulatory requirements.

After the presentation, Mr. Burns opened the floor for nominations for 700 MHz RPC Chairperson. Fred Smart nominated David Saffel for the position; Bill Wood seconded. Mr. Saffel was elected unanimously.

Copies of draft By-Laws were distributed to the attendees and, after a brief discussion were adopted.

The meeting was adjourned at 11 am.

**Meeting Minutes  
October 13, 2009  
Snowshoe, WV**

David Saffel called the meeting to order at 1 pm. He explained that a Writing Committee had been formed to develop a draft Plan using templates from the NCC as well as portions of adjacent Regions' 700 MHz Plans. Copies of this draft were made available to those in attendance and it will be posted on the WV APCO website.

Mr. Saffel briefly outlined the major elements of the Region 44 700 MHz Plan and asked attendees to review the draft and provide comments and suggestions to him via email.

The meeting was adjourned at 2 pm.

## Appendix G

### Frequency Allotments

County	Class	Bandwidth	Channel	Base Frequency	Mobile Frequency
Barbour	General Use	Voice 25 kHz	41-44	769.2625	799.2625
	General Use	Voice 25 kHz	121-124	769.7625	799.7625
	General Use	Voice 25 kHz	173-176	770.0875	800.0875
	General Use	Voice 25 kHz	377-380	771.3625	801.3625
	General Use	Voice 25 kHz	421-424	771.6375	801.6375
	General Use	Voice 25 kHz	465-468	771.9125	801.9125
	General Use	Voice 25 kHz	533-536	772.3375	802.3375
	General Use	Voice 25 kHz	909-912	774.6875	804.6875
Berkeley	General Use	Voice 25 kHz	169-172	770.0625	800.0625
	General Use	Voice 25 kHz	333-336	771.0875	801.0875
	General Use	Voice 25 kHz	377-380	771.3625	801.3625
	General Use	Voice 25 kHz	453-456	771.8375	801.8375
	General Use	Voice 25 kHz	529-532	772.3125	802.3125
	General Use	Voice 25 kHz	581-584	772.6375	802.6375
	General Use	Voice 25 kHz	665-668	773.1625	803.1625
	General Use	Voice 25 kHz	833-836	774.2125	804.2125
	General Use	Voice 25 kHz	901-904	774.6375	804.6375
	General Use	Voice 25 kHz	945-948	774.9125	804.9125
Boone	General Use	Voice 25 kHz	517-520	772.2375	802.2375
	General Use	Voice 25 kHz	565-568	772.5375	802.5375
	General Use	Voice 25 kHz	605-608	772.7875	802.7875
	General Use	Voice 25 kHz	821-824	774.1375	804.1375
	General Use	Voice 25 kHz	861-864	774.3875	804.3875
Braxton	General Use	Voice 25 kHz	17-20	769.1125	799.1125
	General Use	Voice 25 kHz	93-96	769.5875	799.5875
	General Use	Voice 25 kHz	373-376	771.3375	801.3375
	General Use	Voice 25 kHz	429-432	771.6875	801.6875
	General Use	Voice 25 kHz	469-472	771.9375	801.9375
	General Use	Voice 25 kHz	585-588	772.6625	802.6625
	General Use	Voice 25 kHz	629-632	772.9375	802.9375
	General Use	Voice 25 kHz	833-836	774.2125	804.2125
	General Use	Voice 25 kHz	877-880	774.4875	804.4875
Brooke	General Use	Voice 25 kHz	253-256	770.5875	800.5875
	General Use	Voice 25 kHz	485-488	772.0375	802.0375
	General Use	Voice 25 kHz	525-528	772.2875	802.2875
	General Use	Voice 25 kHz	605-608	772.7875	802.7875
	General Use	Voice 25 kHz	753-756	773.7125	803.7125
Cabell	General Use	Voice 25 kHz	97-100	769.6125	799.6125
	General Use	Voice 25 kHz	165-168	770.0375	800.0375
	General Use	Voice 25 kHz	209-212	770.3125	800.3125
	General Use	Voice 25 kHz	381-384	771.3875	801.3875
	General Use	Voice 25 kHz	433-436	771.7125	801.7125

700 MHz Regional Plan for West Virginia

	General Use	Voice 25 kHz	529-532	772.3125	802.3125
	General Use	Voice 25 kHz	621-624	772.8875	802.8875
	General Use	Voice 25 kHz	665-668	773.1625	803.1625
	General Use	Voice 25 kHz	745-748	773.6625	803.6625
	General Use	Voice 25 kHz	789-792	773.9375	803.9375
	General Use	Voice 25 kHz	865-868	774.4125	804.4125
	General Use	Voice 25 kHz	905-908	774.6625	804.6625
Calhoun	General Use	Voice 25 kHz	125-128	769.7875	799.7875
	General Use	Voice 25 kHz	177-180	770.1125	800.1125
	General Use	Voice 25 kHz	337-340	771.1125	801.1125
	General Use	Voice 25 kHz	389-392	771.4375	801.4375
	General Use	Voice 25 kHz	481-484	772.0125	802.0125
	General Use	Voice 25 kHz	789-792	773.9375	803.9375
Clay	General Use	Voice 25 kHz	209-212	770.3125	800.3125
	General Use	Voice 25 kHz	249-252	770.5625	800.5625
	General Use	Voice 25 kHz	357-360	771.2375	801.2375
	General Use	Voice 25 kHz	437-440	771.7375	801.7375
	General Use	Voice 25 kHz	489-492	772.0625	802.0625
	General Use	Voice 25 kHz	529-532	772.3125	802.3125
	General Use	Voice 25 kHz	745-748	773.6625	803.6625
Doddridge	General Use	Voice 25 kHz	169-172	770.0625	800.0625
	General Use	Voice 25 kHz	521-524	772.2625	802.2625
	General Use	Voice 25 kHz	561-564	772.5125	802.5125
	General Use	Voice 25 kHz	617-620	772.8625	802.8625
	General Use	Voice 25 kHz	673-676	773.2125	803.2125
Fayette	General Use	Voice 25 kHz	53-56	769.3375	799.3375
	General Use	Voice 25 kHz	217-220	770.3625	800.3625
	General Use	Voice 25 kHz	281-284	770.7625	800.7625
	General Use	Voice 25 kHz	341-344	771.1375	801.1375
	General Use	Voice 25 kHz	421-424	771.6375	801.6375
	General Use	Voice 25 kHz	509-512	772.1875	802.1875
	General Use	Voice 25 kHz	573-576	772.5875	802.5875
	General Use	Voice 25 kHz	625-628	772.9125	802.9125
	General Use	Voice 25 kHz	901-904	774.6375	804.6375
	General Use	Voice 25 kHz	945-948	774.9125	805.9125
Gilmer	General Use	Voice 25 kHz	381-384	771.3875	801.3875
	General Use	Voice 25 kHz	501-504	772.1375	802.1375
	General Use	Voice 25 kHz	541-544	772.3875	802.3875
	General Use	Voice 25 kHz	861-864	774.3875	804.3875
	General Use	Voice 25 kHz	917-920	774.7375	804.7375
Grant	General Use	Voice 25 kHz	17-20	769.1125	799.1125
	General Use	Voice 25 kHz	97-100	769.6125	799.6125
	General Use	Voice 25 kHz	413-416	771.5875	801.5875
	General Use	Voice 25 kHz	557-560	772.4875	802.4875
	General Use	Voice 25 kHz	673-676	773.2125	803.2125
Greenbrier	General Use	Voice 25 kHz	13-16	769.0875	799.0875

700 MHz Regional Plan for West Virginia

	General Use	Voice 25 kHz	245-248	770.5375	800.5375
	General Use	Voice 25 kHz	409-412	771.5625	801.5625
	General Use	Voice 25 kHz	453-456	771.8375	801.8375
	General Use	Voice 25 kHz	533-536	772.3375	802.3375
	General Use	Voice 25 kHz	593-596	772.7125	802.7125
	General Use	Voice 25 kHz	753-756	773.7125	803.7125
	General Use	Voice 25 kHz	793-796	773.9625	803.9625
Hampshire	General Use	Voice 25 kHz	209-212	770.3125	800.3125
	General Use	Voice 25 kHz	397-400	771.4875	801.4875
	General Use	Voice 25 kHz	445-448	771.7875	801.7875
	General Use	Voice 25 kHz	517-520	772.2375	802.2375
	General Use	Voice 25 kHz	589-592	772.6875	802.6875
	General Use	Voice 25 kHz	633-636	772.9625	802.9625
Hancock	General Use	Voice 25 kHz	173-176	770.0875	800.0875
	General Use	Voice 25 kHz	293-296	770.8375	800.8375
	General Use	Voice 25 kHz	377-380	771.3625	801.4625
	General Use	Voice 25 kHz	549-552	772.4375	802.4375
	General Use	Voice 25 kHz	597-600	772.7375	802.7375
	General Use	Voice 25 kHz	669-672	773.1875	803.1875
	General Use	Voice 25 kHz	793-796	773.9625	803.9625
Hardy	General Use	Voice 25 kHz	89-92	769.5625	799.5625
	General Use	Voice 25 kHz	173-176	770.0875	800.0875
	General Use	Voice 25 kHz	497-500	772.1125	802.1125
	General Use	Voice 25 kHz	545-548	772.4125	802.4125
	General Use	Voice 25 kHz	713-716	773.4625	803.4625
	General Use	Voice 25 kHz	781-784	773.8875	803.8875
Harrison	General Use	Voice 25 kHz	89-92	769.5625	799.5625
	General Use	Voice 25 kHz	137-140	769.8625	799.8625
	General Use	Voice 25 kHz	209-212	770.3125	800.3125
	General Use	Voice 25 kHz	325-328	771.0375	801.0375
	General Use	Voice 25 kHz	449-452	771.8125	801.8125
	General Use	Voice 25 kHz	489-492	772.0625	802.0625
	General Use	Voice 25 kHz	545-548	772.4125	802.4125
	General Use	Voice 25 kHz	609-612	772.8125	802.8125
	General Use	Voice 25 kHz	753-756	773.7125	803.7125
	General Use	Voice 25 kHz	797-800	773.9875	803.9875
	General Use	Voice 25 kHz	837-840	774.2375	804.2375
	General Use	Voice 25 kHz	945-948	774.9125	804.9125
Jackson	General Use	Voice 25 kHz	121-124	769.7625	799.7625
	General Use	Voice 25 kHz	205-208	770.2875	800.2875
	General Use	Voice 25 kHz	377-380	771.3625	801.3625
	General Use	Voice 25 kHz	425-428	771.6625	801.6625
	General Use	Voice 25 kHz	485-488	772.0375	802.0375
	General Use	Voice 25 kHz	577-580	772.6125	802.6125
	General Use	Voice 25 kHz	617-620	772.8625	802.8625
Jefferson	General Use	Voice 25 kHz	81-84	769.5125	799.5125
	General Use	Voice 25 kHz	281-284	770.7625	800.7625

700 MHz Regional Plan for West Virginia

	General Use	Voice 25 kHz	433-436	771.7125	801.7125
	General Use	Voice 25 kHz	521-524	772.2625	802.2625
	General Use	Voice 25 kHz	605-608	772.7875	802.7875
	General Use	Voice 25 kHz	753-756	773.7125	803.7125
Kanawha	General Use	Voice 25 kHz	45-48	769.2875	799.2875
	General Use	Voice 25 kHz	89-92	769.5625	799.5625
	General Use	Voice 25 kHz	129-132	769.8125	799.8125
	General Use	Voice 25 kHz	173-176	770.0875	800.0875
	General Use	Voice 25 kHz	241-244	770.5125	800.5125
	General Use	Voice 25 kHz	289-292	770.8125	800.8125
	General Use	Voice 25 kHz	329-332	771.0625	801.0625
	General Use	Voice 25 kHz	369-372	771.3125	801.3125
	General Use	Voice 25 kHz	413-416	771.5875	801.5875
	General Use	Voice 25 kHz	477-480	771.9875	801.9875
	General Use	Voice 25 kHz	537-540	772.3625	802.3625
	General Use	Voice 25 kHz	589-592	772.6875	802.6875
	General Use	Voice 25 kHz	637-640	772.9875	802.9875
	General Use	Voice 25 kHz	677-680	773.2375	803.2375
	General Use	Voice 25 kHz	717-720	773.4875	803.4875
	General Use	Voice 25 kHz	757-760	773.7375	803.7375
	General Use	Voice 25 kHz	797-800	773.9875	803.9875
	General Use	Voice 25 kHz	873-876	774.4625	804.4625
	General Use	Voice 25 kHz	913-916	774.7125	804.7125
Lewis	General Use	Voice 25 kHz	81-84	769.5125	799.5125
	General Use	Voice 25 kHz	129-132	769.8125	799.8125
	General Use	Voice 25 kHz	341-344	771.1375	801.1375
	General Use	Voice 25 kHz	413-416	771.5875	801.5875
	General Use	Voice 25 kHz	509-512	772.1875	802.1875
	General Use	Voice 25 kHz	637-640	772.9875	802.9875
	General Use	Voice 25 kHz	821-824	774.1375	804.1375
Lincoln	General Use	Voice 25 kHz	81-84	769.5125	799.5125
	General Use	Voice 25 kHz	345-348	771.1625	801.1625
	General Use	Voice 25 kHz	453-456	771.8375	801.8375
	General Use	Voice 25 kHz	581-584	772.6375	802.6375
	General Use	Voice 25 kHz	629-632	772.9375	802.9375
	General Use	Voice 25 kHz	833-836	774.2125	804.2125
Logan	General Use	Voice 25 kHz	213-216	770.3375	800.3375
	General Use	Voice 25 kHz	285-288	770.7875	800.7875
	General Use	Voice 25 kHz	417-420	771.6125	801.6125
	General Use	Voice 25 kHz	501-504	772.1375	802.1375
	General Use	Voice 25 kHz	545-548	772.4125	802.4125
	General Use	Voice 25 kHz	613-616	772.8375	802.8375
	General Use	Voice 25 kHz	909-912	774.6875	804.6875
Marion	General Use	Voice 25 kHz	45-48	769.2875	799.2875
	General Use	Voice 25 kHz	125-128	769.7875	799.7875
	General Use	Voice 25 kHz	241-244	770.5125	800.5125
	General Use	Voice 25 kHz	373-376	771.3375	801.3375
	General Use	Voice 25 kHz	425-428	771.6625	801.6625

700 MHz Regional Plan for West Virginia

	General Use	Voice 25 kHz	469-472	771.9375	801.9375
	General Use	Voice 25 kHz	529-532	772.3125	802.3125
	General Use	Voice 25 kHz	581-584	772.6375	802.6375
	General Use	Voice 25 kHz	629-632	772.9375	802.9375
	General Use	Voice 25 kHz	825-828	774.1625	804.1625
	General Use	Voice 25 kHz	913-916	774.7125	804.7125
Marshall	General Use	Voice 25 kHz	205-208	770.2875	800.2875
	General Use	Voice 25 kHz	281-284	770.7625	800.7625
	General Use	Voice 25 kHz	361-364	771.2625	801.2625
	General Use	Voice 25 kHz	477-480	771.9875	801.9875
	General Use	Voice 25 kHz	517-520	772.2375	802.2375
	General Use	Voice 25 kHz	565-568	772.5375	802.5375
	General Use	Voice 25 kHz	633-636	772.9625	802.9625
	General Use	Voice 25 kHz	941-944	774.8875	804.8875
Mason	General Use	Voice 25 kHz	361-364	771.2625	801.2625
	General Use	Voice 25 kHz	401-404	771.5125	801.5125
	General Use	Voice 25 kHz	509-512	772.1875	802.1875
	General Use	Voice 25 kHz	553-556	772.4625	802.4625
	General Use	Voice 25 kHz	709-712	773.4375	803.4375
	General Use	Voice 25 kHz	945-948	774.9125	804.9125
McDowell	General Use	Voice 25 kHz	49-52	769.3125	799.3125
	General Use	Voice 25 kHz	437-400	771.7375	801.7375
	General Use	Voice 25 kHz	513-516	772.2125	802.2125
	General Use	Voice 25 kHz	561-564	772.5125	802.5125
	General Use	Voice 25 kHz	825-828	774.1625	804.1625
	General Use	Voice 25 kHz	865-868	774.4125	804.4125
Mercer	General Use	Voice 25 kHz	97-100	769.6125	799.6125
	General Use	Voice 25 kHz	137-140	769.8625	799.8625
	General Use	Voice 25 kHz	209-212	770.3125	800.3125
	General Use	Voice 25 kHz	361-364	771.2625	801.2625
	General Use	Voice 25 kHz	429-432	771.6875	801.6875
	General Use	Voice 25 kHz	481-484	772.0125	802.0125
	General Use	Voice 25 kHz	521-524	772.2625	802.2625
	General Use	Voice 25 kHz	609-612	772.8125	802.8125
	General Use	Voice 25 kHz	673-676	773.2125	803.2125
	General Use	Voice 25 kHz	877-880	774.4875	804.4875
Mineral	General Use	Voice 25 kHz	245-248	770.5375	800.5375
	General Use	Voice 25 kHz	345-348	771.1625	801.1625
	General Use	Voice 25 kHz	469-472	771.9375	801.9375
	General Use	Voice 25 kHz	509-512	772.1875	802.1875
	General Use	Voice 25 kHz	573-576	772.5875	802.5875
	General Use	Voice 25 kHz	625-628	772.9125	802.9125
	General Use	Voice 25 kHz	825-828	774.1625	804.1625
Mingo	General Use	Voice 25 kHz	293-296	770.8375	800.8375
	General Use	Voice 25 kHz	357-360	771.2375	801.2375
	General Use	Voice 25 kHz	461-464	771.8875	801.8875
	General Use	Voice 25 kHz	533-536	772.3375	802.3375

700 MHz Regional Plan for West Virginia

	General Use	Voice 25 kHz	597-600	772.7375	802.7375
	General Use	Voice 25 kHz	785-788	773.9125	803.9125
Monongalia	General Use	Voice 25 kHz	13-16	769.0875	799.0875
	General Use	Voice 25 kHz	93-96	769.5875	799.5875
	General Use	Voice 25 kHz	217-220	770.3625	800.3625
	General Use	Voice 25 kHz	293-296	770.8375	800.8375
	General Use	Voice 25 kHz	337-340	771.1125	801.1125
	General Use	Voice 25 kHz	405-408	771.5375	801.5375
	General Use	Voice 25 kHz	445-448	771.7875	801.7875
	General Use	Voice 25 kHz	501-504	772.1375	802.1375
	General Use	Voice 25 kHz	549-552	772.4375	802.4375
	General Use	Voice 25 kHz	589-592	772.6875	802.6875
	General Use	Voice 25 kHz	665-668	773.1625	803.1625
	General Use	Voice 25 kHz	705-708	773.4125	803.4125
	General Use	Voice 25 kHz	833-836	774.2125	804.2125
Monroe	General Use	Voice 25 kHz	345-348	771.1625	801.1625
	General Use	Voice 25 kHz	489-492	772.0625	802.0625
	General Use	Voice 25 kHz	545-548	772.4125	802.4125
	General Use	Voice 25 kHz	585-588	772.6625	802.6625
	General Use	Voice 25 kHz	705-708	773.4125	803.4125
Morgan	General Use	Voice 25 kHz	257-260	770.6125	800.6125
	General Use	Voice 25 kHz	429-432	771.6875	801.6875
	General Use	Voice 25 kHz	489-492	772.0625	802.0625
	General Use	Voice 25 kHz	537-540	772.3625	802.3625
	General Use	Voice 25 kHz	609-612	772.8125	802.8125
Nicholas	General Use	Voice 25 kHz	165-168	770.0375	800.0375
	General Use	Voice 25 kHz	321-324	771.0125	801.0125
	General Use	Voice 25 kHz	397-400	771.4875	801.4875
	General Use	Voice 25 kHz	461-464	771.8875	801.8875
	General Use	Voice 25 kHz	557-560	772.4875	802.4875
	General Use	Voice 25 kHz	665-668	773.1625	803.1625
	General Use	Voice 25 kHz	785-788	773.9125	803.9125
	General Use	Voice 25 kHz	825-828	774.1625	804.1625
	General Use	Voice 25 kHz	865-868	774.4125	804.4125
Ohio	General Use	Voice 25 kHz	85-88	769.5375	799.5375
	General Use	Voice 25 kHz	213-216	770.3375	800.3375
	General Use	Voice 25 kHz	333-336	771.0875	801.0875
	General Use	Voice 25 kHz	381-384	771.3875	801.3875
	General Use	Voice 25 kHz	461-464	771.8875	801.8875
	General Use	Voice 25 kHz	533-536	772.3375	802.3375
	General Use	Voice 25 kHz	613-616	772.8375	802.8375
	General Use	Voice 25 kHz	661-664	773.1375	803.1375
Pendleton	General Use	Voice 25 kHz	249-252	770.5625	800.5625
	General Use	Voice 25 kHz	357-360	771.2375	801.2375
	General Use	Voice 25 kHz	433-436	771.7125	801.7125
	General Use	Voice 25 kHz	749-752	773.6875	803.6875
	General Use	Voice 25 kHz	865-868	774.4125	804.4125

700 MHz Regional Plan for West Virginia

Pleasants	General Use	Voice 25 kHz	49-52	769.3125	799.3125
	General Use	Voice 25 kHz	253-256	770.5875	800.5875
	General Use	Voice 25 kHz	393-396	771.4625	801.4625
	General Use	Voice 25 kHz	533-536	772.3375	802.3375
	General Use	Voice 25 kHz	613-616	772.8375	802.8375
	General Use	Voice 25 kHz	709-712	773.4375	803.4375
Pocahontas	General Use	Voice 25 kHz	49-52	769.3125	799.3125
	General Use	Voice 25 kHz	205-208	770.2875	800.2875
	General Use	Voice 25 kHz	257-260	770.6125	800.6125
	General Use	Voice 25 kHz	473-476	771.9625	801.9625
	General Use	Voice 25 kHz	577-580	772.6125	802.6125
	General Use	Voice 25 kHz	701-704	773.3875	803.3875
Preston	General Use	Voice 25 kHz	57-60	769.3625	799.3625
	General Use	Voice 25 kHz	285-288	770.7875	800.7875
	General Use	Voice 25 kHz	481-484	772.0125	802.0125
	General Use	Voice 25 kHz	621-624	772.8875	802.8875
	General Use	Voice 25 kHz	793-796	773.9625	803.9625
	General Use	Voice 25 kHz	861-864	774.3875	804.3875
	General Use	Voice 25 kHz	901-904	774.6375	804.6375
Putnam	General Use	Voice 25 kHz	13-16	769.0875	799.0875
	General Use	Voice 25 kHz	253-256	770.5875	800.5875
	General Use	Voice 25 kHz	297-300	770.8625	800.8625
	General Use	Voice 25 kHz	353-356	771.2125	801.2125
	General Use	Voice 25 kHz	393-396	771.4625	801.4625
	General Use	Voice 25 kHz	469-472	771.9375	801.9375
	General Use	Voice 25 kHz	521-524	772.2625	802.2625
	General Use	Voice 25 kHz	569-572	772.5625	802.5625
	General Use	Voice 25 kHz	609-612	772.8125	802.8125
Raleigh	General Use	Voice 25 kHz	161-164	770.0125	800.0125
	General Use	Voice 25 kHz	201-204	770.2625	800.2625
	General Use	Voice 25 kHz	257-260	770.6125	800.6125
	General Use	Voice 25 kHz	349-352	771.1875	801.1875
	General Use	Voice 25 kHz	401-404	771.5125	801.5125
	General Use	Voice 25 kHz	465-468	771.9125	801.9125
	General Use	Voice 25 kHz	661-664	773.1375	803.1375
	General Use	Voice 25 kHz	701-704	773.3875	803.3875
	General Use	Voice 25 kHz	741-744	773.6375	803.6375
	General Use	Voice 25 kHz	781-784	773.8875	803.8875
	General Use	Voice 25 kHz	837-840	774.2375	804.2375
Randolph	General Use	Voice 25 kHz	281-284	770.7625	800.7625
	General Use	Voice 25 kHz	329-332	771.0625	801.0625
	General Use	Voice 25 kHz	369-372	771.3125	801.3125
	General Use	Voice 25 kHz	441-444	771.7625	801.7625
	General Use	Voice 25 kHz	493-496	772.0875	802.0875
	General Use	Voice 25 kHz	565-568	772.5375	802.5375
	General Use	Voice 25 kHz	605-608	772.7875	802.7875
	General Use	Voice 25 kHz	873-876	774.4625	804.4625

700 MHz Regional Plan for West Virginia

Ritchie	General Use	Voice 25 kHz	349-352	771.1875	801.1875
	General Use	Voice 25 kHz	433-436	771.7125	801.7125
	General Use	Voice 25 kHz	569-572	772.5625	802.5625
	General Use	Voice 25 kHz	741-744	773.6375	803.6375
	General Use	Voice 25 kHz	781-784	773.8875	803.8875
	General Use	Voice 25 kHz	829-832	774.1875	804.1875
Roane	General Use	Voice 25 kHz	137-140	769.8625	799.8625
	General Use	Voice 25 kHz	445-448	771.7875	801.7875
	General Use	Voice 25 kHz	513-516	772.2125	802.2125
	General Use	Voice 25 kHz	597-600	772.7375	802.7375
	General Use	Voice 25 kHz	705-708	773.4125	803.4125
	General Use	Voice 25 kHz	941-944	774.8875	804.8875
Summers	General Use	Voice 25 kHz	125-128	769.7875	799.7875
	General Use	Voice 25 kHz	325-328	771.0375	801.0375
	General Use	Voice 25 kHz	393-396	771.4625	801.4625
	General Use	Voice 25 kHz	441-444	771.7625	801.7625
	General Use	Voice 25 kHz	633-636	772.9625	802.9625
Taylor	General Use	Voice 25 kHz	253-256	770.5875	800.5875
	General Use	Voice 25 kHz	389-392	771.4375	801.4375
	General Use	Voice 25 kHz	437-440	771.7375	801.7375
	General Use	Voice 25 kHz	597-600	772.7375	802.7375
	General Use	Voice 25 kHz	677-680	773.2375	803.2375
	General Use	Voice 25 kHz	785-788	773.9125	803.9125
Tucker	General Use	Voice 25 kHz	297-300	770.8625	800.8625
	General Use	Voice 25 kHz	393-396	771.4625	801.4625
	General Use	Voice 25 kHz	585-588	772.6625	802.6625
	General Use	Voice 25 kHz	717-720	773.4875	803.4875
	General Use	Voice 25 kHz	757-760	773.7375	803.7375
Tyler	General Use	Voice 25 kHz	245-248	770.5375	800.5375
	General Use	Voice 25 kHz	289-292	770.8125	800.8125
	General Use	Voice 25 kHz	357-360	771.2375	801.2375
	General Use	Voice 25 kHz	553-556	772.4625	802.4625
	General Use	Voice 25 kHz	905-908	774.6625	804.6625
Upshur	General Use	Voice 25 kHz	161-164	770.0125	800.0125
	General Use	Voice 25 kHz	201-204	770.2625	800.2625
	General Use	Voice 25 kHz	361-364	771.2625	801.2625
	General Use	Voice 25 kHz	401-404	771.5125	801.5125
	General Use	Voice 25 kHz	477-480	771.9875	801.9875
	General Use	Voice 25 kHz	517-520	772.2375	802.2375
	General Use	Voice 25 kHz	573-576	772.5875	802.5875
	General Use	Voice 25 kHz	661-664	773.1375	803.1375
	General Use	Voice 25 kHz	713-716	773.4625	803.4625
Wayne	General Use	Voice 25 kHz	56-60	769.3625	799.3625
	General Use	Voice 25 kHz	133-136	769.8375	799.8375
	General Use	Voice 25 kHz	249-252	770.5625	800.5625

700 MHz Regional Plan for West Virginia

	General Use	Voice 25 kHz	405-408	771.5375	801.5375
	General Use	Voice 25 kHz	445-448	771.7875	801.7875
	General Use	Voice 25 kHz	713-716	773.4625	803.4625
	General Use	Voice 25 kHz	877-880	774.4875	804.4875
Webster	General Use	Voice 25 kHz	213-216	770.3375	800.3375
	General Use	Voice 25 kHz	293-296	770.8375	800.8375
	General Use	Voice 25 kHz	353-356	771.2125	801.2125
	General Use	Voice 25 kHz	525-528	772.2875	802.2875
	General Use	Voice 25 kHz	621-624	772.8875	802.8875
Wetzel	General Use	Voice 25 kHz	257-260	770.6125	800.6125
	General Use	Voice 25 kHz	345-348	771.1625	801.1625
	General Use	Voice 25 kHz	385-388	771.4125	801.4125
	General Use	Voice 25 kHz	537-540	772.3625	802.3625
	General Use	Voice 25 kHz	789-792	773.9375	803.9375
Wirt	General Use	Voice 25 kHz	53-56	769.3375	799.3375
	General Use	Voice 25 kHz	365-368	771.2875	801.2875
	General Use	Voice 25 kHz	405-408	771.5375	801.5375
	General Use	Voice 25 kHz	633-636	772.9625	802.9625
	General Use	Voice 25 kHz	901-904	774.6375	804.6375
Wood	General Use	Voice 25 kHz	85-88	769.5375	799.5375
	General Use	Voice 25 kHz	133-136	769.8375	799.8375
	General Use	Voice 25 kHz	217-220	770.3625	800.3625
	General Use	Voice 25 kHz	285-288	770.7875	800.7875
	General Use	Voice 25 kHz	417-420	771.6125	801.6125
	General Use	Voice 25 kHz	465-468	771.9125	801.9125
	General Use	Voice 25 kHz	505-508	772.1625	802.1625
	General Use	Voice 25 kHz	549-552	772.4375	802.4375
	General Use	Voice 25 kHz	601-604	772.7625	802.7625
	General Use	Voice 25 kHz	669-672	773.1875	803.1875
	General Use	Voice 25 kHz	749-752	773.6875	803.6875
	General Use	Voice 25 kHz	793-796	773.9625	803.9625
	General Use	Voice 25 kHz	909-912	774.6875	804.6875
Wyoming	General Use	Voice 25 kHz	17-20	769.1125	799.1125
	General Use	Voice 25 kHz	85-88	769.5375	799.5375
	General Use	Voice 25 kHz	169-172	770.0625	800.0625
	General Use	Voice 25 kHz	337-340	771.1125	801.1125
	General Use	Voice 25 kHz	389-392	771.4375	801.4375
	General Use	Voice 25 kHz	493-496	772.0875	802.0875
	General Use	Voice 25 kHz	709-712	773.4375	803.4375

## **Appendix H**

### **Pre-Coordination Procedures Simplified 700 MHz Pre-assignment Rules**

#### **Introduction**

This paper describes a process for coordinating the initial block assignments of 700 MHz channels before details of actual system deployments is available. In this initial phase, there is little actual knowledge of the specific equipment to be deployed and the exact antenna sites locations. As a result, a simple, high-level method is proposed to establish guidelines for frequency coordination. When actual systems are deployed, additional details will be known and the system designers will be required to select specific sites and supporting hardware to control interference.

#### **Overview**

Assignments will be based on a defined service area for each applicant. This will normally be an area defined by geographical or political boundaries such as city, county or by a data file consisting of line segments creating a polygon that encloses the defined area. The service contour is normally allowed to extend slightly beyond the geo/political boundaries such that systems can be designed for maximum signal levels within the boundaries, or coverage area. Systems must also be designed to minimize signal levels outside their geo/political boundaries to avoid interference into the coverage area of other co-channel users.

For co-channel assignments, the 40 dB $\mu$  service contour will be allowed to extend beyond the defined service area by 3 to 5 miles, depending on the type of environment: urban, suburban or rural. The co-channel 5 dB $\mu$  interfering contour will be allowed to touch but not overlap the 40 dB $\mu$  service contour of the system being evaluated. All contours are (50,50).

For adjacent and alternate channels, the 60 dB $\mu$  interfering contour will be allowed to touch but not overlap the 40 dB $\mu$  service contour of the system being evaluated. All contours are (50,50).

#### **Discussion**

Based upon the ERP/HAAT limitations referenced in 47CFR ¶ 90.541(a), the maximum field strength will be limited to 40 dB relative to 1 $\mu$ V/m (customarily denoted as 40 dB $\mu$ ). It is assumed that this limitation will be applied similar to the

way it is applied in the 821-824/866-869 MHz band. That is, a 40 dB $\mu$  field strength can be deployed up to a defined distance beyond the edge of the service area, based on the size of the service area or type of applicant, i.e. city, county or statewide system. This is important that public safety systems have adequate margins for reliability within their service area in the presence of interference, including the potential for interference from CMRS infrastructure in adjacent bands.

The value of 40 dB $\mu$  in the 700 MHz band corresponds to a signal of -92.7 dBm, received by a half-wavelength dipole ( $\lambda/2$ ) antenna. The thermal noise floor for a 6.25 kHz bandwidth receiver would be in the range of -126 dBm, so there is a margin of approximately 33 dB available for “noise limited” reliability. Figure 1 shows show the various interfering sources and how they accumulate to form a composite noise floor that can be used to determine the “reliability” or probability of achieving the desired performance in the presence of various interfering sources with differing characteristics.

If CMRS out-of-band emissions (OOBE) noise is allowed to be equal to the original thermal noise floor, there is a 3 dB reduction<sup>1</sup> in the available margin. This lowers the reliability and/or the channel performance of Public Safety systems. The left side of Figure 1 shows that the original 33 dB margin is reduced by 3 dB to only 30 dB available to determine “noise + CMRS OOBE limited” performance and reliability.

There are also different technologies with various channel bandwidths and different performance criteria. C/N in the range of 17 – 20 dB is required to achieve channel performance.

---

<sup>1</sup> TIA TR8 made this 3 dB allowance for CMRS OOBE noise during the meetings in Mesa, AZ, January 2001.

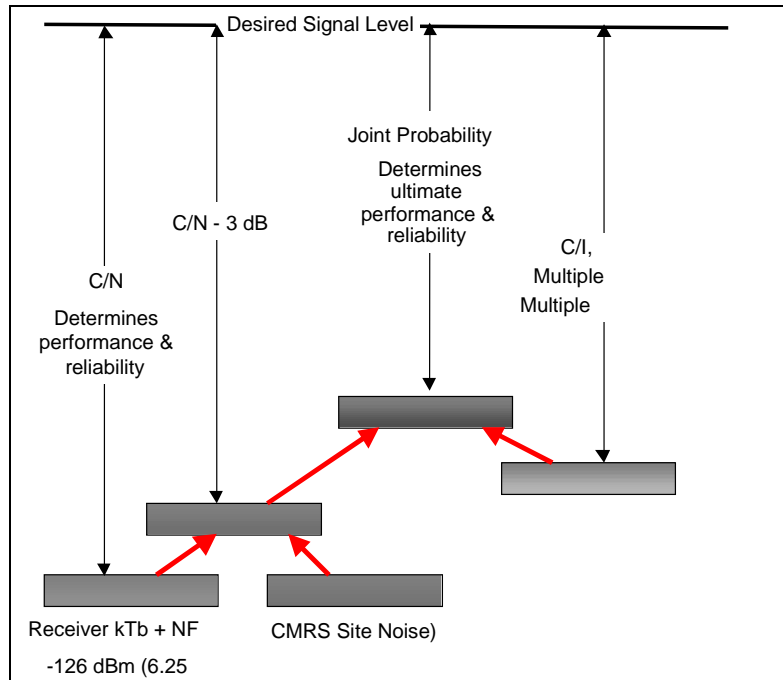


Figure 1 - Interfering Sources Create A “Noise” Level Influencing Reliability

In addition, unknown adjacent and alternate channel assignments need to be accounted for. The co-channel and adjacent/alternate sources are shown in the right hand side of Figure 1. At the edge of the service area, there would normally be only a single co-channel source, but there could potentially be several adjacent or alternate channel sources involved. It is recommended that co-channel assignments limit interference to <1% at the edge of the service area (worst case mile). A C/I ratio of 26.4 dB plus the required capture value (~10 dB) is required to achieve this goal.<sup>2</sup>

The ultimate performance and reliability has to take into consideration both the noise sources (thermal & CMRS OOB) and all the interference sources. The center of Figure 1 shows that the joint probability that the both performance criteria and interference criteria are met must be determined.

Table 1 shows estimated performance considering the 3 dB rise in the noise floor at the 40 dBμ signal level. Performance varies due to the different Cf/N requirements and noise floors of the different modulations and channel bandwidths.

Note that since little is known about the affects of terrain, an initial lognormal standard deviation of 8 dB is used.

<sup>2</sup> See Appendix A for an explanation of how the 1% interference value is defined and derived.

<b>Comparison of Joint Reliability for various</b>				
Channel Bandwidth	6.25 kHz	12.5 kHz	12.5 kHz	25.0 kHz
Receiver ENBW (kHz)	6	6	9	18
Noise Figure(10 dB)	10	10	10	10
Receiver Noise Floor (dBm)	-126.22	-126.22	-124.46	-121.45
Rise in Noise Floor (dB)	3.00	3.00	3.00	3.00
New Receiver Noise Floor (dB)	-123.22	-123.22	-121.46	-118.45
40 dBu = -92.7 dBm	-92.7	-92.7	-92.7	-92.7
Receiver Capture (dB)	10.0	10.0	10.0	10.0
Noise Margin (dB)	30.52	30.52	28.76	25.75
C/N Required for DAQ = 3	17.0	17.0	18.0	20.0
C/N Margin (dB)	<b>13.52</b>	<b>13.52</b>	<b>10.76</b>	<b>5.75</b>
Standard deviation (8 dB)	8.0	8.0	8.0	8.0
Z	1.690	1.690	1.345	0.718
Noise Reliability (%)	<b>95.45%</b>	<b>95.45%</b>	<b>91.06%</b>	<b>76.37%</b>
C/I for <1% prob of capture	36.4	36.4	36.4	36.4
I (dBu)	3.7	3.7	3.7	3.7
I (dBm)	-129.0	-129.0	-129.0	-129.0
Joint Probability (C & I)	<b>94.7%</b>	<b>94.7%</b>	<b>90.4%</b>	<b>76.1%</b>

40 dBu = -92.7 dBm @ 770 MHz

Table 1 Joint Probability For Project 25, 700 MHz Equipment Configurations.

These values are appropriate for a mobile on the street, but are considerably short to provide reliable communications to portables inside buildings.

### Portable In-Building Coverage

Most Public Safety communications systems, today, are designed for portable in-building<sup>3</sup> coverage and the requirement for >95 % reliable coverage. To analyze the impact of requiring portable in building coverage and designing to a 40 dBμ service contour, several scenarios are presented. The different scenarios involve a given separation from the desired sites. Whether simulcast or multi-cast is used in wide-area systems, the antenna sites must be placed near the service area boundary and directional antennas, directed into the service area, must be used. The impact of simulcast is included to show that the 40 dBμ service contour must be able to fall outside the edge of the service area in order to meet coverage requirements at the edge of the service area. From the analysis, recommendations are made on how far the 40 dBμ service contour should extend beyond the service area.

Table 2 estimates urban coverage where simulcast is required to achieve the desired portable in building coverage. Several assumptions are required to use this estimate.

<sup>3</sup> Building penetration losses typically required for urban = 20 dB, suburban = 15 dB, rural = 10 dB.

700 MHz Regional Plan for West Virginia

- Distance from the location to each site. Equal distance is assumed.
- CMRS noise is reduced when entering buildings. This is not a guarantee as the type of deployments is unknown. It is possible that CMRS units may have transmitters inside buildings. This could be potentially a large contributor unless the CMRS OOB is suppressed to TIA's most recent recommendation and the "site isolation" is maintained at 65 dB minimum.
- The 40 dBμ service contour is allowed to extend beyond the edge of the service area boundary.
- Other configurations may be deployed utilizing additional sites, lower tower heights, lower ERP and shorter site separations.

Estimated Performance at 2.5 miles from each site				
Channel Bandwidth	6.25 kHz	12.5 kHz	12.5 kHz	25.0 kHz
Receiver Noise Floor (dBm)	-126.20	-126.20	-124.50	-118.50
Signal at 2.5 miles (dBm)	-72.7	-72.7	-72.7	-72.7
Margin (dB)	53.50	53.50	51.80	45.80
C/N Required for DAQ = 3	17.0	17.0	18.0	20.0
Building Loss (dB)	20	20	20	20
Antenna Loss (dBd)	8	8	8	8
Reliability Margin	8.50	8.50	5.80	-2.20
Z	1.0625	1.0625	0.725	-0.275
Single Site Noise Reliability (%)	<b>85.60%</b>	<b>85.60%</b>	<b>76.58%</b>	<b>39.17%</b>
Simulcast with 2 sites	97.93%	97.93%	94.51%	62.99%
Simulcast with 3 sites	99.70%	99.70%	98.71%	77.49%
Simulcast with 4 sites	99.96%	99.96%	99.70%	86.30%

Table 2, Estimated Performance From Site(s) 2.5 Miles From Typical Urban Buildings.

Table 2 shows for the example case of 2.5 miles a single site cannot provide >95% reliability. Either more sites must be used to reduce the distance or other system design techniques must be used to improve the reliability. For example, the table shows that simulcast can be used to achieve public safety levels of reliability at this distance. Table 2 also shows that the difference in performance margin requirements for wider bandwidth channels requires more sites and closer site-to-site separation.

Figures 2 and 3 show how the configurations would potentially be deployed for a typical site with 240 Watts ERP. This is based on:

- 75 Watt transmitter, 18.75 dBW

700 MHz Regional Plan for West Virginia

- 200 foot tower
- 10 dBd 180 degree sector antenna
- 5 dB of cable/filter loss.

+10.0 dBd  
 - 5.0 dB  
 23.75 dBW  $\approx$  240 Watts (ERPd)

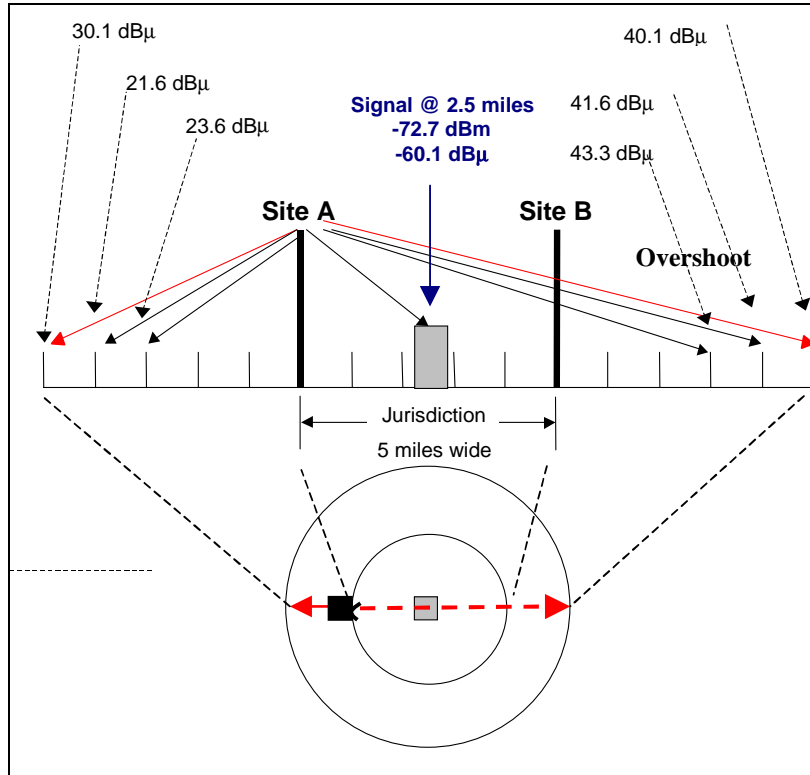


Figure 2 - Field Strength From Left Most Site.

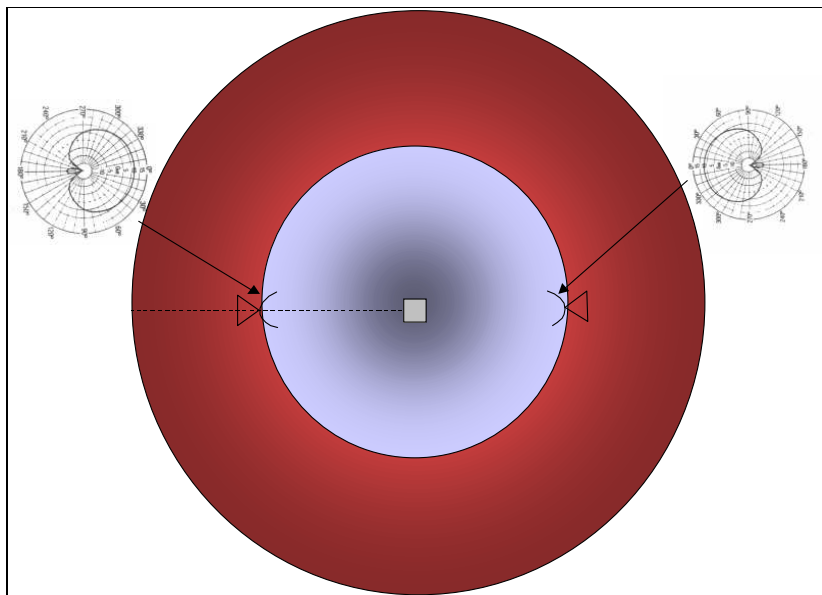


Figure 3 - Antenna Configuration Required To Limit Field Strength Off “Backside”

Figure 2 is for an urbanized area with a jurisdiction defined as a 5 mile circle. To provide the necessary coverage to portables in buildings at the center of the jurisdiction requires that the sites be placed along the edge of the service area and utilize directional antennas oriented toward the center of the service area (Figure 3). In this case, at 5 miles beyond the edge of the service area, the sites would produce a composite field strength of approximately 40 dB $\mu$ . Since one site is over 10 dB dominant, the contribution from the other site is not considered. The control of the field strength behind the site relies on a 20 dB antenna with a Front to Back Ratio (F/B) specification as shown in Figure 3. This performance may be optimistic due to back scatter off local obstructions in urbanized areas. However, use of antennas on the sides of buildings can assist in achieving better F/B ratios and the initial planning is not precise enough to prohibit using the full 20 dB.

The use of a single site at the center of the service area is not normally practical. To provide the necessary signal strength at the edge of the service area would produce a field strength 5 miles beyond in excess of 44 dB $\mu$ . However, if the high loss buildings were concentrated at the service area’s center, then potentially a single site could be deployed, assuming that the building loss sufficiently decreases near the edge of the service area allowing a reduction in ERP to achieve the desired reliability.

Downtilting of antennas, instead of directional antennas, to control the 40 dB $\mu$  is not practical, in this scenario. For a 200 foot tall tower, the center of radiation from a 3 dB down-tilt antenna hits the ground at ~ 0.75 miles<sup>4</sup>. The difference in angular discrimination from a 200 foot tall tower at service area boundary at 5 miles and service contour at 10 miles is approximately 0.6 degrees, so ERP is basically the same as ERP toward the horizon. It would not be possible to achieve necessary signal strength at service area boundary and have 40 dB $\mu$  service contour be less than 5 miles away.

Tables 3 and 4 represent the same configuration, but for less dense buildings. In these cases, the distance to extend the 40 dB $\mu$  service contour can be determined from Table 5.

---

<sup>4</sup> Use of high gain antennas with down-tilt on low-level sites is one of the causes of far-near interference experienced in the 800 MHz band.

700 MHz Regional Plan for West Virginia

Estimated Performance at 3.5 miles from each site				
Channel Bandwidth	6.25 kHz	12.5 kHz	12.5 kHz	25.0 kHz
Receiver Noise Floor (dBm)	-126.20	-126.20	-124.50	-118.50
Signal at 3.5 miles (dBm)	-77.7	-77.7	-77.7	-77.7
Margin (dB)	48.50	48.50	46.80	40.80
C/N Required for DAQ = 3	17.0	17.0	18.0	20.0
Building Loss (dB)	15	15	15	15
Antenna Loss (dBd)	8	8	8	8
Reliability Margin	8.50	8.50	5.80	-2.20
Z	1.0625	1.0625	0.725	-0.275
Single Site Noise Reliability (%)	<b>85.60%</b>	<b>85.60%</b>	<b>76.58%</b>	<b>39.17%</b>
Simulcast with 2 sites	97.93%	97.93%	94.51%	62.99%
Simulcast with 3 sites	99.70%	99.70%	98.71%	77.49%
Simulcast with 4 sites	99.96%	99.96%	99.70%	86.30%

Table 3 - Lower Loss Buildings, 3.5 Mile From Site(s)

Estimated Performance at 5.0 miles from each site				
Channel Bandwidth	6.25 kHz	12.5 kHz	12.5 kHz	25.0 kHz
Receiver Noise Floor (dBm)	-126.20	-126.20	-124.50	-118.50
Signal at 5.0 miles (dBm)	-82.7	-82.7	-82.7	-82.7
Margin (dB)	43.50	43.50	41.80	35.80
C/N Required for DAQ = 3	17.0	17.0	18.0	20.0
Building Loss (dB)	10	10	10	10
Antenna Loss (dBd)	8	8	8	8
Reliability Margin	8.50	8.50	5.80	-2.20
Z	1.0625	1.0625	0.725	-0.275
Single Site Noise Reliability (%)	<b>85.60%</b>	<b>85.60%</b>	<b>76.58%</b>	<b>39.17%</b>
Simulcast with 2 sites	97.93%	97.93%	94.51%	62.99%
Simulcast with 3 sites	99.70%	99.70%	98.71%	77.49%
Simulcast with 4 sites	99.96%	99.96%	99.70%	86.30%

Table 4 - Low Loss Buildings, 5.0 Miles From Site(s)

Note that the receive signals were adjusted to offset the lowered building penetration loss. This produces the same numerical reliability results, but allows increasing the site to building separation and this in turn lowers the magnitude of the “overshoot” across the service area.

Table 5 shows the field strength for a direct path and for a path reduced by a 20 dB F/B antenna. This allows the analysis to be simplified for the specific example being discussed.

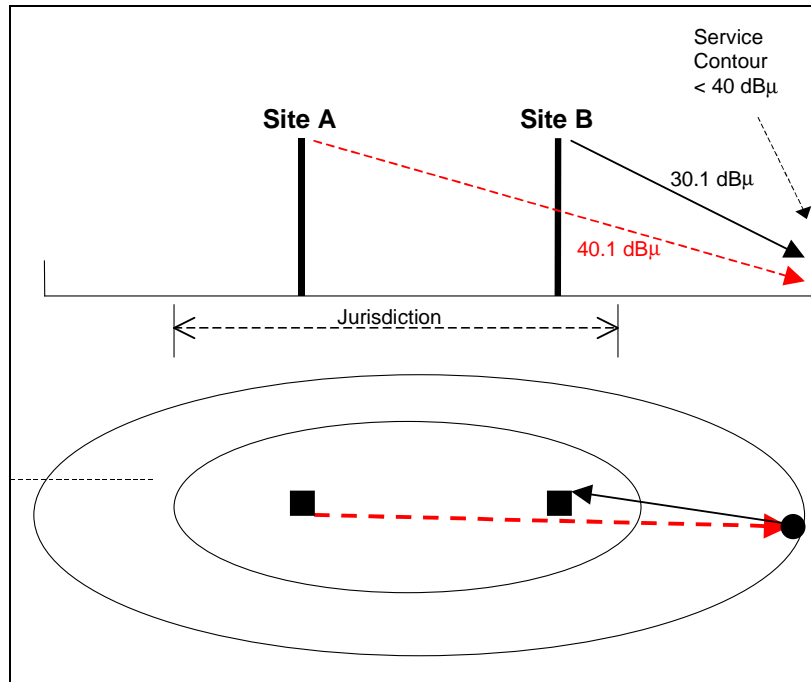
700 MHz Regional Plan for West Virginia

	Site A Direct Path	Site B Back Side of 20 dB F/B Antenna
Overshoot Distance (mi)	Field Strength (dBμ)	Field Strength (dBμ)
1	73.3	53.3
2	63.3	43.3
2.5	60.1	40.1
3	57.5	37.5
<b>4</b>	53.3	<b>33.5</b>
5	50.1	30.1
...	...	
10	40.1	
<b>11</b>	<b>38.4</b>	
12	37.5	
13	36.0	
14	34.5	
15	33.0	

Table 5 - Field Strength Vs. Distance From Site

For the scenarios above, the composite level at the Service Contour is the sum of the signals from the two sites. The sum can not exceed 40 dBμ. Table 5 allows you to calculate the distance to Service Contour given the distance from one of the sites.

Scenario 1: Refer to Figure 3a. Site B is just inside the Service Area boundary and Service Contour must be <5 Miles outside Service Area boundary. Signal level at Service Contour from Site B is 30.1 dBμ. Signal level for Site A can be up to 40 dBμ, since when summing two signals with >10 dB delta, the lower signal level has little effect (less than 0.4 dB in this case). Therefore, Site A can be 10 miles from the Service Contour, or 5 miles inside the Service Area boundary. The coverage performance for this scenario is shown in Table 2, above, for 20 dB building loss typical of urban areas.



**Figure 3a. Scenario 1 on of Use of Table 5**

Scenario 2: Refer to bold data in Table 5. Site B is just inside the Service Area boundary and Service Contour must be <4 Miles outside Service Area boundary. Signal level at Service Contour from Site B is 33.5 dB $\mu$ . Signal level for Site A can be up to 38.4 dB $\mu$ . (See Appendix B for simple method to sum the powers of signals expressed in decibels.) The composite power level is 39.7 dB $\mu$ . Therefore, Site A can be slightly less than 11 miles from the Service Contour, or ~7 miles inside the Service Area boundary. The coverage performance for this example is shown in Table 3, above, for 15 dB building loss typical of suburban areas.

Scenario 3: Site B is just inside the Service Area boundary and Service Contour must be <3 Miles outside Service Area boundary. Signal level at Service Contour from Site B is 37.5 dB $\mu$ . Signal level for Site A can be up to 36.4 dB $\mu$ . (See Appendix B simple method to sum signals expressed in decibels.) The composite power level is 40.0 dB $\mu$ . Therefore, Site A can be ~13 miles from the Service Contour, or ~10 miles inside the Service Area boundary. The coverage performance for this example is shown in Table 4, above, for 10 dB building loss typical of rural areas.

### **Service Contour Extension Recommendation**

The resulting recommendation for extending the 40 dB $\mu$  service contour beyond the service area boundary is:

Type of Area	Extension (mi.)
Urban (20 dB Buildings)	5
Suburban (15 dB Buildings)	4
Rural (10 dB Buildings)	3

Table 6 - Recommended Extension Distance Of 40 dB $\mu$  Field Strength

Using this recommendation the 40 dB $\mu$  service contour can then be constructed based on the defined service area without having to perform an actual prediction.

### **Interfering Contour**

Table 1 above shows that 36.4 dB of margin is required to provide 10 dB of co-channel capture and <1% probability of interference. Since the 40 dB $\mu$  service contour is beyond the edge of the service area, some relaxation in the level of interference is reasonable. Therefore, a 35 dB co-channel C/I ratio is recommended and is consistent with what is currently being licensed in the 821-824/866-869 MHz Public Safety band.

### ***Co-Channel Interfering Contour Recommendation***

- Allow the constructed 40 dB $\mu$  (50,50) service contour to extend beyond the edge of the defined service area by the distance indicated in Table 6.
- Allow the 5 dB $\mu$  (50,50) interfering contour to intercept but not overlap the 40 dB $\mu$  service contour.

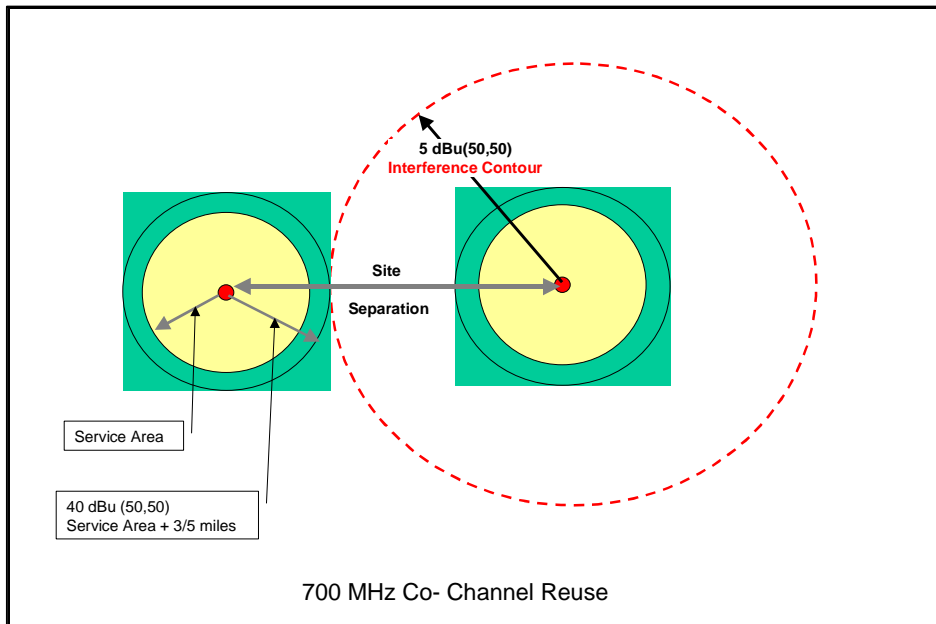


Figure 4 - Co-Channel Reuse Criterion

### Adjacent and Alternate Channel Considerations

Adjacent and alternate channels are treated as being noise sources that alter the composite noise floor of a victim receiver. Using the 47 CFR § 90.543 values of ACCP can facilitate the coordination of adjacent and alternate channels. The C/I requirements for <1% interference can be reduced by the value of ACCPR. For example to achieve an X dB C/I for the adjacent channel that is -40 dBc a C/I of [X-40] dB is required. Where the alternate channel ACP value is -60 dBc, then the C/I = [X-60] dB is the goal for assignment(s). There is a compounding of interference energy, as there are numerous sources, i.e. co channel, adjacent channels and alternate channels plus the noise from CMRS OOB.

There is insufficient information in 47 CFR § 90.543 to include the actual receiver performance. Receivers typically have “skirts” that allow energy outside the bandwidth of interest to be received. In addition, the FCC defines ACCP differently than does the TIA. The term used by the FCC is the same as the TIA definition of ACP. The subtle difference is that ACCP defines the energy intercepted by a defined receiver filter (e.g., 6 kHz ENBW). ACP defines the energy in a measured bandwidth that is typically wider than the receiver (e.g., 6.25 kHz channel bandwidth). As a result, the FCC values are optimistic at very close spacing and somewhat pessimistic at wider spacings, as the typical receiver filter is less than the channel bandwidth.

In addition, as channel bandwidth is increased, the total amount of noise intercepted rises compared to the level initially defined in a 6.25 kHz channel

bandwidth. However, the effect is diminished at very close spacings as the slope of the noise curve falls off rapidly. At greater spacings, the slope of the noise curve is essentially flat and the receiver’s filter limits the noise to a rise in the thermal noise floor.

Digital receivers tend to be less tolerant to interference than analog. Therefore, a 3 dB reduction in the C/(I+N) can reduce a DAQ = 3 to a DAQ = 2, which is threshold to complete muting in digital receivers. Therefore to maintain a DAQ = 3, at least 17 dB of fading margin plus the 26.4 dB margin for keeping the interference below 1% probability is required, for a total margin of 43.4 dB. However, this margin would be at the edge of the service area and the 40 dBμ service contour is allowed to extend past the edge of the service area.

Frequency drift is controlled by the FCC requirement for 0.4-ppm stability when locked. This equates to approximately a 1 dB standard deviation, which is negligible when associated with the recommended initial lognormal standard deviation of 8 dB and can be ignored.

Project 25 requires that a transceiver receiver have an ACIPR of 60 dB. This implies that an ACCPR ≥ 65 dB will exist for a “companion receiver”. A companion receiver is one that is designed for the specific modulation. At this time the highest likelihood is that receivers will be deploying the following receiver bandwidths at the following channel bandwidths.

Estimated Receiver Parameters	
Channel Bandwidth	Receiver Bandwidth
6.25 kHz	5.5 kHz
12.5 kHz	5.5 or 9 kHz
25 kHz	18.0 kHz

Table 7 - Estimated Receiver Parameters

Based on 47 CFR ¶ 90.543 and the P25 requirement for an ACCPR ≥ 65 dB into a 6.0 kHz channel bandwidth and leaving room for a migration from Phase 1 to Phase 2, allows for making the simplifying assumption that 65 dB ACCPR is available for both adjacent 25 kHz spectrum blocks.

The assumption is that initial spectrum coordination sorts are based on 25 kHz bandwidth channels. This provides the maximum flexibility by using 65 dB ACCPR for all but one possible combination of 6.25 kHz channels within the 25 kHz allotment.

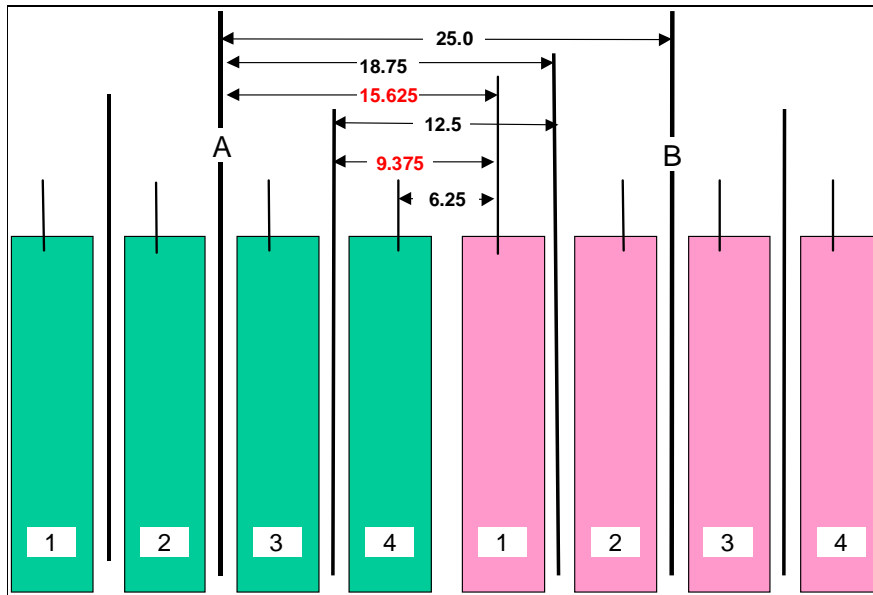


Figure 5, Potential Frequency Separations

Case	Spacing	ACCPR
25 kHz to 25 kHz	25 kHz	65 dB
25 kHz to 12.5 kHz	18.750 kHz	65 dB
25 kHz to 6.25 kHz	15.625 kHz	>40 dB
12.5 kHz to 12.5 kHz	12.5 kHz	65 dB
12.5 kHz to 6.25 kHz	9.375 kHz	>40 dB
6.25 kHz to 6.25 kHz	6.25 kHz	65 dB

Table 8 - ACCPR Values For Potential Frequency Separations

All cases meet or exceed the FCC requirement. The most troublesome cases occur where the wider bandwidths are working against a Project 25 Phase 2 narrowband 6.25 kHz channel. This pre-coordination based upon 25 kHz spectrum blocks still works if system designers and frequency coordinators keep this consideration in mind and move the edge 6.25 kHz channels inward away from the edge of the system. This approach allows a constant value of 65 dB ACCPR to be applied across all 25 kHz spectrum blocks regardless of what channel bandwidth is eventually deployed. There will also be additional coordination adjustments when exact system design details and antenna sites are known.

For spectrum blocks spaced farther away, it must be assumed that transmitter filtering, in addition to transmitter performance improvements due to greater frequency separation, will further reduce the ACCPR.

Therefore it is recommended that a consistent value of 65 dB ACCPR be used for the initial coordination of adjacent 25 kHz channel blocks. Rounding to be

conservative due to the possibility of multiple sources allows the Adjacent Channel Interfering Contour to be approximately 20 dB above the 40 dBμ service contour, at 60 dBμ.

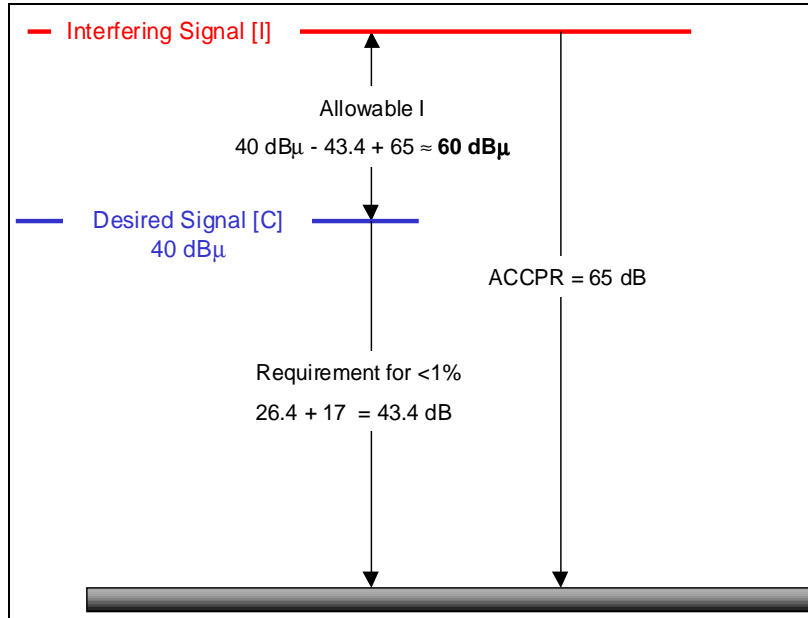


Figure 6 - Adjusted Adjacent 25 kHz Channel Interfering Contour Value

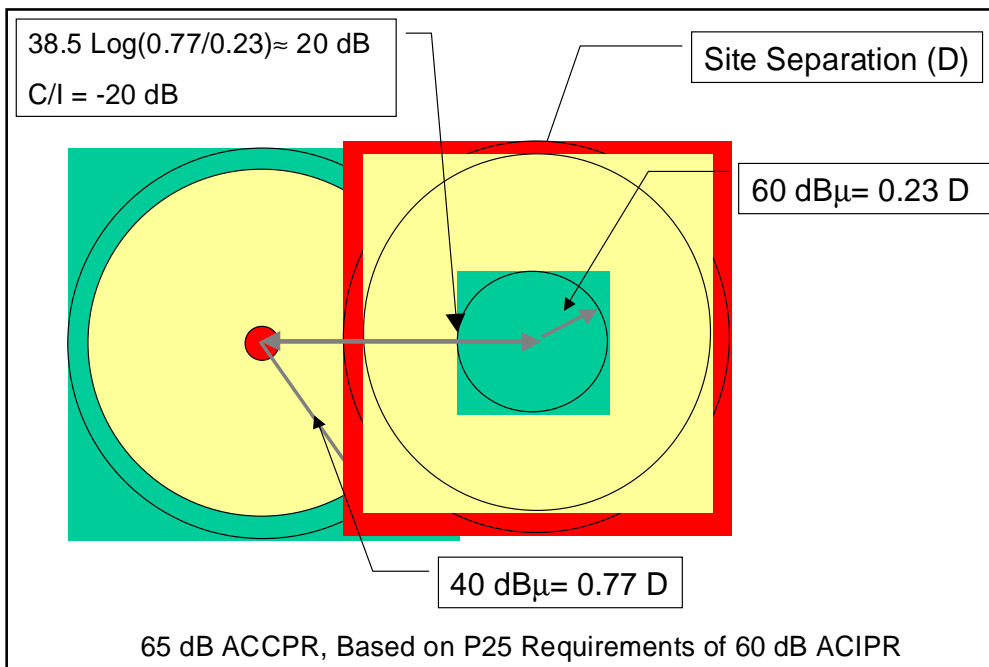


Figure 7 - Example Of Adjacent/Alternate Overlap Criterion

### **Adjacent Channel Interfering Contour Recommendation**

An adjacent (25 kHz) channel shall be allowed to have its 60 dB $\mu$  (50,50) interfering contour touch but not overlap the 40 dB $\mu$  (50,50) service contour of a system being evaluated. Evaluations should be made in both directions.

### **Final Detailed Coordination**

This simple method is only adequate for presorting large blocks of spectrum to potential entities. A more detailed analysis should be executed in the actual design phase to take all the issues into consideration.

Additional factors that should be considered include:

- Degree of Service Area Overlap
- Different size of Service Areas
- Different ERPs and HAATs
- Actual Terrain and Land Usage
- Differing User Reliability Requirements
- Migration from Project 25 Phase 1 to Phase 2
- Actual ACCP
- Balanced Systems
- Mobiles vs. Portables
- Use of voting
- Use of simulcast
- Radio specifications
- Simplex Operation
- Future unidentified requirements.

Special attention needs to be paid to the use of simplex operation. In this case, an interferer can be on an offset adjacent channel and in extremely close proximity to the victim receiver. This is especially critical in public safety where simplex operations are frequently used at a fire scene or during police operation. This type operation is also quite common in the lower frequency bands. In those cases, evaluation of base-to-base as well as mobile-to-mobile interference should be considered and evaluated.

## Appendix H-A

### Carrier to Interference Requirements

There are two different ways that Interference is considered.

- Co Channel
- Adjacent and Alternate Channels

Both involve using a C/I ratio. The C/I ratio requires a probability be assigned. For example, if 10% Interference is specified, the C/I implies 90% probability of successfully achieving the desired ratio. 1% interference means that there is a 99% probability of achieving the desired C/I.

$$\frac{C}{I} \% = \frac{1}{2} \cdot \operatorname{erfc} \left( \frac{\frac{C}{I} \text{ margin}}{2\sigma} \right) \quad (1)$$

This can also be written in a form using the standard deviate unit ( $Z$ ). In this case the  $Z$  for the desired probability of achieving the C/I is entered. For example, for a 90% probability of achieving the necessary C/I,  $Z = 1.28$ .

$$\frac{C}{I} \% = Z \cdot \sqrt{2} \cdot \sigma \quad (2)$$

The most common requirements for several typical lognormal standard deviations ( $\sigma$ ) are included in the following table based on Equation (2).

Location Standard Deviation ( $\sigma$ ) dB	5.6	6.5	8	10
Probability %				
10%	10.14 dB	11.77 dB	14.48 dB	18.10 dB
5%	13.07 dB	15.17 dB	18.67 dB	23.33 dB
4%	13.86 dB	16.09 dB	19.81 dB	24.76 dB
3%	14.90 dB	17.29 dB	21.28 dB	26.20 dB
2%	16.27 dB	18.88 dB	23.24 dB	29.04 dB
1%	18.45 dB	21.42 dB	<b>26.36 dB</b>	32.95 dB

Table A1 - Probability Of Not Achieving C/I For Various Location Lognormal Standard Deviations

These various relationships are shown in Figure A1, a continuous plot of equation(s) 1 and 2.

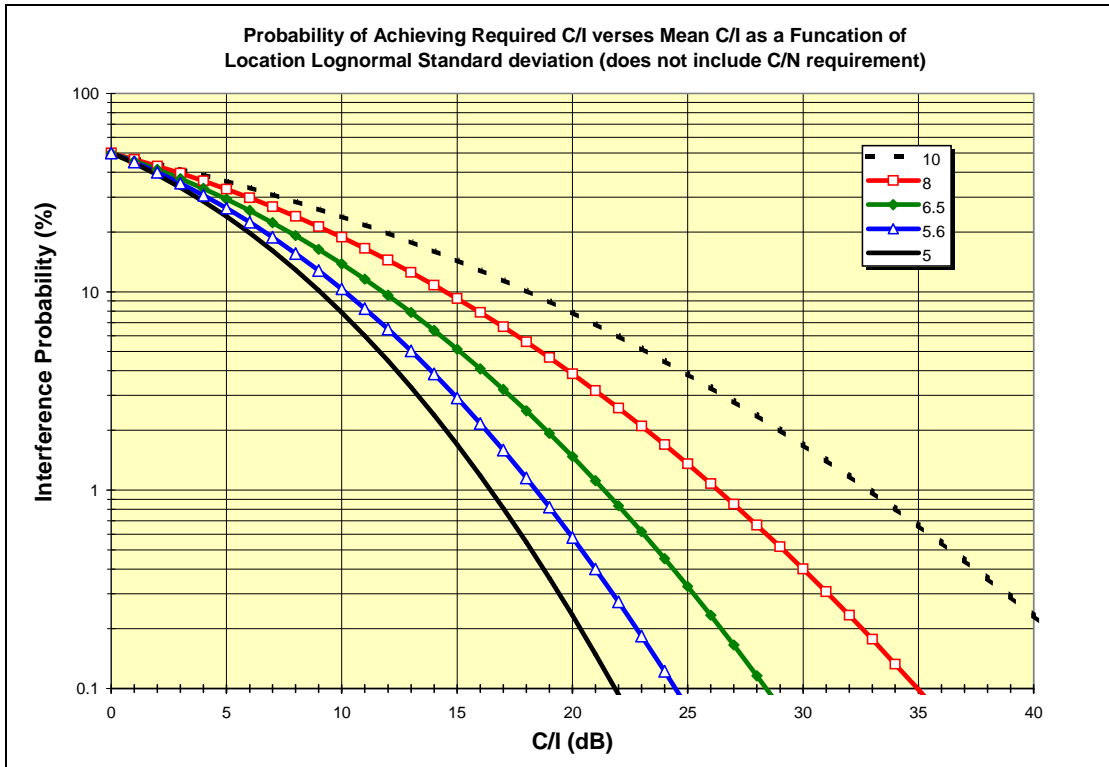


Figure A1, Probability Of Achieving Required C/I As A Function Of Location Standard Deviation

For co-channel the margin needs to include the “capture” requirement. When this is done, then a 1% probability of co channel interference can be rephrased to mean, there is a 99% probability that the “capture ratio” will be achieved. The capture ratio varies with the type of modulation. Older analog equipment has a capture ratio of approximately 7 dB. Project 25 FDMA is specified at 9 dB. Figure A1 shows the C/I requirement without including the capture requirement.

The 8 dB value for lognormal location standard deviation is reasonable when little information is available. Later when a detailed design is required, additional details and high-resolution terrain and land usage databases will allow a lower value to be used. The TIA recommended value is 5.6 dB. Using 8 dB initially and changing to 5.6 dB provides additional flexibility necessary to complete the final system design.

To determine the desired probability that both the C/N and C/I will be achieved requires that a joint probability be determined. Figure A2 shows the effects of a family of various levels of C/N reliability and the joint probability (Y-axis) in the presence of various probabilities of Interference. Note that at 99% reliability with

1% interference (X-axis) that the reduction is nearly the difference. This is because the very high noise reliability is degraded by the interference, as there is little probability that the noise criterion will not be satisfied. At 90%, the 1% interference has a greater likelihood that it will occur simultaneously when the noise criterion not being met, resulting in less degradation of the 90%.

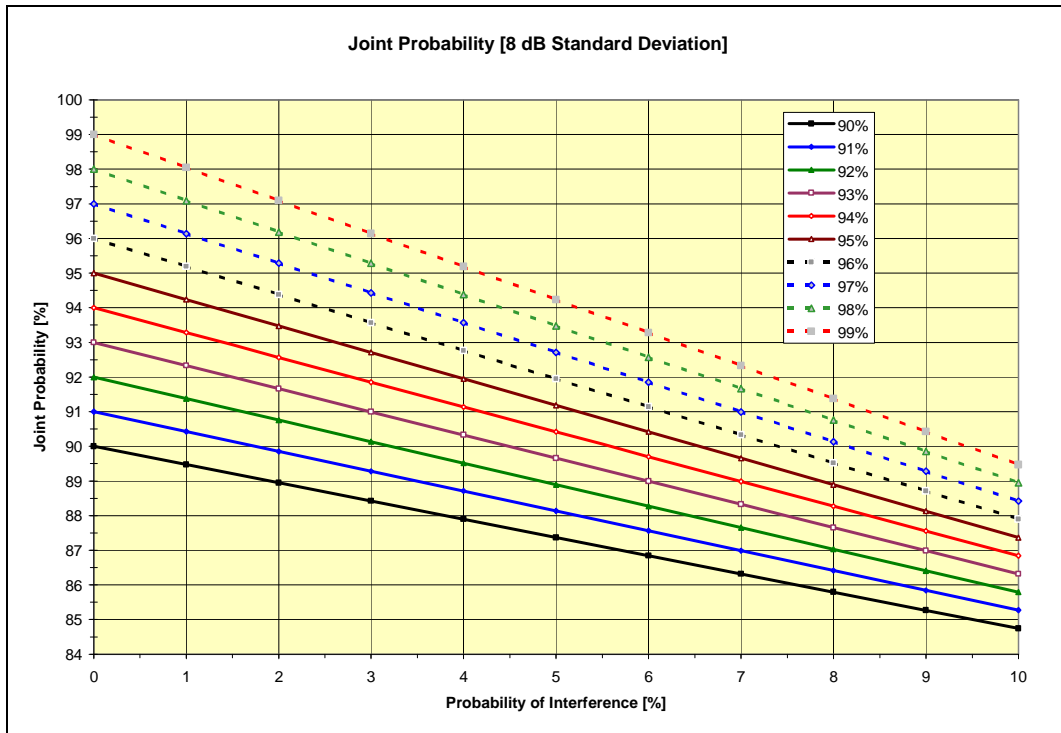
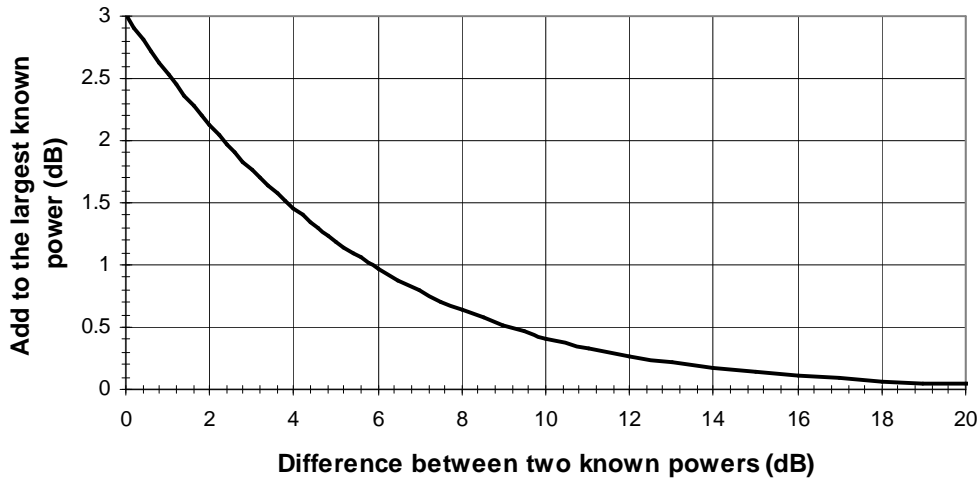


Figure A2 - Effect Of Joint Probability On The Composite Probability

For adjacent and alternate channels, the channel performance requirement must be added to the C/I ratio. When this is applied, then a 1% probability of adjacent/alternate channel interference can be rephrased to mean, there is a 99% probability that the “channel performance ratio” will be achieved.

## Appendix H-B

### Adding Two Known Non-Coherent Powers



In order to sum the power of two or more signals expressed in dBm or dB $\mu$ , they level should be converted to a voltage level or a power level, summed (root of the sum of the squares), and then converted back to dBm or dB $\mu$ .

The chart above provides simple method to sum two power levels expressed in dBm or dB $\mu$ . First find the difference between the two signals on the horizontal axis. Go up to the curve and across to the vertical axis to find the power delta. Add the power delta to the larger of the two original signal levels.

Example 1: Signal A is 36.4 dB $\mu$ . Signal B is 37.5 dB $\mu$ . Difference is 1.1 dB. Power delta is about 2.5 dB. Composite signal level is 37.5 dB $\mu$  + 2.5 dB = 40 dB $\mu$ .

Example 2: Signal is -96.3 dBm. Signal B is -95.2 dBm. Difference is 1.1 dB. Power delta is about 2.5 dB. Composite signal level is -95.2 dBm + 2.5 dB = -92.7 dBm.

***Appendix I***

**Inter-Regional Dispute Resolution Agreements**

## 700 MHz Regional Plan for West Virginia

**Appendix J**

**Low Power Pool Frequencies  
Pursuant to 2<sup>nd</sup> Report & Order  
(Released August 10, 2007/Effective October 23, 2007)**

Channel #	Center Frequency (6.25 kHz)	Center Frequency (12.5 kHz)	Center Frequency (25 kHz)	Use	Channel #	Center Frequency (6.25 kHz)	Center Frequency (12.5 kHz)	Center Frequency (25 kHz)
1	769.003125			RPC Admin	961	799.003125		
2	769.009375	769.00625		RPC Admin	962	799.009375	799.00625	
3	769.015625		769.0125	RPC Admin	963	799.015625		799.0125
4	769.021875	769.01875		RPC Admin	964	799.021875	799.01875	
5	769.028125			RPC Admin	965	799.028125		
6	769.034375	769.03125		RPC Admin	966	799.034375	799.03125	
7	769.040625		769.0375	RPC Admin	967	799.040625		799.0375
8	769.046875	769.04375		RPC Admin	968	799.046875	799.04375	
9	769.053125			Itinerant	969	799.053125		
10	769.059375	769.05625		Itinerant	970	799.059375	799.05625	
11	769.065625		769.0625	Itinerant	971	799.065625		799.0625
12	769.071875	769.06875		Itinerant	972	799.071875	799.06875	
949	774.928125			RPC Admin	1909	804.928125		
950	774.934375	774.93125		RPC Admin	1910	804.934375	804.93125	
951	774.940625		774.9375	RPC Admin	1911	804.940625		804.9375
952	774.946875	774.94375		RPC Admin	1912	804.946875	804.94375	
953	774.953125			RPC Admin	1913	804.953125		
954	774.959375	774.95625		RPC Admin	1914	804.959375	804.95625	
955	774.965625		774.9625	RPC Admin	1915	804.965625		804.9625
956	774.971875	774.96875		RPC Admin	1916	804.971875	804.96875	
957	774.978125			RPC Admin	1917	804.978125		
958	774.984375	774.98125		RPC Admin	1918	804.984375	804.98125	
959	774.990625		774.9875	Itinerant	1919	804.990725		804.9875
960	774.996875	774.99375		Itinerant	1920	804.996875	804.99375	

## 700 MHz Regional Plan for West Virginia