Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Facilitating Opportunities for Flexible, Efficient and Reliable Spectrum Use Employing Cognitive Radio Technologies	)))	ET Docket No. 03-108

REPLY COMMENTS OF VERIZON WIRELESS

Based on the initial comments filed in this proceeding,[1] the Commission has no record basis to allow unlicensed devices a/k/a "cognitive radios" to operate in licensed spectrum bands. It should terminate this proceeding without further action. More than 50 parties filed comments, many of which question the premise of the proceeding that it is in the public interest for the Commission to promote cognitive radio techniques as a means to force sharing of licensed spectrum.[2] Even some parties that otherwise support the Commission's efforts to promote cognitive radio devices acknowledge the serious difficulties of permitting these devices to

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[1] *Facilitating Opportunities for Flexible, Efficient and Reliable Spectrum Use Employing Cognitive Radio Technologies, Authorization and Use of Software Defined Radios,* ET Docket 03-108, 18 FCC Rcd. 26859 (2003), Notice of Proposed Rulemaking ("*NPRM*" or "*Cognitive Radio NPRM*"). All references to parties' comments are those filed May 5, 2003 in this docket, unless otherwise noted.

[2] *See, e.g.,* Comments of Access Spectrum, L.L.C. (Access Spectrum Comments; Joint Comments of Cingular Wireless and BellSouth Corporation (Cingular/BellSouth Joint Comments); Comments of the Cellular Telecommunications & Internet Association (CTIA Comments); Comments of Industrial Telecommunications Association (ITA Comments); Comments of Motorola, Inc.; Comments of Nextel Partners, Inc.; Comments of Nokia Inc.; Comments of Sirius Radio Inc and XM Radio Inc.; and Comments of Wireless Communications Association International (WCA Comments).

operate in licensed spectrum.[3] Furthermore, those that would have the Commission permit such operation in licensed spectrum offer no sound technical analysis nor reassurances that these devices can operate without causing harmful interference to licensees.[4] Nothing in these few comments should persuade the Commission that it should allow "non-voluntary" invasion of spectrum licensed on an exclusive, flexible use basis. Adopting such policies in the face of clear economic and technical harms and no apparent benefits would be misguided. Instead, if the Commission truly wishes to promote cognitive radios, it should reaffirm protections for licensees against interference and give licensees further flexibility to negotiate spectrum sharing arrangements in the secondary market.[5]

I. The Commission Should Continue Its Policy of Letting Markets and Not Regulators Determine the Highest and Best Use of Spectrum

Over the past decades, the Commission has determined that it is in the public interest to allow licensees greater flexibility and to let markets determine the best use of spectrum. These polices have led to mass adoption of wireless technologies and to considerable benefits for the American consumer.[6] Many parties agree that the FCC should continue down this path of

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[3] *See, e.g.,* Comments of Cisco Systems, Inc; Comments of IEEE-USA; and Comments of Information Technology Industry Council.

[4] *See gen.* Comments of Hypres (Hypres Comments); Comments of IEEE-802 (IEEE-802 Comments); Comments of Pulse~LINK (Pulse~LINK Comments); Comments of Texas Instruments (Texas Instruments Comments) and Comments of Shared Spectrum (Shared Spectrum Comments). *See also* Reply Comments of V-Comm, L.L.C., filed June 1, 2004 (V-Comm Replies) at 3-16 for a detailed analysis of the flaws in various parties' technical submissions.

[5] *See, e.g.,* Access Spectrum Comments, Comments of Thomas Hazlett and Matthew Spitzer (Hazlett and Spitzer); Cingular/BellSouth Joint Comments; Comments of Verizon Wireless (Verizon Wireless Comments); and WCA Comments.

[6] *See gen.* Hazlett and Spitzer.

letting markets and not regulators determine how best to use the spectrum.[7] CTIA, for example, suggests that a better way than forced sharing to facilitate access to spectrum and encourage the further development of cognitive radio technologies is to "foster a robust secondary market."[8] In its comments, Vanu, Inc. states that "secondary markets will be a major contributor to ensuring efficient usage of spectrum through permitting market forces to govern how portions of the radio spectrum are used."[9] And, as Cingular/BellSouth state, under a secondary markets regime, "[C]ritically, the licensee would retain control of its licensed spectrum so that it can ensure the quality of service that it is providing to its customers."[10]

The NPRM, however, would take the Commission down an unfortunate new path that is of questionable benefit but of clear harm. It would subvert existing licensed spectrum policies and the intense and efficient use of spectrum they have achieved in the CMRS band by allowing unlicensed devices to operate in licensed spectrum. In addition to the general system disruption such devices are likely to cause in licensed spectrum, some parties note that non-voluntary third party sharing of licensed spectrum will make "it much more difficult, if not impossible, to lease the use of the spectrum to others in the secondary market."[11] Not only are there technical difficulties with coordination of such non-voluntary third party use of a licensee's spectrum, but if these devices can use a licensee's spectrum for free and without permission, what incentive is there to coordinate use with the licensee? Permitting non-voluntary sharing of licensed spectrum

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[7] *See gen.* Verizon Wireless Comments; *see also* CTIA Comments at 3-5.

[8] CTIA Comments at 7; *see also* Access Spectrum Comments at 1.

[9] Comments of Vanu, Inc. at 1

[10] Cingular/BellSouth Joint Comments at 5.

[11] Cingular/BellSouth Joint Comments at 2-3.

thus severely undercuts the market efficiencies that the Commission hopes to achieve through its Secondary Market initiative.[12]

It might appear that, by its recent actions on many different fronts, the Commission is ready to alter or even abandon its market approach to promoting spectrum efficiency, by promoting the use of cognitive radios in licensed bands on a non-voluntary basis.[13] Taking that

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[12] *See gen. Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets,* WT Docket No. 00-230, Report and Order and Further Notice of Proposed Rulemaking, 18 FCC Rcd. 20604 (2003) ("*Secondary Markets Further Notice"*). A few commenters suggest that licensees currently hold spectrum monopolies and are unlikely to lease use of their spectrum to competitors, and thus should not be permitted to hold these secondary market rights. Comments of Affero, Inc. *et al* (The Technology Companies Comments) at 5. Others suggest that secondary markets might lead to monopoly control of the spectrum, that, in fact, a licensee's desire to control its RF environment amounts to "monopoly control" and that the economic theories used to support this desire are an attempt to "seek to rule out at the outset a new type of service and not permit it to be tested in the marketplace." Shared Spectrum Comments at 4; Shared Spectrum Reply Comments in *Establishment of an Interference Temperature Metric to Quantify and Manage Interference and to Expand Available Unlicensed Operation in Certain Fixed, Mobile and Satellite Frequency Bands*, ET Docket 03-237, Notice of Inquiry and Notice of Proposed Rulemaking, 18 FCC Rcd 25309 (2003) ("*Interference Temperature NOI*") (filed May 3, 2004) at 10. These claims are frivolous and without any legal or economic support. Of course neither Verizon Wireless nor any other licensee holds any sort of "monopoly control" over spectrum. To the contrary, the Commission has repeatedly characterized the wireless market as subject to robust competition that has supported a large variety of technologies. No commenter attempts to refute the economic evidence in the record as to benefits to the economy of the CMRS licensing model and the harms that would flow from allowing unlicensed devices to share licensed spectrum on a non-voluntary basis. The Commission should dismiss such comments as unsupported and meaningless.

[13] The Commission has opened or completed various proceedings seeking additional spectrum for unlicensed devices, such as the instant proceeding; the *Interference Temperature NOI; Revision of Parts 2 and 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices,* ET Docket 03-122, Notice of Proposed Rule Making, 18 FCC Rcd. 11581 (2003); *Commission Seeks Public Comment on Spectrum Policy Task Force Report*, ET Docket 02-135, Public Notice, 17 FCC Rcd. 24316 (2002)*; Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band,* ET Docket 02-380, Notice of Inquiry, 17 FCC Rcd. 25632 (2002); *Unlicensed Operation in the Band 3650 – 3700 MHz*, ET Docket 04-151, Notice of Proposed Rule Making, FCC Rcd. 7545 (2004); and *Unlicensed*

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course would be a serious mistake, for independent technical, economic and legal reasons. It would be particularly unjustified and unlawful, given that the record in this proceeding would permit no such change in course. The record to the contrary confirms the wisdom of separating licensed and unlicensed spectrum use. While the Commission may be intrigued with promoting unlicensed devices, there are ways to accomplish this without intruding on and damaging the regime it has established for licensed spectrum – a regime that has brought tangible and substantial public interest benefits.

II. Parties That Support "Involuntary Sharing" of Licensed Spectrum Offer No Details or Support for Their Conclusion that Such Use Will Not Cause Harmful Interference to Licensed Services

Despite the success of the Commission 's exclusive, flexible use licensing policies, however, several parties suggest that the Commission should permit "non-voluntary third party access to spectrum" as proposed in the *NPRM*.[14] One party incorrectly suggests that "[c]oexistense between unlicensed devices and licensed devices in much simpler since the licensed devices are at a known location, with known power and on known frequencies."[15] Such comments suggest a static operating environment that is far from the complex and dynamic reality of CMRS.

Operation in the TV Broadcast Bands, ET Docket 04-186, Notice of Proposed Rule Making, FCC 04-113 (rel. May 25, 2004).

[14] *See, e.g.,* Comments of Alvarion (Alvarion Comments); Hypres Comments; IEEE-802 Comments; Pulse~LINK Comments; Texas Instrument Comments and Shared Spectrum Comments. *NPRM* at ¶ 3.

[15] Alvarion Comments at 5.

Furthermore, these parties offer no detail with respect to practical issues, technical difficulties and impact on existing licensees. As explained by V-Comm in its reply comments to this proceeding, these proposals "are not well thought out, are not based upon detailed analysis or practical considerations, [and] do not consider. . . significant technical difficulties."[16] Among other things, V-Comm points out that these parties do not consider hidden node and "sensing while transmitting" problems, differences in receiver and in antenna characteristics, impact of transmissions on licensed services, cumulative effects, inability of cognitive radio devices to distinguish primary signals form other signals and interferences, incompatibilities with CMRS networks that employ other cognitive radio algorithms in their licensed spectrum.[17] The result of such oversight would be many "false positives" as cognitive radio devices incorrectly perceive that spectrum is available on which to transmit.

V-Comm further notes that such devices would have to be able to detect numerous technologies having very different signal characteristics, including, but not limited to, AMPS, CDPD, NAMPS, SMR, iDEN, TDMA, GSM, GPRS, CDMA IS95, CDMA 1xRTT, EVDO. [18] In order to operate correctly in a licensed CMRS band, not only would such a device be quite complicated, and likely quite expensive, it would also have to anticipate new technological developments in the CMRS space. Otherwise, licensed carriers would have to consider in their plans to innovate how to accommodate the thousands of devices in their licensed spectrum, but not under their control. As Cingular/BellSouth state in their joint comments, "Cognitive radio

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[16] V-Comm Replies at 3. *See* V-Comm Replies at 3-16 for a detailed analysis of the flaws in various parties' technical submissions.

[17] *Id* .at 3-4. *See also* Cingular/BellSouth Joint Comments at 5-16.

[18] V-Comm Replies at 11.

can be a beneficial tool when employed by a licensee for internal use for voluntarily sharing use of its spectrum, but has significant detriments when used to impose spectrum sharing on licensees involuntarily."[19]

If the FCC were to permit non-voluntary sharing of CMRS spectrum by unlicensed devices, it would be creating the same quality of service problems in CMRS spectrum that commenters describe in unlicensed spectrum.[20] Some commenters suggest ways that the Commission should control unlicensed spectrum to deal with these issues. Recommendations range from a common centralized database or "master controller"[21] to a common signaling mode protocol or beacon channel.[22] These same sorts of controls would have to apply to unlicensed use of licensed CMRS spectrum and would be made more complicated by the range of licensed technologies already operating in those bands. Under these circumstances, the FCC would need to implement a detailed spectrum management and enforcement scheme, not only for unlicensed spectrum bands, but for licensed CMRS bands, imposing significant costs on the Commission.

One party even suggests that an additional way to permit coexistence between unlicensed and licensed devices is for the Commission to grant Wireless Internet Service Providers (WISPs) an "operational permit" as a non-technological means of identifying the location of unlicensed systems.[23] Verizon Wireless disagrees. Clearly there are legal issues inherent in the Commission granting a permit that has the look and feel of a license, without going through the

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[19] Cingular/BellSouth Joint Comments at 2.

[20] *See* Alvarion Comments at 3.

[21] *See, e.g.,* Texas Instruments Comments at 1; Comments of Intel Corporation at 7.

[22] *See gen.* Pulse~LINK Comments.

[23] Alvarion Comments at 5.

appropriate spectrum allocation and assignment processes prescribed by law. Furthermore, site licensing of WiFi systems would undermine existing Commission policy. The Commission has spent the last decades undoing such inefficient, restrictive and administratively burdensome licensing schemes, and instead primarily grants licenses, purchased at auction, on an exclusive use, geographic basis. In its MMDS/ITFS restructuring proceeding,[24] inefficient site licensing is precisely this kind of site licensing scheme that the Commission is attempting to undo.

It is clear that there is a high likelihood that some of these cognitive radio systems will fail in their attempts to protect licensed spectrum. At a minimum, as the comments from proponents of those systems admit, the Commission will be required to resurrect some of the same "command and control," market-intervening involvement that it has, for years, sought to end. Given the numerous issues that commenters raise here, and the great difficulty in locating and shutting down unlicensed devices, it would be foolhardy for the Commission to test cognitive radio techniques by permitting non-voluntary sharing of licensed spectrum.

IV. Conclusion

The Commission should terminate its inquiry into whether it should allow "non-voluntary" invasion of spectrum licensed on an exclusive, flexible use basis. If it wishes to

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[24] *Amendment of Parts 1, 21, 73, 74 and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands,* Notice of Proposed Rule Making, WT Docket No. 03-66, 18 FCC Rcd. 6722 (2003).

promote cognitive radios, the Commission should reaffirm protections for licensees against interference and give licensees further flexibility to lease or "share" spectrum under the Secondary Markets initiative.

Respectfully submitted,

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