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	)	
Equipment approval.	)	

COMMENTS OF THE CONSUMER ELECTRONICS ASSOCIATION

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Executive Summary

CEA applauds the Commission's efforts in this proceeding to update its rules governing unlicensed devices. The Commission's proposals are forward-looking and will accommodate the rapidly changing technologies being used by a variety of unlicensed devices today and promote development and use of additional new technologies in the future.

In particular, the Commission's proposals to permit use of phased array and adaptive sectorized antennas will improve the reliability of communications carried by unlicensed devices and increase spectrum efficiency by allowing the signals to be directed toward the devices with which communication is desired and away from other devices and users. We suggest that the Commission extend these same provisions to the other unlicensed bands, including specifically the 5 GHz U-NII bands and the 5.8 GHz unlicensed bands where devices operate that are comparable to those using the 2.4 GHz band and the same benefits could be realized. We also support the Commission's proposal to permit use of multiple certified antennas with a single device, and suggest that perhaps data on only the antenna with the highest gain need be submitted to attain the Commission's objectives.

Similarly, we support the Commission's proposals to allow professional installers and service providers to customize their systems with different antennas and to use amplifiers of up to 1 watt where that amount of power is permitted; and to amend its power measurement rules to permit using methods more appropriate for digital devices. These amendments will promote the wireless delivery of broadband Internet access.

We also support amending the permissible channel spacing for devices using frequency hopping spread spectrum ("FHSS") in the 2.4 GHz band. Doing so will permit improved data rates. CEA also supports codifying the criteria for approving modular transmitters. With regard to partitioned modules, we suggest that an electronic handshake be required, but that the Commission staff be permitted to approve any effective method for the handshake rather than limiting the code exchange to one specific format.

Finally, the Commission asks whether its adoption of spectrum etiquettes might improve spectrum efficiency and sharing. When the Commission adopted specific etiquettes for unlicensed bands – the unlicensed PCS bands ("UPCS") – equipment and services failed to grow notwithstanding the prime location of the spectrum. The Commission now has before it in a different proceeding proposals to change those rules. This stands in marked contrast to the success of a wide variety of unlicensed devices in the unlicensed bands neighboring the UPCS bands. We therefore urge the Commission to NOT consider adopting spectrum etiquettes and similar standards except in very narrow circumstances where specific methods are required to protect a primary user in the same band.

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The Consumer Electronics Association ("CEA") respectfully submits these Comments addressing proposals made in the Commission's Notice of Proposed Rulemaking ("*Notice*") in the above captioned proceeding to amend certain rules governing unlicensed devices.[1] We applaud the Commission's efforts to update and increase the flexibility of its rules in this increasingly important area of rapidly changing technology.

CEA generally supports the proposed changes and clarifications as more fully discussed below, with the exception that we disagree with the suggestion that mandatory equipment standards or spectrum etiquettes are desirable and should be considered for general application to unlicensed equipment. While there have been special situations in which spectrum must be shared with a primary user that requires assurances of non-interference, adoption of FCC-mandated standards and etiquettes generally have hindered

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[1] *Modification of Parts 2 and 15 of the Commission's Rules for unlicensed devices and equipment approval*, ET Docket No. 03-201, Notice of Proposed Rulemaking, 18 FCC Rcd 18910 (2003) ("*Notice")*.

both equipment innovation and spectrum efficiency. Such measures therefore should not be considered unless and until there is demonstration of a strong and specific need for specific requirements to permit spectrum sharing.

I. INTRODUCTION

The Consumer Electronics Association is the principal U.S. trade association of the consumer electronics and information technologies industries, including manufacturers of the television receivers, monitors, and associated equipment such as set-top boxes, personal video recorders (PVRs), video cassette recorders (VCRs) and DVD players that bring the video marketplace into consumers' homes.[2] Our members also design and manufacture a broad array of unlicensed devices, including Wi-Fi and similar equipment that increasingly will be used throughout the home to network audio and video equipment such as television sets and monitors with video delivery services such as cable, DBS, and over-the-air broadcast as well as personal computers and broadband Internet access.

II. GREATER FLEXIBILITY TO USE SPECIALIZED ANTENNAS WILL INCREASE COMMUNICATIONS RELIABILITY AND IMPROVE SPECTRUM EFFICIENCY

In its *Notice*, the Commission proposes to add to its Rules a new Subsection 15.247(a)(6) to permit the use of advanced antenna technologies with spread spectrum

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[2] CEA's more than 1,300 companies include all of this country's major consumer electronics manufacturers. Our members design, manufacture, distribute and sell a wide range of consumer products in addition to the above devices, including direct broadcast satellite radio (DARS) and television (DBS) equipment, broadcast AM and FM radios, and unlicensed devices such as cordless phones, baby monitors, and wireless headsets.

devices in the 2.4 GHz band.[3] The Commission also proposes to amend Section 15.203[4] to relax the replacement antenna restrictions for unlicensed devices generally.[5] We support both proposed rules changes.

Allowing use of antenna technologies such as phased arrays and adaptive sectorized antennas will increase the reliability of communications carried by unlicensed devices by allowing the signals to be directed more readily toward the devices with which communication is desired. As the Commission notes, doing so results in less power being transmitted in non-desired directions around the transmitter, which improves spectrum efficiency by lessening interference in those areas. The overall result will be better communications reliability due to the lessened susceptibility to interference and improved spectrum efficiency by facilitating use of spectrum in other directions that otherwise would be blocked were an omnidirectional antenna used to communicate with multiple points. We believe the Commission's approach of limiting the total simultaneous beam width to 120° and aligning power limits with those in Section 15.247(b) is sound.

It is unclear, however, why the Commission proposes to limit use of innovative antennas to the 2.4 GHz unlicensed band. Deployment of such antennas generally in the other unlicensed bands, including the 5 GHz U-NII bands and 5.8 GHz unlicensed band,

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3 47 C.F.R. § 15.247(a).

4 47 C.F.R. § 15.203.

5 *See Notice* at ¶¶ 5-17.

in which unlicensed devices operate that are comparable to those in the 2.4 GHz band, similarly would increase communications reliability, improve spectrum efficiency, and foster technological innovation. We believe that Section 15.407(a) also should be amended in the same fashion as proposed for Section 15.247(a) for the purpose of permitting newer, more spectrum-efficient antenna technologies also to be deployed with unlicensed devices in the 5 GHz bands.[6]

We also strongly support the Commission's proposed flexibility to enhance the availability of alternative antennas in all of the unlicensed bands. Adopting the proposal will improve device operations and increase spectrum efficiency. Testing of only the highest gain antenna of each type approved for use with the maximum output of the transmitter and requiring a list of acceptable antenna types is a technically sound method to evaluate the maximum interference potential of a system.

We do suggest that the Commission consider simplifying the approval process by requiring tests of only the single matched antenna of the highest gain to be authorized. While the Commission did not articulate the purpose of testing one of each "type" of

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[6] Two of the four U-NII bands (5.250-5.350 and 5.475-5.725 GHz) are subject to special requirements to protect primary Government radar operations. *See, Revision of Parts 2 and 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band,* Report and Order, 18 FCC Rcd 24484 (2003), adopting new Subsection 15.407(h) of the Commission's rules to require Dynamic Frequency Selection ("DFS") and Transmit Power Control ("TPC"). Since directional antennas exhibit reception gain proportional to their transmit power gain, their use in the U-NII bands would appear to be totally consistent with these requirements, and in fact, could aid efforts in avoiding interference. In any event, two U-NII bands (5.150-5.250 and 5.725-5.825 GHz) and the overlapping unlicensed band (5.725-5.850 GHz) are not subject to the provisions requiring DFS and TPC.

antenna, our impression is that generally characteristics of antenna patterns vary more by gain than by "type", and requiring tests of the single highest gain antenna would best define the greatest range of a transmitted signal and its interference potential.[7]

III. FLEXIBLE EQUIPMENT AUTHORIZATION WILL PROMOTE BROADBAND DEPLOYMENT

The Commission proposes to change the equipment authorization rules to enable wireless Internet service providers (WISPs) to customize their systems by connecting transmitters and antennas without a requirement that each combination be tested and approved by the Commission as a unit. This change would permit professional installers and service providers to substitute technically equivalent components of a system, such as transceivers and antennas; and also to acquire and add amplifiers with up to 1 watt of output power.[8] These changes are proposed for the unlicensed 2.4 and 5.8 GHz bands only, which are the bands most commonly employed by WISPs.

We support the proposed flexibility in the equipment authorization rules. Unlicensed links provide an important opportunity to extend broadband Internet access to more homes at reasonable cost, particularly in rural areas. Permitting antennas to be exchanged more readily will lower costs by allowing more equipment to be re-deployed

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[7] For example, a comparison of the two types of antennas referred to in the *Notice,* a yagi antenna with a dish antenna, would find that the pattern of a properly designed 10 element yagi will be closer to that of a dish of the same gain than to a 2 element yagi, everything else being equal. Antenna gain, sidelobes, and backlobes are determined more by specific design criteria and total forward gain than by the particular "type" of antenna. Furthermore, antennas such as yagis can exhibit different patterns that depend upon their design and purpose more than the "type" of antenna.

[8] *See Notice* at ¶¶ 18-20.

quickly as customers subscribe and unsubscribe. These changes, along with implementing the antenna flexibility discussed above, will encourage additional deployment of unlicensed broadband access.

We do not expect this added flexibility to cause interference problems, although there are a large number of unlicensed devices operating in the 2.4 GHz band. To limit the potential for any interference, the Commission should ensure that the amplifiers can be added only to equipment authorized to operate with 1 watt of output power.

IV. MEASUREMENT TECHNIQUES APPROPRIATE FOR DIGITAL DEVICES SHOULD BE ADOPTED

The Commission proposes to amend Section 15.247(d) of its Rules[9] to include methods of measuring power output based on average power as provided in the digital device rules adopted in 1997 to govern unlicensed devices operating in the 5 GHz U-NII bands.[10] Adopting the Commission's proposal would allow use of measurement techniques more appropriate for digital devices because power peaks of short duration are typical of digital modulation but do not increase the potential for interference.[11]

CEA supports adopting these power measuring techniques because they are more relevant for measuring the power of digital devices. Additionally, we note that the Commission has recognized that current measurement practices using peak power over

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9 47 C.F.R. § 15.247(d).

10 *See* 47 C.F.R. § 15.407(a)(4) – (a)(6).

11 *Notice* at ¶¶ 21-24.

estimates the interference potential of devices using some types of digital modulation that exhibit high peak to average power. CEA agrees that similar devices should be tested using similar measurements and supports the Commission's proposed changes to allow measurement of average power for devices operating under Section 15.247 of the Commission's Rules.[12]

V. FREQUENCY HOPPING CHANNEL SPACING SHOULD BE ADJUSTED

In response to a request of the Bluetooth Special Interest Group ("Bluetooth SIG"), the Commission proposes that the channel spacing requirement for frequency hopping spread spectrum ("FHSS") devices in the 2.4 GHz band be amended to permit a minimum separation of 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater. The Commission also proposes to establish a power limit of 125 milliwatts for such devices, consistent with the existing power limit for systems that use fewer than 75 hopping channels.[13]

CEA supports the proposed changes. Their adoption will permit Bluetooth devices to triple their data rates, from 1 to 3 mbps. Relaxing the current rules and proposed power limit is appropriate given the utility of unlicensed devices using this type

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[12] The Commission also has recognized that devices using OFDM may present a measurement issue due to the shortness of symbol duration. The Commission's Public Notice clarifying Section 15.407 should be referenced or incorporated into the new rules to ensure their clarity. *See Measurement Procedure Updated for Peak Transmit Power in the Unlicensed National Infrastructure (U-NII) Bands,* DA 02-2138 (released Aug. 30, 2002).

[13] *See Notice* at ¶¶ 25-30 and 47 C.F.R. § 15.247(b)(1).

of modulation and their limited potential to cause interference because of the generally short range over which they communicate.

VI. UNLICENSED DEVICE MODULAR TRANSMITTER APPROVAL CRITERIA SHOULD BE ADOPTED

Manufacturers increasingly rely on FCC-approved radio modules that are self-contained and can be incorporated into a variety of devices, such as laptops and PDAs, to provide connectivity to the Internet (*e.g.,* WiFi) or other devices and equipment (*e.g.,* Bluetooth). Modular construction provides high-quality devices to consumers at low cost. The Commission proposes to update and codify in the rules its criteria for approving modular transmitters.[14] Its proposal would accommodate existing modular devices, which are completely self-contained, as well as newer partitioned devices.[15]

CEA supports the Commission's efforts to streamline the equipment authorization process for modular approval. Codifying these rules will decrease costs and lend clarity and certainty to the process. The result will be a greater availability of modules that will fuel mobile access to broadband links to the Internet at low cost to consumers.

With regard in particular to the proposals to govern partitioned modules, industry generally is supportive of the change to Requirement No. 1, which would specify that the interface signaling be at a minimum of 150 mV peak-to-peak.[16] However, a different

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14 *See Notice* at ¶¶ 31-42.

15 *Notice* at ¶¶ 31-42.

16 *See Notice* at ¶ 38.

minimum signaling level may be appropriate for future technologies, and the specificity proposed for this regulation could hinder the rapid development and approval of future methods. Therefore, the Commission should consider specifying the interfering signal levels and tests as an additional approach to specifying the minimum signaling amplitude of the device being tested.

With regard to ensuring that partitioned modular transmitters operate with a front end and firmware that have been certified together as a pair,[17] the Commission's objectives have merit but would be met equally well without affecting future developments by requiring an electronic handshake. The details of this handshake could then be subject to review and approval. This would introduce flexibility in the process and allow industry to use new techniques that otherwise might be precluded even when more secure.[18]

Finally, we support the Commission's proposed modifications to its labeling requirements for modules.[19] These requirements provide the flexibility needed to provide identification in the various situations presented when modules are inserted into

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17 *See Notice* at ¶ 41.

18 For example, industry already makes widespread use of a 24-bit globally unique company identification number called the "Organizationally Unique Identifier ("OUI") that is administered by the IEEE. This OUI makes up part of the MAC address of every Ethernet adapter in the world. Since this number serves the same purpose as the FCC's proposed 16-bit company information, there is no reason to disallow such alternate approaches as long as they ensure proper matching of modular transmitter components. *See* http://standards.ieee.org/faqs/OUI.html.

19 *See Notice* at ¶ 35, subpara. 6.

equipment.

VII. FOSTERING IMPROVED SHARING IN THE UNLICENSED BANDS

The Commission requests comment in the *Notice* on improving spectrum efficiency in the unlicensed bands, and specifically inquires about the possible spectrum efficiency benefits to adopting "spectrum etiquettes" such as those it adopted for unlicensed PCS devices ("UPCS").[20] We oppose Commission adoption of mandatory spectrum etiquettes and standards for the unlicensed bands because technological innovation in these bands is fast-moving. Inevitably, standards and etiquettes represent a snapshot of technology at one particular time that is rapidly surpassed by later developments.

CEA itself has special expertise in this area because we are a standards-setting organization accredited by the American National Standards Institute ("ANSI"). Unless there are compelling reasons for government adoption of a standard, we support industry adoption of standards rather than government adoption because this process minimizes unnecessary standards and leads to better and more flexible standards where standards are needed for technical reasons.[21] Too often the result of the government adopting

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20 *See Notice* at ¶¶ 43-45; *Amendment of the Commission's Rules to Establish New Personal Communications Services*, ET Docket 90-314, Report and Order, 8 FCC Rcd 7700 (1993), recon., 9 FCC Rcd 4957 (1994).

21 For example, CEA supported Commission adoption of the ATSC digital TV and related standards in MM Docket No. 87-268, because broadcasting to the public requires such standards. We also supported adoption of Dynamic Frequency Selection ("DFS") and transmitter power control ("TPC") requirements for U-NII devices in ET Docket No. 03-

(continued...)

etiquettes and standards has been spectrum inefficiency and obsolescence. Government standards are difficult to change once adopted and tend to freeze technology, provide preferences and incentives for the continued use of older less-efficient technologies, and provide disincentives for the development of new technologies.

One need only examine the lack of success of the etiquettes adopted by the Commission a decade ago that are cited by the Commission in its NPRM to observe the spectrum inefficient results, notwithstanding industry support for adoption of those standards and the best of intentions by the Commission. The UPCS bands consist of the highly desirable spectrum ranges of 1910-1930 and 2390-2400 MHz, yet today these bands are comparatively vacant. As the Commission itself has noted in its consideration of petitions to change the UPCS etiquettes or to reallocate this valuable spectrum, there is little use of these bands despite their prime location.[22] This stands in marked contrast to the use being made of the neighboring unlicensed bands which have no FCC etiquettes or standards. Exceedingly heavy use is being made of the 900 and 2400 MHz unlicensed bands, and use of the 5 GHz U-NII and 5.8 GHz unlicensed bands is increasing steadily.

(...continued)

122 because the requirements are necessary to share the spectrum with military radar operations. The DFS and TPC rules are technologically neutral requirements more similar to radiated power and emission limits than to the detailed isochronous and asynchronous spectrum etiquettes adopted for UPCS bands.

22 The Commission has pending before it a proceeding in which it is considering how to deal with the lack of activity in the UPCS bands. *See, Advanced Wireless Services,* ET Docket No. 00-258, IB Docket No. 99-81, RM-9911, RM-9498 and RM-10024, Memorandum Opinion and Order and Further Notice of Proposed Rulemaking, 16 FCC Rcd 16043 (2001); Second Report and Order, 17 FCC Rcd 23193 (2002); Third Notice of Proposed Rulemaking, 18 FCC Rcd. 2223 (2003).

Minimum regulation of technical standards in the principal unlicensed bands has provided strong incentives to industry standards organizations and entrepreneurs to use emerging technologies to successfully deal with the radio frequency environment present in the heavily-used unlicensed bands. Thus we are observing consistently improved 802.II and Bluetooth standards, for example, and substantial effort devoted to improving equipment designs to deal with the increased interference potential. With flexibility and marketplace incentives, new and advanced unlicensed equipment continues to be marketed for these bands while the UPCS bands saddled with two FCC-adopted etiquettes remain mostly vacant. There hardly could be a more compelling case for eschewing FCC-required etiquettes and standards.

We do note that there are situations, such as that presented by two of the 5 GHz U-NII bands, where a minimum requirement may be necessary to ensure successful sharing with a primary user. We believe that the Commission got it right when it adopted rules in that proceeding because (1) it adopted the minimum rules necessary that directly serve the clear objective of spectrum sharing; and (2) it adopted generic requirements that must be met, rather than dictating technology-specific standards incorporating specific design requirements. This type of regulation allows these bands to be opened to unlicensed use while protecting the incumbent primary operations and provides incentives for meeting the sharing requirements in new, innovative ways as technology advances in future years. The result is that the band is open to all technologies and users equally and we expect more and better sharing mechanisms to evolve in future years.

We also note that the concepts set forth in the Commission staff's Spectrum Policy Task Force Report of interference temperature and cognitive radios address the possibility of increased spectrum sharing using new technologies.[23] We support the Commission's continuing work on these spectrum-sharing concepts and believe that they could lead to much more efficient spectrum use in the future than spectrum etiquettes and standards.

VIII. CONCLUSION

CEA applauds the Commission's efforts to update and increase the flexibility of its rules that govern unlicensed devices. This is an area of rapidly changing technology that is an increasingly important to bring new and better services to the American public.

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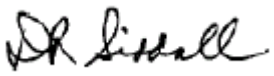
[23] *See* FCC, *Spectrum Policy Task Force Report* (2002); *Facilitating Opportunities for Flexible, Efficient and Reliable Spectrum Use Employing Cognitive Radio Technologies,* Notice of Proposed Rulemaking and Order, ET Docket No. 03-108 (FCC 03-322, rlsd Dec. 30, 2003); and *Establishment of an Interference Temperature Metric to Quantify and Manage Interference and to Expand Available Unlicensed Operation in Certain Fixed, Mobile and Satellite Frequency Bands*, Notice of Inquiry and Notice of Proposed Rulemaking, ET Docket No. 03-237 (FCC 03-289, rlsd Nov. 28, 2003).

As explained above, CEA supports most of the proposed changes and clarifications as more fully discussed above and urge the Commission to conclude this and related proceedings expeditiously.

Respectfully Submitted,

CONSUMER ELECTRONICS ASSOCIATION

By:



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