

**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)

Comments of the RadioSoft

RadioSoft, hereby respectfully submits its comments in response to the Commission's *Notice of Proposed Rulemaking* (NPRM) in the above-referenced matter.¹ RadioSoft provides radio engineering software that, among other things, analyzes spectrum allocation, service and interference, and additionally provides coordination services to many Part 90 Frequency Advisory Committees and their customers. Since we list among our customers public, private and government entities and frequently consult with them, we have a somewhat different perspective than Nextel² or NAM³.

We agree that Public Safety spectrum needs have expanded in light of terrorism and our

¹ See Improving Public Safety Communications in the 800 MHz Band and Consolidating the 900 MHz Industrial/Land Transportation and Business Pool Channels, *Notice of Proposed Rule Making*, WT Docket No. 02-55 (rel. Mar. 15, 2002) (NPRM).

² Promoting Public Safety Communications – Realigning the 800 MHz Land Mobile Radio Band to Rectify Commercial Mobile Radio - Public Safety Interference and Allocate Additional Spectrum to Meet Critical Public Safety Needs (*Nextel Proposal*), Nov. 21, 2001.

³ See letter of December 21, 2001, to Michael Powell, Chairman, Federal Communications Commission, from Jerry Jasinowski, President, National Association of Manufacturers and Clyde Morrow, Sr., President, MRFAC, Inc. (*NAM Proposal*).

response to control its aftermath. However, we assert that the distinction between Public Safety under Part 90 and Government (IRAC) spectrum will prove extraordinarily expensive to maintain, and further that such maintenance will compromise the implementation of both systems. We well realize that concerted action, such as constructing a dual band (VHF/UHF) integrated Government/Public Safety communications network is beyond the scope of this NPRM, and would unduly delay 800 MHz Public Safety interference solutions. However, any solution to the 800 MHz band⁴ which does not look forward to integration will waste public funds and spectrum and ought to be carefully considered at this time.

There are four problems to solve: CMRS/Public Safety 800 MHz Interference; CMRS/Business/ILT 800 MHz Interference, Homeland Security/Public Safety Integration and such issues as arise when the time necessary to plan and construct solutions to the first three are considered.

A. CMRS/Public Safety Interference

It is clear that the interference arises from multiple causes, among which the chiefest are the failure of $43 + 10 \log (P)^5$ to protect the noise floor of spectrally distant receivers and Intermodulation between shifting patterns of multiple in-band Cellularized⁶ transmitters. Both problems may be largely resolved by repacking the band. However, a 2 MHz Guard Band as

⁴ The frequency references throughout the rest of this filing only mention the high side, or base station frequency, of the channel pair. All high side frequencies are paired with a low side frequency 45 MHz below.

⁵ See 47 CFR 90.210

⁶ By “Cellularized”, we mean any multifrequency digital low HAAT small area systems with frequency re-use.

suggested by Nextel⁷ is insufficient for either type of interference. With out-of-band attenuation rolling off by as little as 1 dB / MHz, a minimum of 4 MHz is necessary to achieve the 90% reliability of protected service areas which is a typical criterion for Public Safety use. Elimination of Intermodulation products is impossible, but they may be statistically contained by choosing a guard band, the size of which is at least 80% of the occupied bandwidth of the interfering channels. For example, the 4 MHz guard band suggested above for out-of-band interference would permit an adjacent frequency pool of no more than 5 MHz. We note that neither the Nextel nor the NAM proposal achieves this. To the extent that sites are shared by owners of adjacent Cellularized pools, first order Intermodulation products in the form of $2 * F1 - F2$ will not be reduced by the segregation of pooling. If, as seems likely, one entity controls much of the spectrum in both pools, the division becomes, with respect to Intermodulation interference, meaningless.

B. CMRS/Business/ILT 800 MHz Interference

Public Safety is usually understood to have a greater reliability requirement than B/ILT uses, so they might sustain a higher level of interference from Digital systems. But we find the NAM proposal surprisingly submissive, and would recommend instead dividing the 18 MHz from 851 MHz to 869 MHz into at least four segments, with Nextel or other Cellularized users at the top of the band adjacent to the current Cellular spectrum above 869 MHz. Ideally, Public Safety should occupy the bottom of the band, which provides maximum protection of its Uplink receivers. B/ILT ought to be next lowest, with two separated bands of Digital SMR users

⁷ See *Nextel Proposal* at 33-34.

occupying the top half of the band. Thus Public Safety would use 851 – 856 MHz exclusively. This would require NPSPAC users to reconfigure, but since they are now adjacent to cellular users that cannot easily be moved, this is unavoidable. B/ILT should then be allocated the next 5 MHz from 856 to 861 MHz.⁸ In both cases, there are numerous users already using these frequencies, and the hardware (save for NPSPAC) will permit simple retuning. For the remaining 8 MHz, splitting it into 2 bands of Digital Cellularized SMR service (one could use 4 + 4 or 5 + 3 to ease regulatory transition, as the NPSPAC frequencies are the top three) to minimize IM products would be best.

C. Public Safety/Government Integration

I currently lease a transmitter site to a Government Agency. This lease specifies that I may neither disclose the Agency nor any detail of its use at my site. Should I or any interested party be curious about this operation, no details about it are publicly available from Government sources, though one may purchase a local frequency use list from any Radio Shack. Moreover, since the inception of this lease, virtually all sensitive Governmental radio traffic is digitally encrypted, rendering the mere public knowledge of its locations and frequencies uninteresting. Given that Public Safety is migrating to 700 MHz, and that various Government Agencies are currently constructing new radio systems to reflect current command and control necessities, we believe that due consideration to a dual band integrated Public Safety/Government network be given. It is clear from usage patterns at 800/900 MHz that rural, mountainous areas such as the

⁸ Due to specific existing uses, spectrum between 855 and 857 might be shared between Public Safety and B/ILT

New England border cannot be economically served at 700 MHz or any other UHF assignment. A small Public Safety spectrum allocation at VHF (say, 137 MHz) has been often put forth for this reason and others, and now is the time to consider it. It would have to sustain only 20 channel pairs (as a bare minimum), and could be made interoperable with other VHF uses as well as 700 MHz planned spectrum.

D. Timing

The Public Safety Interference problem is pressing and will worsen as Nextel continues to build out its systems. Relocating Nextel to spectrum specifically intended for non-cellularized applications may seem best, as it is Nextel that by so using its existing 800 MHz spectrum has caused the problem. Arguing that its use meets all applicable Rules is disingenuous, since regulation always lags technology, and Nextel has pursued the technological edge vigorously. Moreover, Nextel depends on a waiver obtained by Fleet Call, its predecessor, in which it effectively took responsibility for any interference:

"...ESMR service can be implemented without interference to existing SMR stations (or other 851-869 MHz stations). Furthermore, very conservative assumptions were used in the analysis above providing an extra interference buffer to existing stations and proposed ESMR stations. It is therefore believed that any actual interference experienced in the six congested markets from ESMR service will be limited to isolated cases. Because of the flexibility of the ESMR service, such isolated cases of interference can be resolved utilizing a number of different techniques at the ESMR base station including changing frequencies, reducing power or height,

re-orienting or changing directional antennas, or employing electrical or mechanical beam tilt."⁹ Nevertheless, as shown below, relocating Nextel would practically represent robbing ten Peters to pay one small Paul, especially in the 861-866 MHz band where it is nearly exclusive.

Relocating to Public Safety to 700 MHz or Nextel to some other spectrum is neither a regulatory nor a practical solution to the *immediate* problem, though it is desirable for long-term spectrum efficiency. Hence we propose repacking as a short-term solution, with narrowband solutions to be mandated wherever possible both short- and long-term. Insofar as repacking may also be insufficiently fast, case-by-case remediation using the Best Practices¹⁰ guide at Nextel's expense. This will serve as a result of its increasingly onerous requirements to spur the parties to a better solution.

Should the Commission agree with the boundaries we suggest for repacking, several large B/ILT licensees would have to move. A typical 100 km. radius search (including both rural and urban areas) of the 851 – 869 MHz band¹¹ yields 121,372 frequency records, broken down as follows:

851 – 856 12,149 Total; 11,186 Nextel (92%), 342 GB, 64 GO, 209 GP, 183 GX, 1
IG, 13 YB, 110 YO, 28 YP and 13 YX. Largest non-Public Safety users:
358 Motient
29 Federal Express

⁹ See Fleet Call, Inc. Waiver Request at A-13, April 5, 1990. Filed in Fleet Call, Inc., 6 FCC RCD 1533 (1991)

¹⁰ *Avoiding Interference Between Public Safety Wireless Communications Systems and Commercial Wireless Communications Systems at 800 MHz—A Best Practices Guide*, December 2000 (Best Practices).

¹¹ Spreadsheets of the two lower bands may be downloaded at <http://radiosoft.com/Lower800.htm>

856 – 861 26,061 Total; 24,840 Nextel (95%), 84 GB, 3 GO, 196 GP, 6 GX, 15 YB,
74 YF 483 YO, 324 YP and 36 YX. Largest Public Safety users:

636 Consolidated Edison (NYC Power)

182 City of New York

140 State of NJ

100 State of CT

73 State of NY

30 NYC Transit

861 – 866 82,030 Total, 82,012 Nextel (99.98%)

866 – 869 1,102 Total (entirely Public Safety)

We have not done a thorough statistical analysis of the CONUS, pending and other data in this band¹², but the conclusions are inescapable, even with non-representative data: Nextel dominates all three lower bands. We offer this solely as an illustration of the scope of the repacking problem. If Nextel were not the cause of the interference, one could hardly justify allocating contiguous bands at all for 5 – 8% of users. However, in view of the immediacy of Public Safety’s problem (though we may not ignore B/ILT interference problem, especially as they relate to Critical Infrastructure Industries), and of the less-than desirable location of the NPSPAC spectrum, repacking stands out as the best short-term goal. We would also suggest a phased repacking with Public Safety first, starting at 861 MHz and proceeding downward through 856 MHz. We note that though many of these frequencies are trunked and would move

¹² The State of New York has a large number of pending 800 MHz applications in these bands

as a system, many also are not. We further note that forward-thinking Public Safety licensees should be encouraged to convert to narrow-band technology while repacking.

Respectfully submitted,

RADIOSOFT

109 West Knapp Avenue
Edgewater, FL 32132
386.426.2521

By: /s/ Peter Moncure
Peter Moncure
Vice President