

NEW ENGLAND REGION 19 700 MHZ CHANNEL APPLICATION PROCEDURES

Public safety users wishing to apply for channels in the 769-775 MHz and 799-805 MHz bands identified by the Federal Communications Commission must meet eligibility and coordination rules established by the Regional Planning Committee. Applications must be submitted to one of the following coordination agencies or an FCC approved coordination agency for completion and accuracy before being submitted to the Regional Planning Committee. FCC approved coordination agencies are listed as:

- Local Government Services and Police Services - Association of Public Safety Communications Officials (APCO) www.apcointl.org
- Fire Service - International Municipal Signal Association (IMSA) www.imsasafety.org
- Forestry Conservation Services - Forestry Conservation Communications Association (FCCA) www.fcca-usa.org
- Highway Maintenance Services - American Association of State Highway and Transportation Officials (AASHTO) www.transportation.org

REGIONAL PLANNING COMMITTEE APPLICATION PROCEDURES

Applications for frequencies in the 769-775 MHz and 799-805 MHz spectrum are subject to pre-application review of operational requirements as established by the FCC in the category into which they fall. Each designated committee shall establish the requirements for use of the respective frequency allocations under their jurisdiction. The categories are:

- Interoperability Spectrum
- State Spectrum (State Band Manager)
- Reserved Spectrum (Afford T-Band public safety licensees priority)
- General Use Spectrum.

Interoperability Spectrum - Frequency use in this category will be allocated by each member State's Interoperability Executive Committee, SIEC, if one exists, or by the Region 19 Regional Planning Committee if there is no SEIC. The designated use of the Interoperability Channels will adhere to ANSI Standard APCO ANS 1.104.1-2010 "Standard Channel Nomenclature for the Public Safety Interoperability Channels".

The FCC designated approximately 10 percent (2.6 MHz) of the 700 MHz Public Safety Spectrum for nationwide interoperability communications. State-level organizations are usually in control at large-scale events and disasters or multi-agency incidents. Although the Commission supports the creation of SIECs, some states already have a mechanism in place that is equivalent of an SIEC that could administer the Interoperability channels. The RPC will assist in the development of an Interoperability Plan for a State without a SIEC, review applications for base stations, and provide pre-coordination technical review.

The **SIECs** first responsibility is to develop an Interoperability Plan. The plan would decide who will hold the license for the Interoperability Spectrum, as well as to resolve licensing issues. Other responsibilities involved in administering the Interoperability channels include the creation and oversight of incident response protocols, creation of chains of command for incident response and reporting, and executing Memoranda of Understanding and Sharing Agreements. ~~Vermont has delegated the approval process for Interoperability channels to the Regional Planning Committee.~~ Since Connecticut, Maine, Massachusetts, New Hampshire, **Vermont** and Rhode Island have a SIEC each state has assumed the responsibility for their respective interoperability plans.

On occasion, the FCC will publish notices and bulletins on their internet website. These FCC “Public Notice” 700 MHz Public Safety Band – Announcement of Updates of Interoperability Spectrum Administration Decisions are found in Appendix J.

The individual State Interoperability Spectrum Points of Contact for the New England Region, Region 19, is found in Table 1.

<p>Connecticut: Department of Emergency Services & Public Protection Michael Varney 1111 Country Club Rd Middletown, CT 06457 Phone: (860) 685-8146 Email: Michael.Varney@ct.gov</p>	<p>Massachusetts: Massachusetts Emergency Management Agency Steve Staffier 400 Worcester Road Framingham, MA 01702 Phone: (508) 820-2022 Email: Steve.staffier@state.ma.us</p>
<p>New Hampshire: New Hampshire Department of Safety John T. Stevens 33 Hazen Drive Concord, NH 03305 Phone: (603) 223-8003 Email: john.stevens@dos.nh.gov</p>	<p>Rhode Island: Rhode Island Emergency Management Agency Thomas J. Guthlein 645 New London Ave. Cranston, RI 02920 Phone: (401) 462-7121 Email: Thomas.Guthlein@ema.ri.gov</p>
<p>Maine: Maine Emergency Management Agency Steven Mallory 45 Commerce Drive, Suite 2 Augusta, ME 04333 Phone: (207) 624-4476 Email: Steven.Mallory@maine.gov</p>	<p>Vermont: Vermont Department of Public Safety Homeland Security Unit Jessica Stolz 103 South Main St. Waterbury, VT 05671 Phone: (802) 241-5094 Email: jstolz@dps.state.vt.us</p>

Table 1: Region 19 Interoperability Spectrum Points of Contact

State Spectrum - Frequency use in this category will be allocated by the State Band Manager of each member State in Region 19 or by the Region 19 Regional Planning Committee, if so designated. State Band Managers shall be responsible for planning and

managing the frequency database and shared use of the State Spectrum with the bordering State Band Managers, through the Regional Planning Committee. The designated State Band Manager, or Committee, shall establish the requirements for use of the respective frequency allocations under their jurisdiction and file their plans for approval with the New England Region 19 700 MHz Planning Committee.

The state license is a geographic area license based on state boundaries. It differs from site-based licensing which is the normal type of public safety licensing. State licensees are subject to the general limits that govern geographic area licenses, including antenna structures and air navigation, international coordination, and environmental requirements including quiet zones. The governor, or designee, of each state had the option to apply for up to 2.4 megahertz of spectrum, all narrowband channels, of the 700 MHz band Public Safety spectrum. The application deadline was December 31, 2001. Whatever spectrum was not applied for by this deadline, reverted to General Use Public Safety Spectrum and will be administered by the Regional Planning Committee, or RPC. All states, and the District of Columbia, were granted licenses on January 18, 2002.

The FCC established certain construction and operation requirements to ensure efficient use of the spectrum, including the provision of service to rural and remote areas. The initial construction/operation benchmark was set at 5 years. However, because broadcasters are not required to complete relocations until December 31, 2006, the starting date for calculating the 5-year benchmark is January 1, 2007. As a practical matter, this means that each state license will be granted subject to the condition that the state is providing, or preparing to provide, substantial service to one-third of their population or territory by January 1, 2012 and to two-thirds by January 1, 2017.

The FCC subsequently changed the filing date of substantial service to one-third of their population or territory by June 10, 2014 and to two-thirds by June 10, 2019. The State of Maine and Vermont have turned in their state license and their State allocated spectrum has reverted to General Use Public Safety Spectrum and will be administered by the Regional Planning Committee.

States may begin using the state license spectrum when:

- Full power TV or DTV stations vacate the 700 MHz spectrum, **currently completed** and
- Project 25 Phase 1 equipment is available for purchase, **currently available** and
- The following general operating and technical requirements are met:
 - Coordinating transmitting sites near the U.S./Canada border (**see Appendix P**), and
 - Compliance in quiet zones, and
 - Registration of antenna structures with the FAA and FCC as required under Part 17 of the Commission's Rules.

For further information about the State license, see the Commission's Rules, refer to Appendix K.

Reserved Spectrum - Frequency use in this category will be recommended by the Region 19 Regional Planning Committee ~~if and when the FCC allocates spectrum~~. The FCC's 700MHz Narrowbanding Report & Order (14-172) requires, and the Regional Planning Committee shall, reallocate the reserve channels to General Use Channels. The RPC shall afford T-Band public safety licensees priority for licensing of this spectrum in T-Band areas. The RPC shall apply the same procedures for Reserve Spectrum Applications as applied to general use applications, with the exception of the five -year priority access window for T-Band incumbents to license the reserve spectrum from January 9, 2015 to January 9, 2020, as published in DA 15-34. Upon FCC approval of the Region 19 700MHz Plan, Region 19 will announce a Window Opening for only the T-band incumbents, then after the committee will process applications in the order received. As reserved spectrum is allocated and no longer available to T-Band Licensees, Region 19 will then assign General Use spectrum available at that time. Reserved Spectrum outside the T-Band Licensed areas will be allocated once all general use spectrum is allocated in the county assignment.

RPC19 will incorporate the 700 MHz Deployable Trunked System Channels as identified in FCC DA 15-483 in areas outside of the T-Band incumbent regions. The FCC nationwide recommended channels are listed in Appendix A: - Table of Deployable Trunk Channels.

General Use Spectrum - Frequency use in this category will be recommended by the Region 19 Regional Planning Committee.

All agencies requesting spectrum during the initial filing window will be allotted channels if all plan requirements are met. Allotments given in the first window period will be made in multiples of 6.25 KHz units to allow for implementation of various technologies. Technologies requiring 25 KHz will be allotted four 6.25 KHz units. Requests for voice/data channels will be allocated on the basis of two 6.25 KHz units to accommodate one 12.5 KHz channel per voice channel. For narrowband mobile data requests, one mobile data channel will consist of two (2) 6.25 KHz units to accommodate one 12.5 KHz channel. ~~Allotments given after January 1, 2007 will be made in 6.25 KHz units. Applicants should acknowledge their migration path to 6.25 KHz to the Regional Planning Committee when applying for channels in Region 19.~~

The RPC may request additional information from the requesting agency. This information will aid in the validation of actual spectrum need and help to insure that no requests are duplicated when requests involve multi-agency systems. Small agencies are encouraged to join multi-agency systems, when possible.

REGION 19 REGIONAL PLANNING COMMITTEE PROCEDURES:

To ensure that all eligible agencies have an equal opportunity to apply for the limited 769-775 MHz and 799-805 MHz spectrum approved by the Federal Communications Commission, the Region 19 Regional Planning Committee will accept applications from

eligible entities during two application windows per year. The applications windows are established as of May 1 of each calendar year through October 31 of that same year, and November 1 of each calendar year through April 30 of the following year.

Region 19 will announce a Window Opening for only the first Window and then after the committee will process applications as submitted. Reserved Spectrum applications outside the T-Band Licensed areas will comply with the application filing dates identified below.

The application must contain all information requested and postmarked no later than these dates before being accepted for review by the Committee.

Applications received by November 1, will be reviewed at the Committee's December meeting and voted on at the following March meeting.

Applications received by May 1, will be reviewed at the Committee's June meeting and voted on at the following September meeting.

Applicants shall file a completed CAPRAD application at www.caprad.org, and mail one hard copy and one electronic copy of the completed CAPRAD submitted application and any relevant attachments and/or files to:

Mr. Jerry Zarwanski – Chairman, RPC – Region 19
New England Region 19 700 MHz Regional Planning Committee
State of Connecticut
DESPP/DSET
1111 Country Club Road
Middletown, CT 06457

APPLICATION PROCEDURES OVERVIEW

The Committee evaluates and scores each application and compiles a prioritized list of the approved entities and the number of channels they are eligible to receive. The number may be less than the number requested. Channel allocations are approved after analysis by a committee-approved computer engineering program which tests all possible configurations of channels by considering the proposed service area, topography, and the technical parameters and frequency compatibility of existing (incumbent) and proposed systems. (The committee may approve the use of the Computer Aided Pre-Coordination Resource And Database (CAPRAD) system developed and administered by the National Law Enforcement and Corrections Technology Center-Rocky Mountain Region, Denver, CO. This database is designed to facilitate inter-regional coordination of frequencies, provide search and report generating tools, and create a direct interface link to the FCC's Universal Licensing System.)

(The technical parameters and compatibility criteria tested shall be based on those parameters described in TIA Telecommunications Systems Bulletin TSB88B – latest

published version, “ Wireless Communications Systems - Performance in Noise and Interference-Limited Situations Recommended Methods for Technology-Independent Modeling, Simulation, and Verification.” This document seeks to provide guidance to spectrum managers, system designers and system maintainers for a standardized approach to proof-of-performance and acceptance testing of public safety systems.) The analysis process will produce a list of available channels which may or may not be sufficient to meet the requirements of all applicants. It is possible that an applicant low on the priority list will receive an assignment of channels while none is available for an applicant with a higher priority.

TECHNICAL EVALUATION APPROVAL PROCEDURES

All applications or planned use of Region 19 700 MHz spectrum must undergo a technical evaluation examining the proposed use of 700 MHz channels.

Spectrum Allocation Matrix - See Section 10, Scoring Matrix and Worksheet.

Technical Requirements

Spectrum Utilization

The Region 19 Planning committee will adhere to the National Public Safety Telecommunications Council’s (NPSTC) 700 MHz General Use Channel sort as shown on the CAPRAD database for narrowband General Use Channels (See Appendix L). Region 19 will participate in the CAPRAD database and keep the Regional Plan and current frequency allotment/allocation information on the database.

The Region 19 Planning Committee has the ability to accept recommendations from the committee and, if approved, the authority to change the original frequency allotment. In order to keep the most effective frequency allotments within Region 19, a quarterly review of the allotments will be made at the scheduled meetings by the full committee and recommended changes to the plan will be voted on. The majority of members in attendance at a meeting of the full Regional Planning Committee must approve any changes to the Regional allotments.

If at any time a system is allocated channels within Region 19 and the system cannot be developed within the agreed upon guidelines (slow growth), the channels will be returned to the county pool allotments they originated from and again be available to other agencies in the county. If plan modifications are approved, the Chairperson will, if necessary, obtain adjacent Region approval and file a plan amendment indicating the approved changes with the Federal Communications Commission.

In this plan, the 700 MHz committee is striving to utilize the spectrum as efficiently as possible. The total request for general pool voice and narrowband data totals 1,232 channels. Allotments will be made on the basis of one 6.25 channel for each voice channel. For each narrowband data channel (request of less than 19.2 kbps) the

allocation of two 6.25 KHz units will be made to accommodate 12.5 kHz of spectrum. This conforms to the FCC intent to recommend use of technology that yields one voice path for each 6.25 kHz of spectrum.

Procedure for Frequency Coordination

Assignments will be based on a defined service area of 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.

Responsible Radiation

For all proposed facilities within the region, 80% of the 50 dB μ (-82 dBm) Protected Service Area (PSA) must lie within the jurisdictional boundary plus an 8 km buffer zone. The 50 dB μ (-82 dBm) PSA shall be assessed using Longley- Rice analyses.

Interference Protection – Co-Channel

The co-channel 15 dB μ (-119 dBm) interfering signal, assessed using Longley-Rice analyses, will be allowed to touch but not overlap the 40 dB μ (-93 dBm) service contour of the system being evaluated. All contours are (50,50).

Interference Protection – Adjacent Channel

For adjacent and alternate channels, the 50dB μ (-82dBm) interfering signal, assessed using Longley-Rice analyses, will be allowed to touch but not overlap the 40 dB μ (-93 dBm) service contour of the system being evaluated. All contours are (50,50).

Applicants must provide data showing that practical field tests have been conducted. An overall system diagram showing the latitude, longitude and elevation (meters) of the site(s), power out, ERP, and antenna height must be provided. In addition, the applicant must provide antenna specifications for each site(s).

Due to the existing TV assignments and HDTV assignments, most of Region 19 cannot use this spectrum until the HDTV implementation is completed. Given this date uncertainty, this plan does not limit an agency from initially planning/implementing a system (if it conforms to FCC rules).

Low Power Assignments

Channel assignments for low power portables shall have a maximum ERP of 2W. Low power mobiles shall be required to operate with an ERP of 2W with an antenna not to exceed seven meters from the ground elevation. An applicant may request, under special circumstances, an ERP of 5W for a mobile unit with the identified antenna restriction of seven meters.

Wideband Data

TIA has developed a wideband data interoperability standard based on 50 KHz channel bandwidth. The RPC shall also consider applications for aggregation of data channels up to 150 kHz. Each county within Region 19 shall be allotted, at a minimum, 150 kHz of contiguous bandwidth. If one entity exhausts the spectrum resources within the county, it shall provide facility access for throughput. In such situations, each agency shall internally negotiate costs without mediation by the Regional Planning Committee. The final implementation budget, as well as the abridged loading figures, shall be forwarded to Region 19 prior to adding the new users.

The ranking criteria for each allocated 50 KHz General Use Wideband Data Channel in Region 19 will be developed in accordance with NCC Implementation Subcommittee Guidelines. Applicants will be required to provide the Regional Planning Committee with their identified wideband needs and requirements so the region can determine the number of wideband data channels needed.

REGION 19 REGIONAL PLANNING COMMITTEE SCORING PROCEDURES

Refer to Scoring Matrix and Matrix Worksheet located in Section 10 of the Region 19 700MHz Plan.

REGION 19 700 MHz RPC APPLICATION PROCEDURES

To ensure that all eligible agencies have an equal opportunity to apply for the limited 769-775 MHz and 799-805 MHz spectrum approved by the Federal Communications Commission, the Region 19 Regional Planning Committee will accept applications from eligible entities during two application windows per year. The applications windows are established as of May 1 of each calendar year through October 31 of that same year, and November 1 of each calendar year through April 30 of the following year.

Application procedures for Region 19 comprise of the following steps:

1. Prior to submission of an application for General Use spectrum/reserve spectrum the Regional Planning Committee has adopted a policy that the applicant receives a signed approval letter from the Statewide Interoperability Coordinator (SWIC) of the applicant's State stating that the SIEC concurs that the application is consistent with the SCIP. If a SWIC is not present or appointed by a member state, the designated State Band Manager, or Interoperability Committee Chairman shall have the signature authority. If none exist the RPC will accept the application and decide the validity of the application.
2. Eligible Entity Submits Request for Channel Assignment. Eligible entity presents detailed application and request for channel assignment, in writing, to RPC. Proposals

will be considered for State Frequencies, General Use Frequencies, or Interoperability Channels. Application is provided as an attachment.

Each application must, as a minimum, contain:

- Specific Frequency Details
- Justification – must show ALL intended system uses
- List of 6.25 KHz channels by number and frequency
- Channel Bandwidth - showing each grouping of 6.25 KHz channels (See New England 700MHz Regional Plan Region 19, Appendix L)
- Technical Parameters
- Channel Loading and Use
- Area of Operation Map Detail
- Specific System Design Details
- Existing Allocations of Frequencies in all bands
- Functional Block Diagram of proposed system
- Preliminary Coverage and Interference Analysis
- Frequency givebacks (if applicable)
- An Interference Prediction Map using latest version of TIA/EIA TSB88 Guidelines
- Details of Interference Predictions and Protection

Applications must be submitted with a cover letter on official agency/organization letter head and signed by the chief elected official of the municipality (if a town-wide system) or the head of the organization requesting the frequencies if it is a single agency application. Mail the completed applications in electronic media and 3 paper copies ~~and 20 additional copies~~ to the committee Chairman.

Applications submitted without official signed cover letters will be rejected.

Each Applicant may also be required to:

- Present further details, or documentation, as requested by the RPC.
- Give formal presentation of application to the RPC.
- Be present, or have a representative present, during initial application review of the proposal and, if necessary, subsequent reviews by the Regional Planning Committee.

3. Planning Committee Reviews Proposal. The RPC begins review of application and proposal material.

4. RPC Resolves Proposal Conflicts or Errors and Recommends Frequency Channel Assignments. Intra-regional disputes resolved.

5. Regional Planning Committee Scores Application.

6. Regional Planning Committee reviews Frequency Coordinator Submission. The RPC reviews the application summary for accuracy and pre-coordination of frequencies and then notifies frequency coordinator of any issues or conflicts.

7. Frequency Coordinator Resolves Application Conflicts. The frequency coordinator reviews current allotments and eligibility and resolves potential conflicts or issues.

8. Coordination with Adjacent Regions and Countries:

The regions adjacent to Region 19 are:

- Region 8: Southern New York and New Jersey
- Region 30: Northern New York – Albany, except area of Southern New York (Region 8) and New York – Buffalo (Region 55).

Refer to New England 700MHz Regional Plan Region 19, Appendix E for listing of Region states and counties. See New England 700MHz Regional Plan Region 19, Appendix N for Inter-Regional Dispute Resolution Agreement.

Canada is adjacent to Region 19. Refer to New England 700MHz Regional Plan Region 19, Section 9 for coordination procedures.

9. Regional Planning Committee Notifies Applicant and Frequency Coordinator. The RPC will notify by letter mailed to the applicant and Frequency Coordinator to move forward with FCC licensing.

10. Coordinator Forwards Application to FCC.

The RPC performs database update.

11. FCC Issues License to Entity.

Directions For Completing The Application, Application Follows the Directions

1. Although there may be a number of agencies that will use the system, the name of the licensee should be listed here. The balance of the line is for the agency's mailing address.
2. Identify spacing requirements between channels within the system
3. Enter the number of voice, data, broadband channels you believe you can justify. Starting with "A", list in consecutive letters those channels to be installed at each numbered site. Examples:

A single channel system with one primary site and one back-up site:

<u>Site</u>	<u>Channel</u>	<u>Bandwidth</u>
1	A	12.5KHz
2	A	12.5KHz

A three channel system at a single site:

<u>Site</u>	<u>Channel</u>	<u>Bandwidth</u>
1	A—B—C	12.5KHz
2	C—D—E	12.5KHz

A five channel system. Two channels at one site and a single channel at three additional sites.

<u>Site</u>	<u>Channel</u>	<u>Bandwidth</u>
1	A-B	12.5KHz
2	C	12.5KHz
3	D	12.5KHz
4	E	12.5KHz

4. Enter bandwidth for voice channels between 6.25KHz and 25KHz. The FCC has/will identify dates which will preclude use of 25KHz and possibly

12.5KHz. Please verify your bandwidth requests. Data channels will be available in 12.5KHz and 25KHz segments

5. Enter in degrees, minutes, and nearest second north. (NAD83)
6. Enter in degrees, minutes, and nearest second west. (NAD83)
7. Enter ground level in meters above mean sea level (AMSL)

8. Enter the transmitter output in Watts.
9. Enter effective radiated power (ERP) in Watts.
10. Enter the distance in meters from the ground to the top of the antenna.
11. Enter the gain of the antenna from the manufacturer's specification sheet.
12. Enter the angle in degrees that the antenna is tilted from the vertical plane. If none, enter 0.
13. If a non-directional antenna will be used, enter 360 degrees. If a directional antenna will be used, show the compass point, to the nearest degree, the direction of the main lobe.
14. Enter the manufacturer of the antenna and model#. Provide as an attachment the antenna(s) specification for each antenna listed. Also see section (29)
15. List all agencies/departments that will use the completed system. Identify the loading for each agency/department. For each user agency/department, indicate the number of each equipment type that will be used when the system is completed. The category for # laptops/data devices will be used to determine data and broadband requirements if not specifically specified in the application.
16. List all frequencies that will be returned.
17. List all frequencies in other bands that will be utilized with the 700MHz system.
18. List the intercommunication requirements of your dispatch center.

FCC Region 19 APPLICATION 769-775MHz and 799-805MHz Channels

(1) _____
Agency Name

_____ Address

Voice Channel Requests (6.25KHz, 12.5KHz, 25KHz)

(2) Please identify spacing requirements between

(3) Site Name	Channel	(4) Frequency Bandwidth	(5) Latitude	(6) Longitude	(7) Ground Elev.	(8) Power Out	(9) ERP	(10) Antenna Tip	(11) Antenna Gain	(12) Antenna Tilt	(13) Spacing

Data Channel Requests (12.5KHz, 25KHz)

Please identify spacing requirements between data channels

Site Name	Channel	Frequency Bandwidth	Latitude	Longitude	Ground Elev.	Power Out	ERP	Ant. Tip	Ant. Gain	Ant. Tilt	Spacing

(15) Channel Loading

Agency	Number of Vehicles	Number of Portables	# of Aircraft	# of Marine	# of Pagers	#

(16) Frequencies Returned

List

(17) Frequencies utilized with 700MHz

Site Name	Channel	Frequency	Latitude	Longitude

(18) Intercommunication Requirements

Agency	Frequencies Used

(19) In the application a list of frequencies will be returned (see # (16)) when the system is completed. Explain how these frequencies are being used.

(20) Identify how you plan to integrate a list of all frequencies that will not be returned when the system is completed. Explain how you will integrate the existing frequencies with the 700MHz frequencies (see # (17)). Explain the intended use of all frequencies.

(21) Explain how the users of the new system will intercommunicate with other public safety agencies operating in lower bands during emergency or disaster situations. Identify the intercommunication requirements of your dispatch center (see #(18))

(22) Explain the needs of your agency for a new system in the 700MHz spectrum and why those needs cannot be served by existing communications resources. Explain the deficiencies of your existing system which caused you to apply for new spectrum.

(23) System Justification: Explain why you require this spectrum.

(24) Implementation Time Table: Explain the proposed implementation schedule of your required system.

(25) Provide detailed information and supporting documentation showing the budget commitments for the completion of the system within the time allowed. (RPC expects a letter committing funds to system buildout.)

(26) Provide a time schedule of all significant implementation phases including funding, licensing, initial operation, channel loading and completion of your system.

(27) Provide an area of operation map detailing city/town/county/state boundaries and waterways. Identify any overlap coverage into neighboring cities/towns/counties/states and waterways. Provide marker identifications and a legend.

(28) Provide engineering studies as identified in “Procedure for Frequency Coordination”. The Technical Sub-committee plans to utilize software engineering known as “Comstudy” or “Spectrum E”. The Longley-Rice model is used for coverage and interference prediction methodology (See Below - 1. Interference Determination/Protection) because it is freely available in the public domain and has consistent implementations across propagation modeling programs of different sources, unlike Okumura Hata Davidson. All radiated and received power levels are referenced to a dipole antenna. The Technical Sub-committee will verify the accuracy of all engineering studies submitted to the committee. The engineering studies must be submitted in a version of “Comstudy” that is presently in use by the Technical Sub-committee. The Sub-committee in the future may change engineering software and will identify the software engineering required for submission in advance of any Window.

INTERFERENCE DETERMINATION/PROTECTION

This following procedure is the method that Region 8, 19 and 30 have agreed to for defining and evaluating “interference of a substantive nature” as specified in its letter “Mutual Agreement to protect against radio interference in the 700 MHz NPSPAC band.”
Recommended System Reliability

It is recommended that proposed facilities in Region 8, 19 and 30 be designed to provide 50 dB μ receive power levels for reliable portable coverage operations, and 40 dB μ receive power levels for reliable mobile coverage operations.

Coverage and Interference Prediction Methodology

Both TSB-88 (latest edition) and the Longley-Rice propagation model in median mode (50/50/50) shall be used to evaluate coverage and interference for proposed systems in either Region. The Longley-Rice model is used because it is freely available in the public domain and has consistent implementations across propagation modeling programs of different sources, unlike Okumura Hata Davidson. All radiated and received power levels are referenced to a dipole antenna.

Responsible Radiation Control and System Design

In order to promote responsible use of 700 MHz spectrum resources, all applicants are required to control unnecessary radio-frequency (RF) radiation. Therefore for all proposed facilities within the Region, 80% of the 50 dB μ Protected Service Area (PSA) must lie within the relevant jurisdictional boundary, plus an additional eight kilometer buffer zone. The 50 dB μ Protected Service Area shall be assessed using Longley Rice tile analyses.

Reliability Degradation Threshold

All licensed and previously-approved (by Regions 8, 19 and 30) facilities are required to provide co and adjacent channel interference protection to other similarly approved or licensed facilities.

Further, any new application or operations (which may consist of either single multiple facilities) must pose no more than 2.5% Area Reliability Degradation (ARD) at 90% reliability levels to any incumbent’s protected service area (PSA), with each individual PSA not to exceed a county-size jurisdiction. All facilities (including licensees and all approved allotments) in aggregate must pose no more than 5.0% cumulative area reliability degradation at 90% reliability levels to any incumbent’s protected service area.

The process for determining ARD is as follows:

- Compute the baseline Longley Rice 3-second tile coverage for each incumbent (Victim) co- and adjacent-channel licensee within their jurisdictional area. If the PSA coverage is provided by multiple sites, the coverage is assumed to be the most likely server coverage at each tile location,
- Evaluate the baseline total number of tiles within the Victim jurisdiction that achieve 90% or greater reliability levels using TSB-88 in conjunction with the deployed parameters for Channel Performance Criterion (CPC) at a delivered audio quality of 3.0, and receiver noise floor, and log-normal standard deviation (σ).
 - Example for typical parameters:
 - Receiver Noise Floor = -124 dBm
 - $CPC_f = 18$ dB
 - $\sigma = 7$ dB
 - These, along with the 40 dB μ (approximately -93 dBm at 807.5 MHz) give the following reliability throughout the service area:

$$R = 1 - Q[(-93 \text{ dBm} - (-124 \text{ dBm}) - 18 \text{ dB})/7 \text{ dB}] \approx 97\%$$

where: R = Reliability in decimal, converted to percent, and

Q = Marcum's function, representing the cumulative area under a Gaussian distribution curve.

- Evaluate the received power levels of all proposed facilities at all tiles within the Victim jurisdictional area. Combine these into an equivalent interferer using the process outlined in TSB-88.
- Re-evaluate the total number of tiles within each Victim jurisdiction that achieve 90% or greater reliability levels, considering the effects of all proposed facilities.
- The ARD is defined as one minus the ratio of the number of tiles at 90% reliability (or greater) considering proposed facilities and the baseline number of tiles at 90% reliability (or greater).

Evaluation of Adjacent Channel Effects

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 dBm 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.

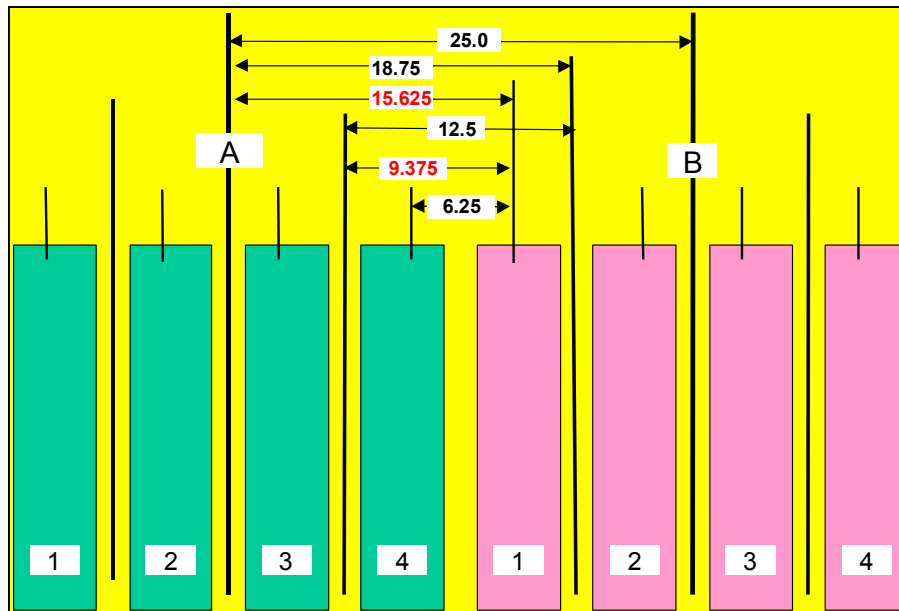


Figure 5, Potential Frequency Separations

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 dBm service contour, at 60 dBm.

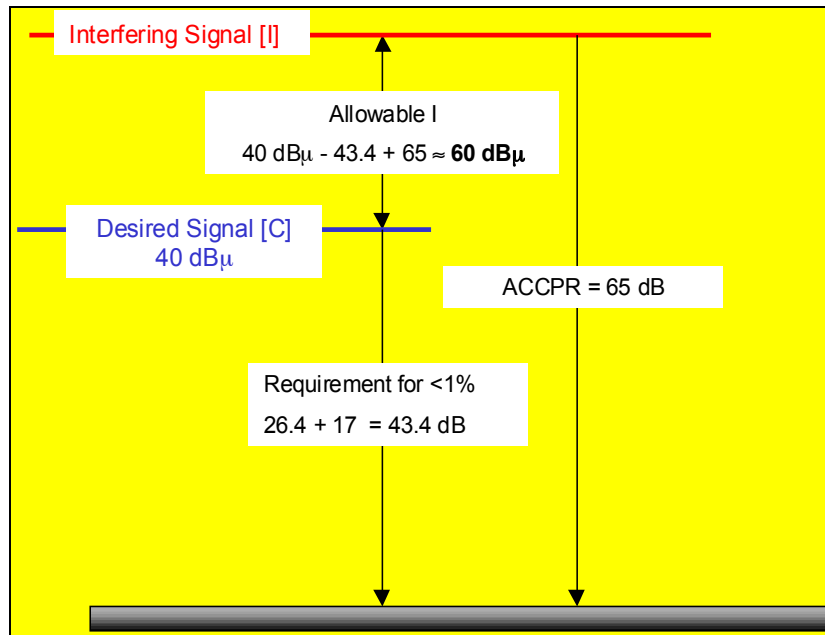


Figure 6 - Adjusted Adjacent 25 kHz Channel Interfering Contour Value

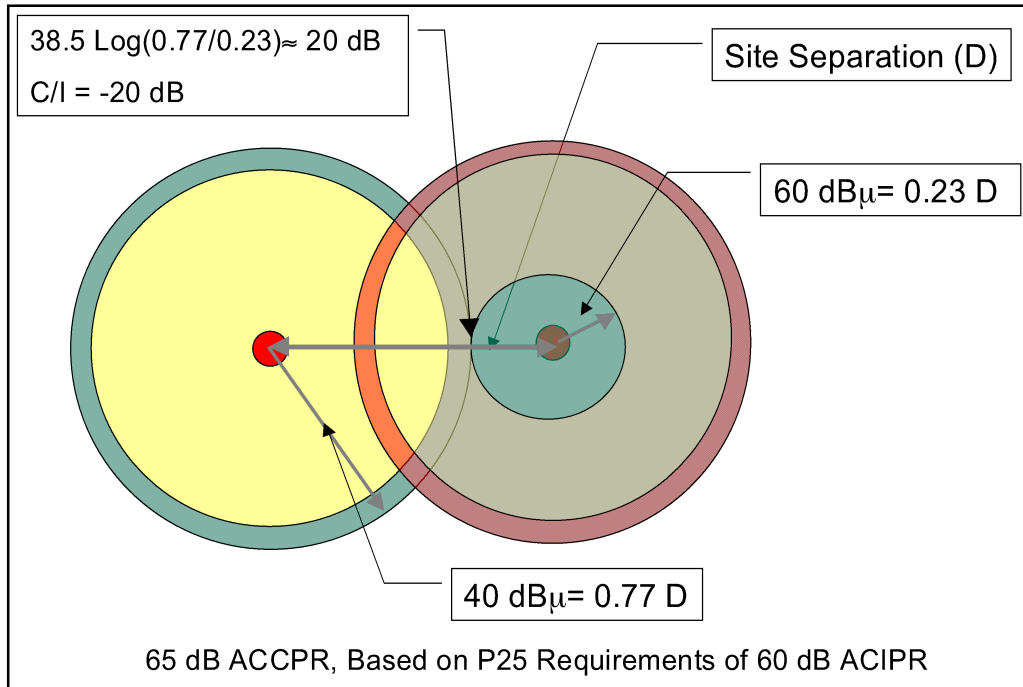


Figure 7 - Example Of Adjacent/Alternate Overlap Criterion

Adjacent Channel Interfering Contour Recommendation

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

(29)

This form must be completed using the Region 19 Antenna Pattern Information Form (refer to Table 1, Horizontal Antenna Pattern, and Table 2, Vertical Antenna Pattern).

Please complete this form in full for each unique fixed-facility transmit antenna configuration (Antenna Number on the Form 601 Schedule-H) employed within the application. Be sure to include both the vertical and horizontal patterns with all gain units in dB and normalized to zero dBd at the main lobe.

This information supersedes the Schedule-H antenna information fields: Azimuth, Beam width, Polarization, and Gain.

Site Name: _____
 Location Number: _____
 Antenna Number: _____

Horizontal Antenna Pattern:

Horizontal antenna pattern from 0° to 360° degrees, with 0° and 360° referenced at true North, and numbered clockwise (CW).

Table 1, Horizontal Antenna Pattern

Pattern Reference (degrees)	Normalized Horizontal Antenna Pattern (dBd)
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	
31	
32	
33	
34	
35	
36	
37	

Pattern Reference (degrees)	Normalized Horizontal Antenna Pattern (dBd)
180	
181	
182	
183	
184	
185	
186	
187	
188	
189	
190	
191	
192	
193	
194	
195	
196	
197	
198	
199	
200	
201	
202	
203	
204	
205	
206	
207	
208	
209	
210	
211	
212	
213	
214	
215	
216	
217	

38	
39	
40	
41	
42	
43	
44	
45	
46	
47	
48	
49	
50	
51	
52	
53	
54	
55	
56	
57	
58	
59	
60	
61	
62	
63	
64	
65	
66	
67	
68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	
81	
82	
83	
84	
85	

218	
219	
220	
221	
222	
223	
224	
225	
226	
227	
228	
229	
230	
231	
232	
233	
234	
235	
236	
237	
238	
239	
240	
241	
242	
243	
244	
245	
246	
247	
248	
249	
250	
251	
252	
253	
254	
255	
256	
257	
258	
259	
260	
261	
262	
263	
264	
265	

86	
87	
88	
89	
90	
91	
92	
93	
94	
95	
96	
97	
98	
99	
100	
101	
102	
103	
104	
105	
106	
107	
108	
109	
110	
111	
112	
113	
114	
115	
116	
117	
118	
119	
120	
121	
122	
123	
124	
125	
126	
127	
128	
129	
130	
131	
132	
133	

266	
267	
268	
269	
270	
271	
272	
273	
274	
275	
276	
277	
278	
279	
280	
281	
282	
283	
284	
285	
286	
287	
288	
289	
290	
291	
292	
293	
294	
295	
296	
297	
298	
299	
300	
301	
302	
303	
304	
305	
306	
307	
308	
309	
310	
311	
312	
313	

134	
135	
136	
137	
138	
139	
140	
141	
142	
143	
144	
145	
146	
147	
148	
149	
150	
151	
152	
153	
154	
155	
156	
157	
158	
159	
160	
161	
162	
163	
164	
165	
166	
167	
168	
169	
170	
171	
172	
173	
174	
175	
176	
177	
178	
179	

314	
315	
316	
317	
318	
319	
320	
321	
322	
323	
324	
325	
326	
327	
328	
329	
330	
331	
332	
333	
334	
335	
336	
337	
338	
339	
340	
341	
342	
343	
344	
345	
346	
347	
348	
349	
350	
351	
352	
353	
354	
355	
356	
357	
358	
359	
360	

Site Name: _____

Location Number: _____

Antenna Number: _____

Vertical Antenna Pattern:

Elevation antenna pattern from -180° to +180° with 0° referenced at the horizon.

Table 2, Vertical Antenna Pattern

Pattern Reference (degrees)	Normalized Vertical Antenna Pattern (dBd)
-180	
-179	
-178	
-177	
-176	
-175	
-174	
-173	
-172	
-171	
-170	
-169	
-168	
-167	
-166	
-165	
-164	
-163	
-162	
-161	
-160	
-159	
-158	
-157	
-156	
-155	
-154	
-153	
-152	
-151	
-150	
-149	
-148	
-147	
-146	
-145	

Pattern Reference (degrees)	Normalized Vertical Antenna Pattern (dBd)
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	
31	
32	
33	
34	
35	

-144	
-143	
-142	
-141	
-140	
-139	
-138	
-137	
-136	
-135	
-134	
-133	
-132	
-131	
-130	
-129	
-128	
-127	
-126	
-125	
-124	
-123	
-122	
-121	
-120	
-119	
-118	
-117	
-116	
-115	
-114	
-113	
-112	
-111	
-110	
-109	
-108	
-107	
-106	
-105	
-104	
-103	
-102	
-101	
-100	
-99	
-98	
-97	

36	
37	
38	
39	
40	
41	
42	
43	
44	
45	
46	
47	
48	
49	
50	
51	
52	
53	
54	
55	
56	
57	
58	
59	
60	
61	
62	
63	
64	
65	
66	
67	
68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	
81	
82	
83	

-96	
-95	
-94	
-93	
-92	
-91	
-90	
-89	
-88	
-87	
-86	
-85	
-84	
-83	
-82	
-81	
-80	
-79	
-78	
-77	
-76	
-75	
-74	
-73	
-72	
-71	
-70	
-69	
-68	
-67	
-66	
-65	
-64	
-63	
-62	
-61	
-60	
-59	
-58	
-57	
-56	
-55	
-54	
-53	
-52	
-51	
-50	
-49	

84	
85	
86	
87	
88	
89	
90	
91	
92	
93	
94	
95	
96	
97	
98	
99	
100	
101	
102	
103	
104	
105	
106	
107	
108	
109	
110	
111	
112	
113	
114	
115	
116	
117	
118	
119	
120	
121	
122	
123	
124	
125	
126	
127	
128	
129	
130	
131	

-48	
-47	
-46	
-45	
-44	
-43	
-42	
-41	
-40	
-39	
-38	
-37	
-36	
-35	
-34	
-33	
-32	
-31	
-30	
-29	
-28	
-27	
-26	
-25	
-24	
-23	
-22	
-21	
-20	
-19	
-18	
-17	
-16	
-15	
-14	
-13	
-12	
-11	
-10	
-9	
-8	
-7	
-6	
-5	
-4	
-3	
-2	
-1	

132	
133	
134	
135	
136	
137	
138	
139	
140	
141	
142	
143	
144	
145	
146	
147	
148	
149	
150	
151	
152	
153	
154	
155	
156	
157	
158	
159	
160	
161	
162	
163	
164	
165	
166	
167	
168	
169	
170	
171	
172	
173	
174	
175	
176	
177	
178	
179	

Frequency Coordinator's Signature _____ Title _____
Printed Name _____ Date _____

This agency has a firm intention to implement a new/expanded/modified 700MHz system with the time permitted by the FCC and to return for use by other public safety eligibles existing unneeded channels/frequencies. We will provide the committee with semi-annual copies of all progress reports. Should implementation not begin or be completed with the time approved by the FCC or channel loading projections are not achieved, the channels will be returned for re-allocation to other public safety agencies.

This agency will comply with all applicable requirements for common channel implementation and participation as required in the 700 MHz Plan – Region 19

The information contained in the application and attachments is true and correct.

Signature _____ Date _____
Typed Name _____ Title _____
Address _____
E-mail _____
Phone # _____ Fax # _____