
Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of)
)
Additional Spectrum for Unlicensed Devices) ET Docket No. 02-380
Below 900 MHz and in the 3 GHz Band)

To: The Commission

COMMENTS OF CINGULAR WIRELESS LLC

J. R. CARBONELL
CAROL L. TACKER
DAVID G. RICHARDS
CINGULAR WIRELESS LLC
5565 Glenridge Connector
Suite 1700
Atlanta, GA 30342
(404) 236-5543

Its Attorneys

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SUMMARY

Cingular Wireless LLC (“Cingular”) urges the Commission not to authorize unlicensed operations in the TV broadcast or 3650-3700 MHz (“3650 MHz”) bands. Unlicensed operation is inconsistent with Section 301 of the Communications Act of 1934, which established licensing as the statutory model. Allowing unlicensed operations as an underlay to licensed operations in these bands is equally contrary to law and creates additional policy and technical problems. Such underlays contribute to the noise floor, thereby degrading the quality of licensed services and inhibiting technological advances that increase operating efficiency.

If the Commission decides to allow such unlicensed underlays in the TV broadcast or 3650 MHz bands, it first must explain its statutory basis for the underlays and then conduct a comprehensive study of the noise floor. Finally, assuming *arguendo* that there is a statutory basis for unlicensed operations, Cingular has no objection to the allocation of the 3650 MHz band to exclusive, unlicensed use. Ideally, however, any additional allocation to unlicensed devices would be in the spectrum above 5 GHz.

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Cingular Wireless LLC (“Cingular”), by its attorneys, hereby submits its comments regarding the above-captioned *Notice of Inquiry*,¹ which examines the possibility of permitting unlicensed devices to operate in additional frequency bands – the TV broadcast band and the 3650-3700 MHz band (“3650 MHz Band”). As discussed below, unlicensed operations in these bands cannot be authorized.

BACKGROUND

Part 15 of the Commission’s rules currently permits unlicensed operation of certain devices. These devices generally operate at low power levels and share frequencies with authorized services.² Part 15 devices are permitted to operate on almost any frequency, except in the TV broadcast band and certain designated “restricted bands.”³ The TV broadcast band

¹ *Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band; Notice of Inquiry*, ET Docket 02-380, FCC 02-328 (Dec. 20, 2002) (“*NOI*”); *Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band; Order Granting Extension of Time*, ET Docket No. 02-380, Public Notice DA 03-1022 (March 31, 2003).

² *NOI* at ¶ 2.

³ Specific frequency bands are designated as restricted under Part 15 in order to protect sensitive radio services from interference, such as those that protect safety of life or that use very

currently consists of 6 MHz channels designated 2-69 (54-72 MHz, 76-88 MHz, 174-216 MHz, and 470-806 MHz).⁴ As part of the Congressionally-mandated transition to digital TV, however, broadcast operations will be confined to Channels 2-51, while Channels 52-69 (698-806 MHz) are being reallocated to other services. Similarly, the 3650 MHz band was reallocated recently pursuant to Congressional mandate.⁵ That band previously was allocated for federal government and satellite use, and operation of Part 15 devices was restricted. The band is now allocated for fixed and mobile services. Based on these reallocations, the Commission now proposes to extend Part 15 unlicensed operations into these bands.

DISCUSSION

I. ALLOCATION OF SPECTRUM IN THE TV BROADCAST OR 3650 MHZ BANDS TO UNLICENSED DEVICES WOULD VIOLATE SECTION 301 OF THE ACT

The Commission may not allocate any spectrum in the TV broadcast or 3650 MHz bands to *unlicensed* devices because such an allocation would violate the Act. 47 U.S.C. § 301.

Section 301 states:

(footnote continued)

low received levels. The 3650 MHz Band is one of these restricted bands. *See* 47 C.F.R. § 15.205.

⁴ *NOI* at ¶ 9.

⁵ As a nationwide provider of mobile radio services, Cingular would be aggrieved by the unlicensed authorization of the 3650 MHz band for competing mobile radio use. *See FCC v. Sanders Brothers Radio Station*, 309 U.S. 470 (1940) (upholding standing for competing licensees); *Associated Gas Distribs. v. FERC*, 899 F.2d 1250, 1259 (D.C. Cir. 1990) (upholding standing where the challenged agency action expands the number of entrants in the petitioner's market). Cingular also would be aggrieved if Channels 60, 61, 62, 65, 66, and 67 were allocated for unlicensed rather than public safety use. Cingular and ALLTEL Communications, Inc. ("ALLTEL") have proposed that these channels be allocated for public safety use in order to alleviate problems experienced between CMRS providers, like Cingular and ALLTEL, and public safety operators. *See* Joint Comments of Cingular Wireless LLC and ALLTEL Communications, Inc., WT Docket No. 02-55, at 17-18 (May 6, 2002).

No person shall use or operate *any apparatus* for the transmission of energy or communications or signals by radio . . . except in accordance with this Act *and with a license* in that behalf granted under the provisions of the Act.⁶

Congress thus prohibited radio transmission without a license.⁷ This licensing requirement is at the core of the Act – the elimination of interference.⁸

The rules for unlicensed devices originated in 1938.⁹ According to the Commission, the rules were:

based upon the rationale that if radiation can be kept within certain fixed limitations, a general assumption can be made that such operations will normally not cause interference *to interstate communications or otherwise have interstate effects* bringing such operations within the purview of those which must be licensed under Section 301 of the Communications Act.¹⁰

Thus, the adoption of Part 15 was premised on the notion that Section 301 only applied to interstate transmissions and that low-power operations could be permitted on an unlicensed basis

⁶ 47 U.S.C. § 301 (emphasis added).

⁷ Section 307(e) sets forth four narrow exceptions to this license requirement: (1) citizens band radio service; (2) radio control service; (3) aviation radio service; and (4) maritime radio service. 47 U.S.C. § 307(e).

⁸ See *Red Lion Broad. Co. v. FCC*, 395 U.S. 367, 375-76 (1969); see also *Frank Bartholomew*, 14 F.C.C.R. 4046 (CIB 1999) (noting that “[u]nlicensed broadcasting threatens the integrity of the regulatory structure established in the Communications Act to prevent chaos to the radio airwaves. The regulatory effectiveness of the Commission to carry out its statutory obligations to license radio stations, prevent chaos, and ensure public safety, would be impaired if the agency could not take meaningful action to stop unlicensed broadcasting.”).

⁹ See *Revision of Part 15 of the Rules Regarding the Operation of Radio Frequency Devices without an Individual License*, GEN. Docket No. 87-389, *First Report and Order*, 4 F.C.C.R. 3943 (1989).

¹⁰ *Amendment of Part 15 of the Commission’s Rules Governing Restricted Radiation Devices*, Docket No. 9288, *First Report and Order*, 13 RR (P&F) 1543, 1544 (1955) (emphasis added).

because such transmissions generally lacked an interstate component.¹¹ This premise was fundamentally flawed.

Although Section 301 did not expressly provide the Commission with jurisdiction over intrastate radio emissions at the time Part 15 was created, Congress always intended Section 301 to apply to intrastate transmissions. Congress eliminated any uncertainty on this issue – and thus the original basis for Part 15 – in 1982 when it amended Section 301 “to make clear that the Commission’s jurisdiction over radio communications extends to intrastate as well as interstate transmissions.”¹² Congress stated that the amendment would also make Section 301 consistent with prior judicial decisions finding that all radio signals are inherently interstate in nature.¹³

Licensing, not unlicensed use, is the statutory model. Thus, it would be contrary to law for the Commission to permit additional unlicensed operations – such as those suggested in the *NOI*.¹⁴

II. THE COMMISSION CANNOT ALLOW UNLICENSED ‘UNDERLAYS’ IN THE TV BROADCAST OR 3650 MHZ BANDS WITHOUT CONDUCTING COMPREHENSIVE STUDIES OF THE NOISE FLOOR

The *NOI* seeks comment on permitting unlicensed operations on spectrum used by licensed providers in the TV broadcast and 3650 MHz spectrum.¹⁵ As stated above, unlicensed

¹¹ *Id.*

¹² Communications Amendments Act of 1982, P.L. 97-259; H.R. Conf. Rep. No. 97-765 at 31-32 (1982), *reprinted in* 1982 U.S.C.C.A.N. 2261, 2275-76.

¹³ *Id.* at 2276 (citing *Fisher’s Blend Station Inc. v. Tax Commission of Washington State*, 297 U.S. 650, 655 (1936)).

¹⁴ The fatal flaw associated with unlicensed operations has already been raised by the American Radio Relay League (“ARRL”) in a separate Part 15 proceeding. *See* ARRL Petition for Reconsideration, ET Docket No. 98-156 (Feb. 13, 2002).

¹⁵ *NOI* at ¶¶ 13-14, 20-21.

operations are inconsistent with the Act. Permitting such operations as an “underlay” to licensed services is also inconsistent with sound policy and technical reality. Such underlays contribute to the noise floor, thereby degrading the service quality of licensed services and inhibiting technological advances that increase operating efficiency.

The use of the interference temperature model to justify unlicensed underlays, as proposed in the SPTF Report,¹⁶ is similarly flawed. If the Commission decides to allow additional unlicensed underlays – in the TV Broadcast, 3650 MHz, or any other bands – it first must explain its statutory basis for the underlays and then conduct comprehensive studies of the noise floor. Failure to perform those studies would violate the FCC’s primary mandate to police interference¹⁷ and would constitute arbitrary and capricious decision-making.

Such a comprehensive study of the noise floor has been urged by both the SPTF and the Technological Advisory Council (“TAC”). For example, the SPTF Report recommended that the Commission “adopt a standard methodology for measuring the noise floor.”¹⁸ The Report further advised that any noise floor study “should include actual spectrum measurements of the RF noise/interference floor,” and “the Commission should create a public/private partnership for

¹⁶ See *SPTF Report*, ET Docket No. 02-135, at 28-39 (Nov. 2002). Under the interference temperature model, the Commission would determine the “‘worst case’ environment in which a receiver would be expected to operate.” SPTF Report at 28. This “worst case environment” would establish the interference temperature for services operating on the band. The Commission would then create underlays to permit unlicensed operations below the interference temperature in spectrum previously awarded via an exclusive licensing process. In other words, the licensee could only operate above the interference temperature and unlicensed operations would be permitted below. Cingular discussed the problems associated with these models in its Comments regarding the SPTF Report. See Cingular Comments, ET Docket No. 02-135 at 17-38 (Jan. 27, 2003).

¹⁷ *NBC v. United States*, 319 U.S. 190, 210-13 (1943); see *Red Lion*, 395 U.S. at 375-77 & nn. 4-5.

¹⁸ SPTF Report at 28.

a long-term noise (interference temperature) monitoring network.”¹⁹ Similarly, the TAC recognized that the Commission cannot engage in effective spectrum management until it “develop[s] a more complete understanding of the current state of the radio noise environment.”²⁰ Thus, the TAC urged the Commission to immediately undertake a multi-part study of the noise floor that would include a detailed analysis of available noise floor literature, the creation of detailed noise floor models, and performance of simulations, and verification of the simulations.²¹

Even with studies of the current noise environment, a central concern is that licensees’ interference tolerance changes over time – it is not static. Licensees should be given incentives to take advantage of these tolerance changes and to use their spectrum *more* efficiently. Requiring incumbents to share spectrum with new unlicensed uses, however, has the opposite effect. The Commission should ensure that sharing does not penalize the most innovative and efficient users of radio spectrum. To accomplish this, the Commission must pay careful attention to the actual noise floors and operating conditions in existing and to-be-deployed radio systems. The Commission also must address the interference protection needs of incumbent licensees who may have a heightened sensitivity to increased noise or interference because (1) they may be providing service today that is optimally engineered through reliance on a combination of the existing noise floor and the use of technologically-advanced equipment along with careful engineering and management techniques, and/or (2) they may be relying on the introduction of emerging technologies to achieve greater spectrum efficiency.

¹⁹ *Id.*

²⁰ FCC TAC, Second Meeting Report at 1, 9 (Oct. 28, 1999).

²¹ FCC TAC II, Second Meeting Report at 8-9 (Nov. 23, 2001).

This is particularly true with cellular/PCS networks that always operate with noise, external interference and self-interference, which is generated by the system itself.²² In general, the self-interference in the network is caused by the combination of in-cell interference and out-of-cell interference. Technologies such as joint detection, multi-user detection, and interference cancellation can effectively remove the self-interference because the statistical characteristics of the signal are well known to the receiving systems in the network (mobile and base). With these advanced technologies, the system will be limited only by the noise and external interference, neither of which can be removed. If unlicensed operations were allowed at power levels referenced to the expected total interference level, which includes the self-interference that can be eliminated, the impact of the unlicensed systems' interference could become so dominant as to negate any incentive to deploy these advanced receiver technologies.

The benefits of these advanced technologies are evident in the evolution of cellular systems. Over time, mobile and base station receiver noise characteristics have improved, permitting the extension of reliable service over greater distances in rural areas. After some time, the 39 dB μ V/m protected service contour adopted in the 1980s no longer adequately depicted the actual service areas of carriers. Accordingly, the Commission changed its criterion to a 32 dB μ V/m service area boundary to reflect the fact that carriers were taking advantage of improved equipment and were engineering their systems consistent therewith.²³ Since then,

²² As noted above, TV broadcast channels 52-69 have been reallocated to CMRS and public safety, while the 3650 MHz band has been allocated for fixed and mobile services. This analysis is applicable to public safety systems, which, for safety-of-life purposes, demand a predictable radio frequency environment.

²³ *Unserved Areas in the Cellular Service*, CC Docket 90-6, *Second Report and Order*, 7 F.C.C.R. 2449 (1992), *recon. denied*, 8 F.C.C.R. 1363 (1993) (*Unserved Areas*), *aff'd sub nom. Committee for Effective Cellular Rules v. FCC*, 53 F.3d 1309 (D.C. Cir. 1995).

systems have matured further, and low-powered handheld units have become nearly universal--3-watt mobiles are now a rarity--thus reducing the signal strength of interfering units. Moreover, handheld units are often used indoors, further decreasing the strength of undesired, interfering signals.

The move toward digital service also has lowered the power levels being transmitted at cellular frequencies, thereby reducing prevailing self-interference levels. As a result, the interference level resulting from signals of undesired mobile units has decreased dramatically, causing a reduction in the overall noise plus interference floor at base station receive sites.²⁴ In addition, the system noise floor has also been diminished by improvements in base station receiver performance, with the noise figure dropping from about 8 dB to about 4 dB, which permits a further reduction of about 4 dB in the received noise floor. These developments permit high-quality service to be extended to units in areas that would have been marginal, at best, a decade ago.

By operating more efficiently, licensees push their technologies and their spectrum usage closer to the performance limits, which often means that the signal is more sensitive to interference or degradation than a signal in a less sophisticated system. For example, a licensee that pushes the technology to increase capacity or throughput will be more heavily affected than less efficient licensees by FCC decisions that allow an additional source of noise or external interference to affect the spectrum being used. Similarly, the noise floor is generally lower in rural areas than in urban areas. Thus, rural wireless systems engineered to take advantage of this fact would be adversely affected by an interference temperature that does not account for their unique operating parameters.

²⁴ See Cingular Comments, ET Docket No. 02-135 at 17-38 (Jan. 27, 2003).

In modern, well-engineered cellular/PCS systems, harmful interference will do more than simply disrupt a single phone conversation or a single user. Increased levels of interference will impact not only the call quality or data throughput, but also affect the entire cell and possibly even the network as a whole through a decrease in network capacity and coverage – at a time when service quality is receiving increasing attention at the state and federal levels.

Moreover, it would be difficult or impossible to assess whether underlay operations are causing interference in any particular situation. Licensees would have to police the interference issue and pinpoint the source(s) of interference. This may be difficult if unlicensed devices become abundant within the “exclusive” licensee’s service area and operate on the licensee’s spectrum. First, the interference emanating from multiple unlicensed devices may present itself as degraded service quality (also resulting in diminished capacity and coverage), and would be difficult to prove, yet may still have adverse consequences for the licensee.²⁵ Second, it may be impossible for the licensee to stop the interference due to the “tragedy of the squatters.”²⁶ As unlicensed devices proliferate and become accepted by the public, it may become politically untenable for the Commission to shut down the devices if they are causing interference. The burden would then be on the licensee to re-engineer its system to account for the unlicensed devices.

In summary, there are significant problems associated with the use of unlicensed underlays. Such underlays contribute to the noise floor, thereby degrading a licensee’s service

²⁵ Specifically, licensees could face increased pressure to improve service quality that has been degraded by unlicensed operations, which would increase carriers’ costs, which would be passed on to consumers. In essence, the licensee’s subscribers would foot the bill for ameliorating the interference caused by the unlicensed operations.

²⁶ See SPTF Report at 58.

quality and inhibiting technological advances that increase operating efficiency. Allowing such underlays in any bands, including the TV broadcast or 3650 MHz bands, is contrary to sound policy and technical reality.

III. INsofar AS THE COMMISSION PERMITS ADDITIONAL UNLICENSED USE, IT SHOULD SET ASIDE SPECIFIC BANDS – IDEALLY ABOVE 5 GHz – FOR THIS USE

Assuming there is a statutory basis for the allocation, Cingular has no objection to the allocation of the 3650 MHz band to exclusive, unlicensed use.²⁷ Ideally, however, any additional allocation to unlicensed devices would be in the spectrum above 5 GHz.

The Commission has already made significant spectrum available for unlicensed use – 139.5 MHz below 3 GHz,²⁸ and 325 MHz between 3 GHz and 6 GHz.²⁹ The possibility of spectrum leasing presents another opportunity for unlicensed devices to gain access to additional spectrum at the discretion of the licensee.³⁰ Any additional unlicensed allocation should be in specific bands set aside for such use, thereby isolating unlicensed devices from bands in which licensees are entitled to operate on an exclusive basis without interference.³¹ The 3650 MHz

²⁷ The Commission already has scheduled the auction of additional spectrum in the lower 700 MHz portion of the TV Broadcast band. *Auction of Licenses in the Lower 700 MHz Band Scheduled for May 28, 2003*, Public Notice DA 03-567 (March 4, 2003).

²⁸ 902-928 MHz, 2400-2483.5 MHz, 1910-1930 MHz, and 2390 – 2400 MHz.

²⁹ 5725-5850 MHz, 5150-5350 MHz, and 5725-5825 MHz (U-NII). In addition, an agreement has been reached by the Administration to advocate for the allocation of an additional 255 MHz of spectrum in the 5 GHz band (5470-5725 MHz) at WRC-03. *See Feds Settle on 5 GHz Modifications*, Mobile Radio Technology, February 2003.

³⁰ SPTF Report at 53, 55-57. The Commission has had a rulemaking pending since November 2000 to address the issue of secondary markets. *See Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, WT Docket No. 00-230, *Notice of Proposed Rulemaking*, 15 F.C.C.R. 24203 (2000).

³¹ The Unlicensed Devices and Experimental Licenses Working Group (“UEWG”) acknowledged that there is controversy over the interference that would be caused by unlicensed

(continued on next page)

band appears to satisfy these criteria, and would suit the Commission's goals because it would provide sufficient bandwidth for wideband operations. The Commission *should not* create underlays or easements for unlicensed use in bands licensed pursuant to Section 301 of the Act.

Given that virtually all spectrum reallocated from the TV broadcast band has been or is expected to be licensed, the Commission should not allow unlicensed use in that band. Specifically, Channels 2-51 are licensed to digital TV broadcasters;³² Channels 54, 55, and 59 were auctioned during August and September 2002 in Auction 44;³³ and Channels 63, 64, 68, and 69, have been allocated to public safety.³⁴ Cingular continues to support the proposal advocated by the Coalition for Constructive Public Safety Solutions to reallocate Channels 60, 61, 62, 65, 66, and 67 (except for those portions of already-auctioned guard band spectrum) to public safety.³⁵

(footnote continued)

operations sharing frequencies with licensed operations, and that these bands could become subject to overcrowding. UEWG Report at 11 (Nov. 15, 2002); *see also id.* at 12 (“[A]ny expansion of unlicensed use will have to pay careful attention to legitimate concerns of other spectrum users and consider untraditional approaches to obtaining spectrum use.”).

³² Unlicensed use in this band could impede the already complex transition to digital TV, which is one of the reasons that the current restriction exists. *Revision of Part 15 of the Rules Regarding the Operation of Radio Frequency Devices Without an Individual License*, GEN Docket No. 87-389, *First Report and Order*, 4 F.C.C.R. 3493, 3501 (1989).

³³ *See supra*, n.27.

³⁴ The Commission has restricted unlicensed use in bands allocated for services involving safety of life. *Revision of Part 15 of the Rules Regarding the Operation of Radio Frequency Devices Without an Individual License*, GEN Docket No. 87-389, *First Report and Order*, 4 F.C.C.R. 3493, 3502 (1989).

³⁵ *See Joint Comments of Cingular Wireless LLC and ALLTEL Communications, Inc.*, WT Docket No. 02-55, at 17-18 (May 6, 2002).

Because of spectrum congestion and associated interference problems,³⁶ any new unlicensed bands ideally should be located above 5 GHz to ensure that these problems are not exacerbated. Allocating spectrum above 5 GHz for unlicensed devices also would spur additional innovation in these bands. Manufacturers would be incented to focus their development dollars on equipment that would operate on uncongested spectrum, thereby accelerating the development of equipment and services capable of operating in higher bands.

As the SPTF has noted, technology developments are making increased use of higher frequencies available for new uses.³⁷ For example, the Commission currently is considering a proposal to establish service rules for the 71-76 GHz, 81-86 GHz, and 92-95 GHz bands.³⁸ These bands are essentially undeveloped and available for new uses, which are approaching practicality as a result of recent technological developments.³⁹ Proposed uses include high-speed wireless local area networks and broadband access to the Internet.⁴⁰ Thus, there is no need to focus on spectrum below 3 GHz for these uses. The traditional dividing lines for prime spectrum are rapidly being erased and manufacturers should be encouraged to focus on technologies that will continue to make better use of frequencies above 5 GHz. As noted by the Commission, “opening new regions of the spectrum to new applications and technologies fosters the

³⁶ National Telecommunications and Information Administration, Spectrum Reallocation Final Report, at 1 (1995); SPTF Report at 38.

³⁷ SPTF Report at 19; UEWG Report at 10. Interference potential is limited in some of these bands. UEWG Report at 10.

³⁸ *Allocations and Service Rules for the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands, Loea Communications Corp. Petition for Rulemaking, WT Docket No. 02-146, Notice of Proposed Rulemaking, FCC 02-180 (2002) (“71 GHz NPRM”).*

³⁹ *71 GHz NPRM* at ¶¶ 2, 10.

⁴⁰ *71 GHz NPRM* at ¶ 1.

