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15th Meeting Summary – October 3rd, 2007

Houston Airport System
16930 JFK Blvd., Houston, TX 77032

- Purpose: The purpose of the meeting is to review issues facing the RPC's and the 700 MHz plans, what changes will have to be made as a result of the latest FCC rule changes, and in particular, how these changes affect Region 51.
- 9:45 am Call to order by Chair Doug Frankhouser in accordance with provisions contained in WT Docket No. 96-86
- 9:46 am Welcome and introduction of attendees and completion/verification of attendee information sheet
- 9:50 am Presentation and discussion of NPSTC September meetings and training in Austin: David Dodson, Jim Bridwell – Harris County Regional Radio
- 10:00 am Presentation of FCC required changes to public-safety 700 MHz frequencies: Bette Reinhart – Motorola, Bobby Jones - RCC
- 10:30 am Review and discussion of final draft which was concurred to by R18, R40, R49, and R53, and was ready to be forwarded when the FCC made a rules change
- 10:40 am Discussion of go-forward with the R51 700 MHz plan
- 10:45 am Discussion of any other issues/topics affecting R51
- 10:48 am PSIC Grants: John Chaney – Harris County Regional Radio
- 10:55 am Letter of request from Port Arthur
- 10:57 am Closing remarks, comments, Q&A
- 11:00 am Meeting adjourned by Doug Frankhouser, Chair

14. 700 MHz Interoperability/Channel Nomenclature

Region 51 will follow the State of Texas' interoperability/channel nomenclature.

15. NCC 700 MHz Pre-Assignment Rules/Recommendations

15.1. Introduction

This section describes a process for coordinating the initial block assignments of 700 MHz channels. The allocation of spectrum provided by CAPRAD is for planning purposes, particularly defining the minimum channels usage at the border of region 51 and neighboring Regions. Channel packing beyond CAPRAD will be based upon actual technical parameters and jurisdictional coverage requirements of the specific licensees. As such, CAPRAD provides a starting point for channel allotment not the most efficient utilization of the spectrum. The Region 51 Committee has the authority to utilize specific engineering analysis to move beyond CAPRAD to satisfy the spectrum requirements of public safety licensees.

15.2. 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 μ 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 μ interfering contour will be allowed to overlap the 40 dB μ service contour of the system being evaluated only in the extended service area and only if the overlap degradation of service area does not exceed 2%. For adjacent and alternate channels, the 60 dB μ interfering contour will be allowed to overlap the 40 dB μ service contour of the system being evaluated only in the extended service area and only if the overlap degradation of service area does not exceed 2%. The service contour reliability is defined at F(95,50), while the interference contours are defined at F(50,50).

Extension of the service contour is required to:

- Allow in-building coverage at the edge of the jurisdictional area

- Permit mobile communication during excursions beyond the jurisdictional area on an itinerant basis¹

15.3. 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 1µV/m (customarily denoted as 40 dBµ). 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 dBµ field strength can be deployed up to a defined distance (extended service area) 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. The value of 40 dBµ in the 700 MHz band corresponds to a signal of -92.7 dBm, received by a half-wavelength dipole antenna.

Two primary concerns are addressed by the Region 51 Committee:

- Public safety systems must provide reliable ubiquitous coverage within the service area
- Public safety systems must be cost effective and not prohibitive to construct and operate

The Committee has chosen to define the service area to the public safety standard of 95% faded reliability to an extended service area 3-5 miles outside of the licensee's jurisdictional area or 3-5 miles beyond the combined jurisdictions in a multi-jurisdictional system. This provides a proper balance between the need to conserve and re-use spectrum, and the necessity to provide reliable service coverage at an affordable infrastructure cost.

15.4. Portable In-Building Coverage

Most Public Safety communications systems, today, are designed for portable in building coverage and the requirement for a typical coverage reliability of 95%. Buildings of 20 dB or greater penetration loss can be located at any point within the jurisdictional polygon of the licensee. The permitting of the service contour to extend 3-5 miles beyond the jurisdictional polygon at a faded 95% reliability will improve the ability to communicate into buildings located at the jurisdictional line. However, the Committee understands that this extended service area alone may not address the in-

¹ Mobile communication beyond the jurisdictional boundary at a high reliability level is particularly important during the early stages of 700 MHz development. Mobile units may travel outside of the jurisdiction on an exigent basis and find that they are without any communication, particularly if adjacent jurisdictions are not operable at 700 MHz and/or the national interoperable channels are not constructed. This is an unacceptable situation.

building requirements of all licensees, particularly when a very high loss building is located at or very close to such boundaries. In these cases the licensee will need to specifically address the particular building with unique and innovative approaches.

15.5. Service Contour Extension Recommendation

The resulting recommendation for extending the 40 dB μ service contour beyond the service area boundary is:

Urban (20 dB Buildings):	5 miles
Suburban (15 dB Buildings):	4 miles
Rural (10 dB Buildings):	3 miles

The Region 51 Committee may waive these limits upon demonstration by the licensee that the urbanization classification does not properly address the licensee's situation; however the maximum distance of the service area extension is 5 miles in all situations.

15.6. Interfering Contour

The service and interference contours are plotted at differing reliability requirements. As such a direct relation between the dB levels is not proper. The service area is defined as 40 dB μ F(95,50), with is approximately 13 dB above a 40 dB μ F(50,50) contour, assuming a standard deviation of approximately 8 dB. Contours are calculated using methods described in TIA TSB-88B (or a subsequent later version), by using Okumura-Hata-Davidson propagation modeling, relative to an open environment. The modeling is to be based on a 1 arc second terrain data. Land Use-Land Cover (LULC) losses are to be applied; however the diffraction portion of the modeling, where it can serve to artificially limit the size of the contour, must be disabled².

15.7. Co-Channel Interfering Contour Recommendation

The Committee will allow the constructed 40 dB μ F(95,50) service contour to extend beyond the edge of the defined service area by the distance indicated in 15.5.

A co-channel shall be allowed to have its 5 dB μ (50,50) interfering contour to overlap the 40 dB μ extended service contour of the system being evaluated only if the reduction of overlap of the extended service area does not exceed 2% and does not overlap into the jurisdictional service area.

² Diffraction modeling may limit the size of the contour by drawing the contour line at the first point where the signal drops below the contour limit, even if the signal increases beyond that point.

15.8. Adjacent and Alternate Channel Considerations

Adjacent and alternate channels are treated as being on channel signals reduced by the value of Adjacent Channel Coupled Power (ACCP). This assumes that the primary mechanism for interference results from transmitter sideband noise appearing as an on-channel signal within the receiver bandwidth. Using the 47 CFR § 90.543 values of ACCP can facilitate the coordination of adjacent and alternate channels.

Based on 47 CFR ¶ 90.543 and the P25 requirement for an ACCP 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 ACCP is available for both adjacent 25 KHz spectrum blocks. 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 dB μ service contour, at 60 dB μ .

15.9. Adjacent Channel Interfering Contour Recommendation

An adjacent channel shall be allowed to have its 60 dB μ (50,50) interfering contour overlap the 40 dB μ extended service contour of the system being evaluated only if the overlap degradation of the extended service area does not exceed 2% and does not overlap into the jurisdictional service area.

15.10. Final Detailed Coordination

The coordination for frequencies prior to system procurement does not address the specific and unique circumstances of the particular system and is only adequate for presorting large blocks of spectrum to potential entities. A more detailed analysis should be included in the actual design phase to take all the issues into consideration. A detailed report to the Region 51 Committee is to be submitted by each license detailing the "As Built" system once it is completed for the purposes of subsequent channel assignment. This information is available to other potential licensees to assist with licensing and coordinating those new systems to avoid interference.

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
- Site Separation
- Actual ACCP
- Balanced Systems
- Mobiles vs. Portables
- Use of voting
- Use of simulcast
- Radio specifications
- Simplex Operation

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. Simplex operations, other than those on the low power or interoperable channels, are generally not offered protection from interference.

16. Region 51 Channel Assignments

The frequency distribution plan for Region 51 has been based on the criteria set forth by the Region 51 RPC. The RPC for Region 51 has elected to configure the channel distribution plan based on a 12.5 KHz channel bandwidth as the original CAPRAD assignments were woefully inadequate for the needs of the Region. After careful engineering modeling and review to determine the most efficient use of available spectrum and to insure no interference with surrounding regions, the following tables contains the channel assignments at 12.5 KHz bandwidth channels. This will preclude the need for 25 KHz channel allocations in most areas with the exception of some bordering counties for the purposes of interoperability.

16.1. 700 MHz Channel Assignments for Region 51

16.1.1. Methodology

The allocation of Region 51 channels was initiated utilizing the CAPRAD foundation of frequency assignments. The Harris County area, being central to Region 51, received the first layer of frequency assignments as part of the assignment process. This is the 1st Reuse Group assigned from the basic CAPRAD pool of frequencies in a narrowband 12.5 KHz configuration. The channel assignment to other counties was performed utilizing Normalized Capacity Loading and by availability from the existing CAPRAD configuration after the First Reuse assignments were completed. This was required in order to accommodate the channel spacing needed for the application of antenna systems. Due to the large population and number of channels allocated within Harris County, the assignment of channels in surrounding counties in some cases resulted in the splitting of 25 KHz groupings. Should 25 KHz channel designs be needed for a specific application or area in the Region, the channel plan could be reworked to accommodate the reconstruction of a limited quantity of 25 KHz channel slots. The assignment of channels was based on the following criteria:

- Maintain the integrity of all adjacent regions.
- Use one point (county centers) from which to calculate co-channel separations. Coordinates for these county centers were obtained from CAPRAD.
- Use Adjacent Regions' CAPRAD Pre-allotments and maintain 80 miles between co-channel assignments (based on county centers). *Please note that the FCC's 2007 reallocation of the 700 MHz Band Plan will create changes in CAPRAD Pre-Allotments in the form of a "relative shift" of all narrowband channel assignments. Region 51 presumed this "relative shift" in maintaining the integrity of all adjacent regions'*

channel assignments. Should any adjacent region(s) stray from this "relative shift" and choose to make channel assignments that differ from that of the original CAPRAD Pre-allotment criteria, then that region must engineer their channel assignments while maintaining the integrity of this Region 51 Plan.

- Within each county, obtain 150 KHz spacing between all channels in groups of ten. Maintained the integrity of all adjacent regions.

16.1.2. Channel Spacing

A strict adherence to 250 KHz separation would severely limit the frequency pool availability for reuse throughout the Region. For sorting purposes, the channel spacing was based on a target separation of 250 KHz to achieve separation for antenna design limitations. In instances where 250 KHz separation cannot be achieved with contiguous channel assignments within a county, sufficient numbers of channels are available such that the use of multiple combiners will allow for appropriate separation within one antenna configuration. The co-channel separation was maintained with surrounding jurisdictions for all narrowband channel assignments as assigned in the originating CAPRAD plan. Adjacent channels within a single county can be designed with sufficient physical separation to allow for unobstructed operations from adjacent channel interference. This is due to the fact that the channel assignments for the 700MHz band do not overlap as in some other frequency bands.

The assignments for the Harris County area were partitioned into seven groups to accommodate potential transmit combiner configurations. Within each Harris County grouping, sufficient adjacent channel spacing is obtainable to make workable channel groupings in a typical transmit combiner. The primary impact of the frequency spread are the overall desired per-channel ERP, tower height, and antenna systems gains or losses. Use of more than one combiner may be required for channel spacing within a single group is less than 150 KHz, nonetheless, use of more than one combiner will most likely be required anyway when exceeding ten channels at a single location. The varied highlighting in the right side columns of the tables below indicates estimated combiner grouping.

16.1.3. Edits to Frequency Assignments

Using the CAPRAD frequency assignments as a base template, the Harris County frequency assignments were plotted and recorded. In some cases, those counties with sufficient distance from Harris County were able to maintain most of their existing CAPRAD assignments per 12.5 KHz channel slot. It was noted that some of the original CAPRAD assignments

were less than the desired 80 miles from center to center of counties. These original CAPRAD assignments were not reassigned.

In general, the remaining counties for Region 51 plan were reassigned channels based on frequency availability and normalized loading. A sufficient channel pool exists to accommodate modifications to the existing plan for the reassignment or combination of channels for 25 KHz applications if needed, with limitations.

16.1.4. County Assignments

The columns, in the tables to follow, show the channel assignments for regions 18, 40, 49, 53, and 51 with each row showing the co-channel assignments relative to the primary sort column. In the Region 51 section on the right side of the table, the county listed in bold text under the "Primary Sort Assignment" is the newly reassigned grouping. (The location of this column may vary in accordance with the originating spreadsheet.) The search and sorting criteria was based on the channel separation required for a typical transmit combiner configuration.

The additional shading under the Region 51 columns show those frequencies (channels) that may be workable into a single transmit combiner. Highlighting of the same color indicates frequency use into one combiner. Additional system design will be needed to determine the target ERP and other system design parameters for the final location of the site.

The co-channel CAPRAD assignments for each frequency are listed on the left side of the table. The counties highlighted in yellow are the closest to the Region 51 assignment; however, they are not necessarily less than the desired 80 miles separation of county centers.

16.1.5. Coordination with Adjacent Regions

Frequency reuse is of vital importance to our region. Careful consideration was given to prevent/minimize interference during the resort process. Further, the CAPRAD frequencies along the borders were left in place so as not to disturb frequencies in adjacent regions. However, there may be channel assignments along the region's border that have the potential to be in conflict with adjacent region(s). Therefore, as a standard step in our application approval process, the Chair of Region 51 will forward via both electronic and via hardcopy a copy of all license applications that have proposed sites within 70 miles (113km) of the region's border to the adjacent region(s) and allow a fourteen day (14) period for the adjacent region(s) to raise any objection. If an objection is raised, the regional chairs will work to mitigate the issue. If said mitigation can't be reached, the situation will be handled via the dispute resolution process identified in section 17. If the Chair of Region 51

receives no response within the 14 day period, the application will then move forward in the normal approval process.