

**Before the Federal Communications Commission  
Washington, D. C. 20554**

In the Matter of:

Improving Public Safety Communications )	
in the 800 MHz Band. )	
)	WT Docket No. 02-55
Consolidating the 900 MHz Industrial/ )	
Land Transportation and Business Pool )	
Channels )	

**Response to the FCC Notice of Proposed Rule Making - WT Docket Number 02-55**

RCC Consultants, Inc (RCC) is an international consulting and engineering firm with offices throughout the United States. RCC provides its services primarily to Public Safety Agencies, Utilities, cellular telephone providers and other critical infrastructure industries. RCC is experienced with both noise limited and cell-based infrastructure. RCC is a major participant in the European TETRA build out and has provided services to the US cellular telephone industry. We also have clients that are constructing and operating noise limited wide area systems, including those using a quasi-synchronous or simulcast technology.

**Summary:**

RCC Consultants, Inc. believes that a new approach to allocating frequency spectrum is necessary in order to provide a viable, long-term solution to the problem of harmful interference to public safety users by CMRS and other cellular-like users in the 800 MHz frequency band. In RCC's opinion the best approach transcends simply restructuring any single frequency band; instead it requires reconsideration of both the current practice of interleaving frequencies and blocks of frequencies assigned to different radio services and the long-term viability of spreading frequency allocations among disparate frequency bands. This paper focuses on public safety spectrum and thus not the consolidation of the 900 MHz spectrum.

**Discussion:**

Restructuring only the 800 MHz band cannot provide a long-term solution to the problem addressed by the NPRM, nor will it avoid recurrence of the problem in other frequency bands, particularly in the 700 MHz band where interleaving<sup>1</sup> will likely continue under current frequency allocation methodology. While restructuring may alleviate a specific interference problem in the short term, RCC believes that implementation of any solution that is limited only to a restructuring of the 800 MHz band would serve to perpetuate RF interference problems that now face the public safety community.

As RF spectrum becomes increasingly crowded, and new technology and system architecture approaches create the potential for new forms of interference, RCC believes that the FCC needs to take a fresh approach to allocating spectrum for users, particularly those in the public safety community. The long-standing need for sufficient, interference-free radio frequency spectrum for use by public safety first-responders was tragically amplified by the events of September 11, 2001. In addition to the need for ample frequency spectrum to support those who safeguard our lives and property, there exists a need for compatible frequency spectrum across public safety operations in order to support mutual aid and communications interoperability for large scale, multi-agency responses. A long-term strategy for accommodating growth in public safety operations must address practical means of facilitating interoperability.

The Commission now has a rare opportunity to implement a viable, long-term frequency allocation plan with the recent reallocation of the 700 MHz band from commercial broadcasters to land mobile users. Implementation of an appropriate spectrum allocation plan will serve to avoid certain interference problems at 700 MHz that now plague users in the 800 MHz band; these problems have only surfaced in recent years as a result of rapid growth of users and cell site infrastructure at 800 MHz. Further, the 700 MHz band

---

<sup>1</sup> *RCC's definition of interleaving in this paper includes both individual channel and sub-band interleaving.*

provides an opportunity to consolidate public safety operations in a single frequency band whereby communications interoperability can be provided more readily than in the past.

Currently in the 800 MHz frequency band, certain channels and sub-bands (e.g., 806 – 815 MHz and 821 – 824 MHz) are interleaved among users in certain services. Cellular and two-way land mobile users are interleaved in the 800 MHz band, and current FCC band plans perpetuate interleaving in both the exiting 800 MHz and the new 700 MHz frequency bands. Interleaving individual channels or sub-bands will, by mathematical definition, always cause localized interference when radio units are subject to high power density off-channel signals. While technology moves to help address such occurrences, technology coupled with system architecture and applications also moves forward to cause other forms of the same phenomena.

Historically, public safety and most other radio users (including cellular carriers) designed systems that used a relatively low number of high-profile radio sites deployed on tall towers and mountaintops. High-profile sites are often placed in remote areas that are removed from population centers where public safety responders typically operate. In order to meet the capacity required by rapid growth in the industry, cellular radio systems now employ a high-density, low-profile architecture whereby high gain sites are placed on relatively low structures and terrain within population centers in order to saturate coverage while permitting frequency reuse.

In the past, the mathematical products that might have resulted in intermodulation interference to mobile and portable radios seldom appeared in practice. Similarly, transmitter noise and receiver desensitization interference was also rare, because the high-profile sites that contributed the potentially troublesome frequencies and signal levels were sufficiently removed geographically from the public safety mobile and portable receivers. In contrast, today's cellular-like architecture now brings low profile sites in close proximity to public safety mobile and portable receivers, such that public safety radios are now vulnerable to harmful interference caused by strong, local signals.

It might be argued that because some modern public safety radio systems are now beginning to migrate to cellular-like architectures, the same problems that result from inter-service channel interleaving and sub-band interleaving will become evident within the public safety band allocations. While on the surface it appears that public safety is creating the same situation that it attempts to correct, a major difference is that mechanisms are currently in place within the public safety radio community that can more easily and practically mitigate any potential interference. Regional planning committees and frequency coordinating organizations within public safety now successfully manage frequency spectrum within the service. Success is possible because the regional planning committees exercise influence over all users within one radio service. There is no similar mechanism for managing spectrum that crosses either all or subsets of commercial, business, industrial, land, transportation and public radio service classes.

The current HDTV migration that will make the upper portion of the 700 MHz band available to land mobile users could take from five to ten years to complete. Therefore, many areas of the country would not have near-term access to the new spectrum. Restructuring the 800 MHz band would take at least as many years comparatively, yet it would not offer a total solution to the interference problem it seeks to alleviate. Restructuring only 800 MHz means that public safety would still be interleaved with the remaining 800 MHz licensee classes. Furthermore, the planned allocation of frequencies in the 700 MHz band includes interleaving by sub-band, so the problem that restructuring seeks to resolve in the 800 MHz band would be perpetuated in the new band. Since neither the HDTV migration nor restructuring of the 800 MHz band can provide relief to the public safety community for as many as 10 years, RCC recommends that the FCC implement a long range, permanent solution to the problem of interleaved interference.

The best way to adequately protect public safety operations is to segregate this critical use need and manage the allocation of spectrum independently of other spectrum usage. RCC suggests the FCC consider this action plan to address the protection of public safety radio communications operations overall:

- 1) Allocate the entire 700 MHz band exclusively for public safety communications (698 to 806 MHz or broadcast channels 52 through 69). This is broken into two sub-bands, 746 MHz and above (channels 60 to 69) and 698 MHz to 746 MHz (channels 52 to 59).
- 2) Allow immediate and mid-term migration (up to 10-15 years) of public safety users from 800 MHz to the upper portion (746 MHz and above) broadcast channels 60 through 69. This would not impact the current HDTV migration for the broadcasters, yet it would provide public safety users in many areas of the country the ability to immediately begin planning and migrating to the new band.
- 3) Halt the auctions for commercial services interleaved in the upper 700 MHz spectrum. Instead, the 800 MHz spectrum vacated by public safety could be auctioned off for commercial interests.
- 4) Allow long-term migration (20 years and beyond) to the lower portion of the 700 MHz band (broadcast channels 52 through 60). This effort could accommodate the future expansion of public safety communications operations consistent with the final report of the Public Safety Wireless Advisory Committee submitted to the FCC on September 11, 1996.

**Conclusion:**

RCC views the above recommendations as being beneficial to the public safety community at large, while presenting minimal impact to commercial interests and broadcasters who currently have interest in the spectrum. Foreseen impact on all interested parties includes the following:

- There will be no impact on broadcasters – they can vacate the 700 MHz band as planned.

- Public safety users can begin migration to the 700 MHz band when appropriate for them. In certain areas of the country, 700 MHz spectrum is currently available for licensing, and users in those areas who have immediate need for spectrum can migrate now. Other public safety users can migrate at a later time when their current radio systems are ready for retirement, or when 700 MHz spectrum becomes available in their areas.
- All public safety can eventually migrate to a single, contiguous block of frequencies, thus eliminating the interference problems associated with interleaving channels or sub-bands of different radio services.
- A single contiguous block of spectrum provides unparalleled capabilities of mutual aid and interoperability for life safety and first responders.
- According to the National Coordinating Committee, all equipment will have a common mode of operation irrespective of manufacturer or mode used for intra-system operation. The Public Safety community would be the ultimate beneficiaries with improved capabilities and commonalities between equipment of different manufacturers. Further, the American taxpayers would benefit with improved pricing as manufacturers can focus product design and engage in market competition.
- The current band plans for the public safety portion of the 700 MHz spectrum need not be changed. In fact, the common public safety inter-Regional Planning Committee applications of sub-band allocations can actually build upon the current band plans, by segregating potentially incompatible system technologies and architecture approaches within the public safety spectrum; this level of planning would be possible only if an entire block of contiguous spectrum were made available to public safety.

- Revenue plans from the auctions may seem to be delayed with this approach. However, while this plan addresses a technically correct approach, it can be aligned to monetary considerations with the caveat that the FCC place public safety needs above anticipated financial gains. Potential considerations include:
  - a- The FCC could auction the 800 MHz spectrum being vacated by the public safety users.
  - b- Auction revenue could be dedicated to migrate public safety users from 800 MHz to 700 MHz.
  - c- Winners of the 800 MHz spectrum could provide incentives, financial or otherwise, to expedite migration of public safety, consistent with the 2 GHz PCS relocations.
  
- Commercial interests will be protected – commercial users would ultimately be assigned the 800 MHz spectrum vacated by public safety users (e.g., 806 and 821 sub-bands and other shared spectrum in other 800 MHz sub-bands.)
  
- Public safety users would be afforded long-term growth in the lower portion of the 700 MHz band (Channels 52-60). The entire 700 MHz band is the only remaining contiguous spectrum in sufficient quantity that is suitable to support cost-effective technology for public safety communications. Overall, the 700 MHz band does not represent an excess of spectrum, especially when viewed in light of the benefits to public safety first responders, and in turn to the American public at large.

It would appear that the preferred solution to the public safety interference problem is to segregate public safety and commercial users by frequency band. The 700 MHz band can offer the public safety community spectrum that is both free from external interference and sufficient to meet its projected growth. RCC's action plan suggested herein can satisfy the needs of the public safety community with tremendous benefit to life safety operations and minimal impact to commercial users and all other parties.