

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

In the Matter of)	
)	
Modification of Parts 2 and 15 of the)	ET Docket No. 03-201
Commission's Rules for unlicensed devices)	
and equipment approval.)	

COMMENTS OF MOTOROLA, INC.

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SUMMARY

On June 22, 2007, the Commission released a Further Notice of Proposed Rulemaking requesting comment on whether it should establish a spectrum etiquette for unlicensed transmitters that are authorized under Sections 15.247 and 15.249 of its rules. Cellnet Technology, Inc. (“Cellnet”) has submitted a proposal that seeks to place prohibitive duty cycle and power level requirements on the 902-928 MHz band as a means of regulating interference between unlicensed devices.

Motorola urges the Commission to maintain its current regulatory framework for unlicensed operations in the 902-928 MHz, 2.4 GHz, and 5.8 GHz bands and refrain from adopting Cellnet’s proposed spectrum etiquette rules. The existing rules are an FCC success story. They have led to a proliferation of diverse technologies that have provided valuable communications capabilities during catastrophic events and that are used to provide wireless broadband services in rural areas at economical costs.

The Commission should reject the Cellnet proposal for a variety of reasons. First, imposition of a spectrum etiquette in these bands will have a devastating effect on delivery of important services, including the cost effective delivery of rural broadband services, that have flourished under the existing rules. Second, the Commission has properly established a precedent of minimal regulation in unlicensed bands, noting that by allowing manufacturers flexibility in designing their products, such manufacturers have developed their own, highly effective sharing and modulation schemes. Third, unlicensed bands under consideration in this proceeding are already so heavily populated with primary operations and ISM devices that the implementation of spectrum etiquette rules would have little real world impact. Fourth, spectrum etiquette rules will stifle innovation and the development of new technologies and also will require the Commission to adopt a hierarchy among Part 15 devices, a result that would contravene the existing policies of technical neutrality and the promotion of innovation and flexibility.

Cellnet has proposed a spectrum etiquette that will do little to alleviate interference in the 902-928 MHz band and which will cause substantial harm to existing technologies. The primary beneficiary of Cellnet’s proposal is Cellnet itself, as its proposal is tailor-made to enhance use of its own products at the expense of others. However, given the diversity of devices deployed in the unlicensed bands, any spectrum etiquette would be similarly problematic. For this reason, the Commission should reject Cellnet’s proposal and decline to impose spectrum etiquette rules on unlicensed bands. The Commission should instead continue a framework that has led to widespread innovation and enhanced consumer access to technologies and services.

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Motorola, Inc. ("Motorola") respectfully submits these comments in response to the Further Notice of Proposed Rulemaking in the above-captioned proceeding ("*Further Notice*") seeking comment on imposition of a spectrum etiquette for unlicensed transmitters authorized under Sections 15.247 and 15.249 of the rules.¹

Motorola believes that the Commission should maintain its current regulatory framework for unlicensed operations in the 902-928 MHz, 2.4 GHz, and 5.8 GHz bands. This framework has effectively encouraged the proliferation of diverse technologies under Part 15 of the FCC rules while providing necessary protection for primary spectrum users. Imposing spectrum etiquettes on this vibrant market would stifle further development and deployment of new technologies without achieving its intended goal of facilitating increased access to the bands. Cellnet Technology, Inc.'s ("*Cellnet*")

¹ *Modification of Parts 2 and 15 of the Commission's Rules for unlicensed devices and equipment approval*, Memorandum Opinion and Order and Further Notice of Proposed Rulemaking, 22 FCC Rcd 11383 (June 22, 2007) ("*Further Notice*").

proposed spectrum etiquette based on prohibitive duty cycle and power level requirements would be particularly harmful to existing and future Part 15 technologies.²

I. THE COMMISSION SHOULD NOT ADOPT A SPECTRUM ETIQUETTE FOR THE 902-928 MHz BAND.

The Further Notice seeks comment on whether there is a “need to require unlicensed transmitters operating in the 915 MHz band...to comply with a spectrum etiquette requirement, and the impact that requiring an etiquette would have on the development and operation of unlicensed 915 MHz devices operating under those rule sections.”³ Motorola strongly urges the Commission to not impose a spectrum etiquette on this band. The Commission has previously considered this issue and properly determined that spectrum etiquette and regulation of interference among unlicensed devices are unnecessary. A spectrum etiquette will do little to prevent interference in the 902-928 MHz band, as the ISM or licensed devices which operate at higher powers and thus have the greatest potential to cause interference would not be required to adhere to spectrum etiquette rules. In addition, no single etiquette would work for all of the different technologies operating in the band. Thus, imposing a spectrum etiquette would stifle technological innovation and set a dangerous and improper precedent of favoring some technologies to the detriment of others. Moreover, imposing Cellnet’s etiquette

² Cellnet Petition for Limited Reconsideration, ET Docket No. 03-201 (filed Oct. 7, 2004) (“Cellnet Petition”); Letter from Lawrence J. Movshin, Counsel to Cellnet Technology, Inc., to Marlene H. Dortch, FCC, ET Docket 03-201 (filed Mar. 28, 2006).

³ *Further Notice* at ¶ 18.

would render the 902-928 MHz band unusable for rural broadband networks, thwarting the Commission's goal of providing broadband access to all Americans.⁴

A. The Commission Has Previously Determined That A Spectrum Etiquette For Regulating Interference Among Unlicensed Devices Is Unnecessary And Would Stifle Innovation Among Unlicensed Services And Devices.

The Commission has consistently held that there should be no hierarchy among unlicensed Part 15 devices in the 902-928 MHz band, noting that “Part 15 transmitters have never been afforded any assurance that their transmissions will be protected from interference received from other devices.”⁵ In addition, the Commission has repeatedly found in a variety of contexts that flexibility promotes innovation.⁶ Indeed, in this very

⁴ See *Facilitating the Provision of Spectrum-Based Services to Rural Areas and Promoting Opportunities for Rural Telephone Companies to Provide Spectrum-Based Services, 2000 Biennial Regulatory Review Spectrum Aggregation Limits for Commercial Mobile Radio Services, Increasing Flexibility To Promote Access to and the Efficient and Intensive Use of Spectrum and the Widespread Deployment of Wireless Services, and To Facilitate Capital Formation*, Notice of Proposed Rulemaking, 18 FCC Rcd 20802, ¶¶ 49-50 (2003) (stating that “we note that the record reflects that WISPs have taken root in many rural areas where [cable and DSL] services have been slow to arrive... We remain committed to exploring more flexible spectrum policies for rural areas to help foster, where possible, a viable last mile solution for delivering Internet services, other data applications, or even video and voice services to underserved or isolated communities”).

⁵ *Amendment of Part 15 of the Commission's Rules Regarding Spread Spectrum Devices*, First Report and Order, 15 FCC Rcd 16244 (2000).

⁶ See, e.g., *Amendment of the Commission's Rules To Permit Flexible Service Offerings in the Commercial Mobile Radio Services*, 11 FCC Rcd 8965, ¶ 3 (1996) (stating that providing CMRS providers greater flexibility to provide various service offerings will encourage innovation and experimentation in development of wireless technologies); *Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, Report and Order and Further Notice of Proposed Rulemaking, 18 FCC Rcd 20604, ¶ 57 (2003) (noting that in the absence of regulatory flexibility, providers of wireless radio services would be unable to use their spectrum in a way that would accommodate changing technology); *Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Bands, Review of the Spectrum Sharing Plan Among Non-Geostationary Satellite Orbit Mobile Satellite Service Systems in the 1.6/2.4 GHz Bands*, 18 FCC Rcd 1962, ¶ 30 (2003) (finding that regulatory flexibility can promote

proceeding, the Commission found that “design flexibility has helped industry to develop efficient sharing and modulation schemes,” and that “the existing regulations [which promote flexibility and innovation] have resulted in very efficient use of available unlicensed spectrum.”⁷ Consistent with these determinations, the Commission declined to impose “any kind of spectrum etiquette for the Part 15 bands.”⁸ The Commission should not reverse this sound decision and instead should again acknowledge the numerous benefits that have resulted from the flexibility granted to unlicensed devices in the 902-928 MHz band.

In previously concluding that spectrum etiquette requirements were not appropriate for unlicensed Part 15 devices in the 902-928 MHz band, the Commission correctly noted that such rules should be considered when opening additional spectrum for unlicensed use, such as in the TV whitespace proceeding, and not in bands that are already heavily used.⁹ Beyond the vast number of Part 15 devices already deployed in the band, upon which new rules should logically have no effect, the 902-928 MHz band

competition and innovation without consuming additional spectrum resources); *Amendment of Part 2 of the Commission’s Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems*, Sixth Report and Order, Third Memorandum Opinion and Order, and Fifth Memorandum Opinion and Order, 19 FCC Rcd 20720, ¶ 79 (2004) (stating that “our experience has been that when provided with flexibility manufacturers will innovate and produce products that the market will support”).

⁷ *Modification of Parts 2 and 15 of the Commission’s Rules for unlicensed devices and equipment approval*, Report and Order, 19 FCC Rcd 13539, ¶ 54 (2004) (“*Report and Order*”).

⁸ *Id.*

⁹ *Id.* See also, *Unlicensed Operation in the TV Broadcast Bands, Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, 21 FCC Rcd 12266, (2006).

is also crowded with licensed and ISM devices, devices from which unlicensed devices must accept any and all interference.¹⁰ For these reasons, the Commission determined that if there were an appropriate place for a spectrum etiquette, it would be a new, unlicensed band where etiquette could have a greater impact.¹¹ In the existing 902-928 MHz band, however, the Commission properly rejected the use of a spectrum etiquette, and should do so again.

B. New Spectrum Etiquette Requirements Will Not Improve Co-Existence In The 902-928 MHz Band And Will Impair Existing Technologies.

In the *Further Notice*, the Commission discusses the potential under its rules “for some unlicensed devices to preclude the operation of other unlicensed devices.”¹² Imposing a spectrum etiquette on the 902-928 MHz band, however, will not resolve this concern. As an initial matter, the amount of interference received by unlicensed devices likely would not significantly lessen as the result of spectrum etiquette, in part because of the number of primary services that operate in the band and from which unlicensed devices much accept interference, but also considering the large number of currently deployed unlicensed devices. In addition, a spectrum etiquette would preclude use of certain existing unlicensed devices in the 902-928 MHz band altogether. In the *Further*

¹⁰ The 902-928 MHz band is allocated primarily for Industrial, Scientific and Medical devices under Part 18 of the FCC’s rules. In addition, the Location and Monitoring Service (LMS) is a licensed service under Part 90 of the FCC’s rules and is designed to provide vehicle and asset tracking data services. LMS systems are authorized to operate with a maximum of 30 watts ERP across most of the band, however, they are permitted to operate with a maximum of 300 watts in the 927.25 – 928 MHz segment. See 47 C.F.R. § 90.205(k) of the FCC’s rules.

¹¹ *Report and Order* at ¶ 54.

¹² *Further Notice* at ¶ 19.

Notice, the Commission expressly states that “our goal is to ensure that the different types of unlicensed devices that operate in a band have an opportunity for spectrum access.”¹³ Imposing a spectrum etiquette, however, would directly contravene this goal by effectively prohibiting certain types of unlicensed devices from operating in the 902-928 MHz band.

The 902-928 MHz band is shared among a variety of licensed users, unlicensed users, and ISM devices. Under the Commission’s rules, unlicensed devices may not cause harmful interference to, and must accept any and all interference from, licensed operations and ISM equipment.¹⁴ Additionally, unlicensed devices must accept all interference from other unlicensed devices. Thus, imposing an etiquette on devices in the 902-928 MHz band, including the spectrum etiquette proposed by Cellnet, would have little impact on unlicensed operations in what is already a heavily used and heavily encumbered band.¹⁵

¹³ *Further Notice* at ¶ 21 (“Rather, our goal is to ensure that the different types of unlicensed devices that operate in a band have an opportunity for spectrum access.”).

¹⁴ ISM devices have the highest priority in the band and all users, government and non-government, are obligated to accept any interference received from such devices. These devices are permitted to operate with unlimited radiated energy within the bands allocated for their use including those under consideration in this proceeding. *See* 47 C.F.R. § 18.305(a).

¹⁵ If the FCC were to adopt new spectrum etiquette requirements, it should – at a minimum – grandfather all deployed equipment and allow for the continued marketing and importation of equipment receiving FCC certification within some future date-certain following the adoption of final rules in this proceeding. It is not in the public interest for the FCC to force consumers to prematurely retire usable FCC-approved devices even if it could address the challenging educational and compliance issues associated with informing consumers that they must dispose of their 900 MHz cordless telephones authorized under Section 15.247. Nor is it in the public interest for the FCC to strand the investments of manufacturers in products developed in good faith reliance of the FCC’s rules.

Millions of Part 15 devices already are in operation in the 902-928 MHz band. These devices include alarm systems, automatic meter reading systems, wireless local area networks, cordless telephones, and baby monitors. Motorola alone has developed numerous Part 15 devices, such as its Canopy product (which includes nearly 200,000 modules, many of which help provide broadband access to rural areas)¹⁶, its RFID products¹⁷ and its MOTOtalk product (which allows for direct unit-to-unit communications between users when the wireless network is not available).¹⁸ Given the flexibility provided in the Commission's Part 15 rules, these devices operate based on very different specifications and methods of operation. Each, however, is designed to operate successfully in the challenging interference environment facing Part 15 devices, through such techniques as requiring low carrier-to-noise ratios or frequency hopping.

¹⁶ The Canopy system provides high quality broadband service in the 902-928 MHz bands via a 6.0 Mbps signaling rate with a line-of-sight range of more than 40 miles and is particularly suited to delivery of broadband services in rural areas. For more information, visit <http://motorola.canopywireless.com>.

¹⁷ Radio frequency identification (RFID) is an automated data collection system that enables businesses to wirelessly capture and move data using radio waves. A typical system consists of "tags" with an embedded, unique identifier for the product or object being moved; "readers" designed to decode the data on the tag; and a host system or server that processes and manages the abundance of information gathered. There are several types of RFID systems that are deployed in the 902-928 MHz band, based on passive tag RFID technology that relies on the transmitted signal "charging" the tag and the return signal being offset from the original transmitted signal.

¹⁸ MOTOtalk is a push-to talk feature implemented in our iDEN radios which creates a temporary virtual network with other MOTOtalk™ capable units within 2 miles, utilizing the 902-928 MHz band. This service keeps users connected if the regular network is down, the signal is weak or the users are in out-of-coverage areas. It allows users to transfer manually to a simplex two-way radio-to-radio communication mode and is also useful for private or group communications for construction teams, utilities, outdoor sports enthusiasts or groups that travel outside of network coverage. MOTOtalk also proved a critical feature for personnel during the aftermath of Hurricane Katrina, where the regular cellular network was not operational.

As a result, imposing a single spectrum etiquette on all of these devices, regardless of what that spectrum etiquette turns out to be, would effectively force certain technologies out of the band, a result that is directly contrary to the Commission's goals in this proceeding.¹⁹

Cellnet's spectrum etiquette proposal, if adopted, would be particularly damaging to existing Part 15 devices as it ignores the reality of how many unlicensed devices operate in the 902-928 MHz band. In particular, Cellnet's proposal improperly focuses on duty cycle and transmit power. In doing so, Cellnet fails to consider that unlicensed devices have built-in duty cycles and quiet times that are a function of the actual usage pattern of the particular network. Devices or networks with low power and a low duty cycle can coexist with higher power/higher duty cycle devices by implementing other techniques that help the devices identify quiet times in the band. These techniques, which are available for use without any mandate to do so by the Commission, include Listen-Before-Talk, meshed technologies to provide alternative communication paths, Dynamic Frequency Selection ("DFS" which allows for monitoring channels and dynamically adapting the hop pattern), or Manual Frequency Selection (allowing the manual selection of the frequencies to be part of the hop pattern). However, no single etiquette may be appropriate or sufficient for all uses for the band.

Indeed, Cellnet's proposal is "tailor-made" to enhance the usability of its own products while precluding the use of many others. In Motorola's view, it is Cellnet's technology that lacks any provisions to avoid interference or to be more adaptable in an

¹⁹ See *Further Notice* at ¶ 23 (expressing a concern that manufacturers not have to redesign or cease marketing certain equipment as a result of a spectrum etiquette).

unlicensed frequency band intended to serve the needs of a variety of technologies and devices.²⁰ Rather than designing a more robust technology, Cellnet is proposing a solution that will handicap other manufacturers and users in favor of their own technology. Motorola believes that such an approach is contrary to the goal of maximizing the use of scarce resources.

Cellnet's proposal effectively prohibits the provision of wireless broadband services in the 902-928 MHz band. Cellnet's proposed etiquette would require 900 MHz digitally modulated devices (*i.e.*, wireless broadband network equipment) to operate with a maximum power of 30 dBm and a continuous silent period of 0.36 seconds in every 0.4 second period.²¹ Under Cellnet's proposal, if a device operates with a smaller silent interval between transmissions, then its maximum power must be significantly lower than 30 dBm, down to an allowed power of 0 dBm for the case when there are no silent intervals between transmissions.²² For data networks, a regulatory requirement to provide mandated silent intervals for devices operating at higher transmitting power imposes severe limits on data speeds. Motorola estimates that the Cellnet power reduction equation would result in a 90 percent reduction in throughput for data networks designed to operate at the maximum permitted power level (*e.g.*, 30 dBm). Such an extreme penalty would render the data device commercially not viable.

²⁰ Motorola's understanding of the Cellnet technology is that it relies on simplistic ALOHA based access methods to control data transmissions. Under this approach, it is Motorola's estimate that their distribution network will typically fail if the overall use of the channel exceeds approximately 15 percent.

²¹ Letter from Lawrence J. Movshin, Counsel to Cellnet Technology, Inc., to Marlene H. Dortch, FCC, ET Docket 03-201 (filed Mar. 28, 2006).

²² *Id.*

Wireless broadband networks cannot effectively operate under such a requirement. For example, Motorola's Canopy devices can operate with duty cycles as high as 50 percent, depending on traffic demands. Under Cellnet's proposal, Canopy's transmit power would have to be reduced by 10 dB, greatly reducing the area a Canopy transmitter can cover and effectively eliminating its ability to provide broadband services in less densely populated rural areas. The provision of broadband access to all Americans, particularly those in rural areas, has been a long-held goal of the Commission. Crippling the effectiveness of technologies that are well suited to meeting the challenges for rural broadband access, which is what the Cellnet etiquette would do, is counter to the public interest and to the Commission's own stated goals. Further, imposing such requirements for silent intervals between transmissions would prohibit real-time communications, such as VoIP or streaming video.

Cellnet's proposal also would negatively impact several types of RFID systems that are currently in use throughout the country. Specifically, passive tag RFID technology relies on the transmitted signal "charging" the tag and the return signal offsetting the original transmitted signal. Duty cycle limitations, however, are not consistent with this type of technology. Indeed, when certain passive tag RFID technologies are used, duty cycle limitations would result in tags being skipped over and not read. Fixed RFID systems, such as those used in warehouses, would be similarly impacted as such systems require higher power outputs to penetrate through pallets of goods and material so they may accurately read the tags in the pallet. These RFID systems already have a naturally short duty cycle and thus are only capable of causing minimal interference even though they may operate at certain times at higher power.

Cellnet's proposal would also negatively impact the MOTOtalk product. MOTOtalk employs frequency hopping techniques pursuant to Section 15.247 of the Commission's rules. Cellnet's proposal will not allow for real-time voice communication, the purpose of the MOTOtalk product, as this requires synchronization between devices with limited delays. Similar to the impact to Canopy, varying the output power from 30 dBm to 0 dBm depending on traffic will significantly affect the range, availability and voice quality of the product due to increased bit error rate, resulting in the inability for MOTOtalk devices to connect and in dropped calls.

Rather than limiting communications capabilities of all devices to some lowest common denominator, the FCC should welcome the development of technologies that are designed to operate robustly in a challenging spectrum environment. Under the current rules, multiple systems effectively share the 902-928 MHz unlicensed band to provide the nation's businesses and consumers with many beneficial solutions. For example, nearly 200,000 Canopy units are being used in the 902-928 MHz band for cost-effective broadband point-to-point and point-to-multipoint systems, many of which are deployed in rural areas. Canopy is designed specifically to support the shared environment prevalent in most unlicensed bands. The Canopy system utilizes sectorized, directional antenna technology to maximize spectrum efficiency, with one 8 MHz channel per sector. Considering some overlap between adjacent sectors, much of the coverage area of a deployed Canopy system is illuminated by only 8 MHz of the spectrum and only some by two-thirds of the spectrum.²³ This approach supports shared use of the 902-928 MHz

²³ Also, the Canopy system only transmits when user traffic is present. When no user data needs to be transmitted, the Canopy 900 Access Point transmits a narrow beacon every 5 ms. While this beacon does not technically meet the Cellnet proposed silent period, it does result in periods of Canopy operating at a very low duty cycle.

band so it can also enable remote meter reading activities, direct unit-to-unit radio communications for consumers, and many other wireless solutions.

Spectrum etiquettes by their nature are not technology-neutral. No matter what type of spectrum etiquette is implemented, there will be technologies that are enabled and technologies that are prohibited. By adopting a spectrum etiquette for the 902-928 MHz band, either Cellnet's proposal or some other proposal, the Commission would be benefiting one technology to the detriment of others, creating the sort of hierarchy that would run afoul of the basic tenets of Part 15 and effectively choosing winners and losers in the marketplace. Most importantly, it would have a detrimental effect on the ability to accommodate and provide a wide variety of beneficial services to the public, including broadband services to rural areas.

C. New Spectrum Etiquette Requirements Will Stifle Innovation and the Deployment of New Devices in the 902-928 MHz Band.

The Commission has repeatedly stated that its Part 15 rules are intended to promote innovation and design flexibility with regard to unlicensed devices. For example, in 2004, the Commission concisely stated that these rules “are designed not only to protect against harmful interference but also to facilitate spectrum sharing among unlicensed devices *while minimizing constraints on product designs.*”²⁴ Indeed, innovation and flexibility are “the cornerstone of unlicensed operation.”²⁵ Even in this

²⁴ *Unlicensed Operation in the TV Broadcast Bands, Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, 21 FCC Rcd 12266, ¶ 47 (2006).

²⁵ *Modification of Parts 2 and 15 of the Commission's Rules for unlicensed devices and equipment approval*, Notice of Proposed Rulemaking, 18 FCC Rcd 18910, ¶ 45 (2003).

proceeding, the Commission has concluded that “design flexibility has helped the industry to develop efficient sharing and modulation schemes.”²⁶

As detailed above, any form of spectrum etiquette, including Cellnet’s proposed framework, would render certain existing technologies unusable in the 902-928 MHz band, and also stifle the development of new technologies. Device manufacturers would be forced to limit their future devices and technologies to designs that could operate within the new spectrum etiquette rules. Such a result directly conflicts with the Commission’s general unlicensed policies and its goal of facilitating unlicensed product development and innovation in the 902-928 MHz band.²⁷

Already in this proceeding, other parties have filed comments addressing the Further Notice and offering their own proposals for spectrum etiquette. Two of the parties that have commented thus far on the Further Notice—Proxim and the Wireless Internet Service Providers Association (WISPA)²⁸—oppose the Cellnet proposal and instead each propose different spectrum etiquettes. These divergent proposals underscore the difficulty in defining a single spectrum etiquette to accommodate the variety of users in the band.

While opposing the Cellnet proposal, Proxim indicates its support for a listen-before-talk requirement for both spread spectrum and digitally modulated devices

²⁶ *Report and Order* at ¶ 54.

²⁷ *Further Notice* at ¶ 19.

²⁸ *Comments on Memorandum Opinion and Order and Further Notice of Proposed Rulemaking*, ET Docket No. 03-201, ¶¶ 3-4 (filed Sept. 10, 2007) (“Proxim Comments”); *Comments of the Wireless ISP Association (WISPA)*, ET Docket No. 03-201, (filed Sept. 13, 2007) (“WISPA Comments”).

authorized under Section 15.247 and also believes that some sort of duty cycle is required.²⁹ Motorola opposes this suggestion, and will address Proxim's comments in greater detail during the reply comment round but will discuss briefly the problems with listen-before-talk. Listen-before-talk obligations are not feasible for real-time, low latency voice communications like that performed by MotoTALK. In addition, listen-before-talk requirements are not effective for systems such as Canopy where sectorized, high-gain antennas are used, because the interference environment of a receiver is quite different from that of the transmitter for any attempt at communication. Furthermore, the industry's experience with listen-before-talk etiquettes has not been successful. Early developmental work in the asynchronous portion of the Unlicensed PCS allocation at 1910-1930 MHz demonstrated that the etiquette greatly limited effective traffic-carrying capacity. Subsequently, when the FCC proposed imposing that same etiquette into the 5150-5350 MHz U-NII band, the negative response from the industry was overwhelming.³⁰

Similarly, the Wireless Internet Service Providers Association (WISPA) opposes the Cellnet etiquette but proposes that the Commission implement a variety of spectrum etiquette requirements.³¹ For example, WISPA proposes that digitally modulated devices be limited to a maximum transmit bandwidth of 8 MHz, or have a small enough bandwidth to allow at least three similar, non-overlapping digital channels to be co-

²⁹ Proxim Comments at ¶¶ 3-4.

³⁰ *Amendment of the Commission's Rules to Provide for Operation of Unlicensed NII Devices in the 5 GHz Frequency Range*, Report and Order, 12 FCC Rcd 1576, ¶ 64 (1997) ("The commenters overwhelmingly oppose the LBT spectrum etiquette proposed in the NPRM for U-NII devices.").

³¹ See WISPA Comments.

located and not cause interference in the 902-928 MHz band.³² WISPA also proposes to impose automatic transmitter power control on unlicensed devices and, also, reduce the minimum number of hops for wideband frequency hopping systems from 25 to 15.³³

Motorola will address WISPA's comments in greater detail during the reply comment round but discusses them here to illustrate the difficulty with developing etiquettes for unlicensed bands populated with non-homogeneous properties. For example, automatic power control is problematic for devices such as MotoTALK, where the devices do not know how much power is needed to reach the other end of the connection. Likewise, reducing the minimum number of hops for wideband frequency hopping systems will concentrate energy within a narrower bandwidth, resulting in greater potential to receive and create interference to primary spectrum users.

As discussed above, imposing spectrum etiquettes in these existing bands cannot be successfully implemented on a technology-neutral basis. The Cellnet approach discussed here, for example, would restrict the ability of two-way systems to communicate in favor of protecting systems with one-way traffic. Motorola urges the Commission to avoid that result.

II. THE COMMISSION SHOULD MAINTAIN THE CURRENT FRAMEWORK IN THE 2.4 AND 5.8 GHz BANDS

In its *Further Notice*, the Commission also asked whether there is a need to adopt a spectrum etiquette for digitally modulated transmitters or other devices operating in the

³² *Id.* at 4.

³³ *Id.* at 6-7, 11-12.

2.4 GHz and 5.8 GHz bands.³⁴ Motorola urges the Commission to maintain the current regulatory framework for these bands. As stated above, regulation of basic technical parameters such as power level and antenna gain has numerous advantages over more onerous regimes: it allows for diverse technologies to operate in the band, it creates a level playing field for unlicensed devices, and it promotes the development of new technology. There is no evidence in the record indicating that there are interference problems in the 2.4 or 5.8 GHz bands that warrant the imposition of spectrum-sharing regulation. The opening of the 2.4 and 5.8 MHz bands for unlicensed use has been a success, and Motorola urges the Commission not to tamper with this regime.

Furthermore, although Motorola believes that a spectrum etiquette is unnecessary, it would be particularly risky to impose a new framework on three major unlicensed bands at once. To do so would likely result in a major disruption in service for American electronics consumers.

III. CONCLUSION

The Commission should decline to impose spectrum etiquette on the 902-928 MHz, 2.4 GHz, and 5.8 GHz bands. As the Commission previously determined, spectrum etiquette would offer little improvement in service to devices operating in these bands, and would effectively prevent or impede a number of services from operating at all. In addition, the imposition of spectrum etiquette would thwart two major public policy goals of the Commission: (1) to provide access to communications services, broadband in particular, to rural America, and (2) to encourage innovation and the development of diverse products and services in unlicensed bands. Simply looking at the

³⁴ *Further Notice* at ¶ 27.

variety of Motorola's devices in the band gives a snapshot of the broad range of devices operating in the unlicensed bands today. Besides the fact that spectrum etiquette is unnecessary, Motorola does not believe that an etiquette could be defined which would accommodate the full compliment of unlicensed devices currently in operation. For these reasons, the Commission should maintain its current, minimally regulated framework for unlicensed spectrum and reject Cellnet's proposal.

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