

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

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In the Matter of )  
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2002 Biennial Review of Telecommunications )  
Regulations Within the Purview of the )  
Office of Engineering and Technology )  

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ET Docket No. 02-312  
Biennial Review 2002 Comments

**COMMENTS OF CISCO SYSTEMS, INC.**

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## SUMMARY

Cisco once again applauds the Commission's ongoing efforts to review and revise key Part 15 technical rules to align them with technological growth and market growth. This diligence on the Commission's part helps the Part 15 industry bring new devices to market as quickly and cost-effectively as possible, benefiting both individual consumers and the economy at large. In response to the Commission's public notice, Cisco has identified several Part 15 rules whose revision, clarification, or elimination ought to ease burdens on the high-tech industry and on the Commission staff as well.

First, the Commission should revise its rules to make clear that whenever a device can be approved based on compliance with CISPR limits, the CISPR testing procedure may also be used. This will eliminate the delay and expense of redundant testing.

Second, the Commission should expand on its recent update of the U-NII peak transmit power measurement procedures so that the same updated procedures apply to multi-carrier devices designed to operate in the 2.4 GHz band.

Third, the Commission should eliminate its "unique coupling" requirement for external antennas and its "integral antenna" requirement for 5150-5250 MHz U-NII devices. These measures do not in fact achieve the Commission's goals in adopting them, but they do impose costs on manufacturers and consumers, in terms of both time and delay.

Fourth, the Commission should amend section 15.407(a)(3) by aligning it with section 15.247(b)(3)(ii), to eliminate an inconsistency in the way that antenna gain limits apply to 5 GHz unlicensed devices.

Finally, the Commission should issue additional guidance on SAR testing. The Commission must make clear that the limit is the limit, and devices will not be detained for

additional scrutiny when they test “near the limit.” In addition, the Commission should explore the possibility of streamlined testing procedures for modular devices, possibly involving the use of “generic” host configurations.

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**COMMENTS OF CISCO SYSTEMS, INC.**

Cisco Systems, Inc. hereby responds to the Commission’s Public Notice seeking comment in the 2002 Biennial Review of Telecommunications Regulation Within the Purview of the Office of Engineering and Technology (“PN”).<sup>1</sup> Cisco once again applauds the Commission’s ongoing efforts to review and revise key Part 15 technical rules to align them with technological growth and market growth. This diligence on the Commission’s part helps the Part 15 industry bring new devices to market as quickly and cost-effectively as possible, benefiting both individual consumers and the economy at large.

Cisco equipment is marketed and used worldwide to provide services such as wireless broadband connectivity for user convenience and increased business productivity. As a leading manufacturer of equipment for wireless services, Cisco has an extremely high degree of interest in assisting the Commission in developing Part 15 rules that foster new technologies and that streamline equipment approval processes. Cisco believes that in order to facilitate the seemingly endless stream of technological breakthroughs in this industry, the Commission must eliminate

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<sup>1</sup> *The Commission Seeks Public Comment in the 2000 Biennial Review of Telecommunications Regulations Within the Purview of the Office of Engineering and Technology, FCC 02-266 (September 26, 2002).*

unnecessary regulations and make necessary regulations as clear as possible. Otherwise, the Commission will hinder the ability to market products, or even prevent the development of some products altogether.

In response to the PN, Cisco has identified several Part 15 rules whose revision, clarification, or elimination ought to ease burdens on the high-tech industry and on the Commission staff as well. In particular, Cisco urges the Commission to modify Part 15 rules that relate to test methodology and antenna requirements. In addition, Cisco requests that the Commission clarify matters related to SAR requirements for devices authorized pursuant to section 15.247 of the Commission's rules. Cisco believes that the minor changes it proposes will greatly ease the equipment authorization process for industry as well as reduce the burden on the OET staff.

#### **I. Section 15.31 Measurement Standards**

A great benefit of the Commission's biennial review process is the opportunity for industry to help the Commission streamline its rules. Cisco takes this opportunity to assist the Commission in completing a streamlining of the testing process that the Commission began almost a decade ago.

In 1993, the Commission sought to help manufacturers compete more effectively in global markets by "amending Part 15 of its rules to harmonize the United States standards for radio frequency (RF) emissions from digital devices with the international standards for these devices."<sup>2</sup> In the *Harmonization R&O*, the Commission decided to permit manufacturers to demonstrate compliance with either the Commission's Part 15 standards for emission limits or

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<sup>2</sup> See *In the Matter of Revision of Part 15 of the Rules to Harmonize the Standards for Digital Devices with International Standards, Report and Order* ("Harmonization R&O"), at ¶ 1, ET Docket No. 92-152, FCC 93-421 (rel. August 20, 1993).

with International Special Committee on Radio Interference (“CISPR”) standards used throughout much of the rest of the world. The Commission reasoned that this would enable United States manufacturers to compete more effectively in international markets.<sup>3</sup>

During the “Harmonization” proceeding, the Commission also invited comment on whether the CISPR measurement procedure (“CISPR Pub.22”)<sup>4</sup> would be suitable for demonstrating compliance with CISPR standards, or whether the ANSI C63.4 measurement procedure<sup>5</sup> should be used.<sup>6</sup> However, the Commission declined to allow demonstration of compliance with CISPR standards using the CISPR Pub.22 measurement procedure. Today, section 15.31(a)(6) of the Commission’s rules specifies that the ANSI C63.4 testing procedure must be used for Class A and Class B digital devices, regardless of whether the purpose of the test is to demonstrate compliance with the ANSI standard or with the CISPR standard.<sup>7</sup>

Unfortunately, that decision negates any benefit of the Commission’s intended streamlining. The whole point of permitting manufacturers to use the CISPR standard in the U.S. is to eliminate the need for duplicative testing – an ANSI test for the U.S. and a CISPR test for everywhere else. However, if the ANSI testing procedures must be used even when performing a CISPR test, then that purpose is defeated because the rest of the world expects compliance with CISPR limits to be demonstrated using the CISPR testing procedure that the Commission forbids. Thus, the practical effect of section 15.31(a)(6) is that manufacturers must

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<sup>3</sup> *Id.*

<sup>4</sup> *See Information Technology Equipment – Radio Disturbance Measurements – Limits and Methods Measurements*, International Electrotechnical Commission, International Committee on Radio Interference (CISPR) Pub. 22 (1997), as amended (2000).

<sup>5</sup> *See Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz*, IEEE SH15180 (July 17, 1992).

<sup>6</sup> *See In the Matter of Revision of Part 15 of the Rules to Harmonize the Standards for Digital Devices with International Standards, Notice of Proposed Rule Making (“Harmonization NPRM”)*, at ¶ 7, 7 FCC Rcd 4872 (1992).

<sup>7</sup> *See* 47 C.F.R. § 15.31(a)(6).

now test each device twice – once in accordance with the ANSI procedure and again in accordance with the CISPR procedure – even if they are electing to use the same CISPR emission limits worldwide. This presents an enormous burden for manufacturers of global equipment.

Though the test procedures of ANSI C63.4 and CISPR Pub. 22 differ, they are functionally equivalent. In Cisco’s experience, there is no material difference in results obtained using either procedure.<sup>8</sup> However, Cisco notes that many countries around the world specify the CISPR Pub. 22 test procedures and CISPR standards - while suffering no additional interference problems due to any differences in result that may exist between the two procedures. Cisco believes that the probability that a device tested using the CISPR Pub. 22 procedure would have a greater interference potential (i.e., not meet established emission limits) is vanishingly small. It can even be argued that it is irrational to take the CISPR standards out of context by separating the standards from the test procedure for which they are intended. The standards and test procedures go hand-in-hand. Consequently, to relieve this unnecessary burden of duplicative work, Cisco requests that the Commission amend section 15.31(a)(6) of its rules to permit compliance testing using the CISPR Pub. 22 test procedures when demonstrating compliance with CISPR standards.

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<sup>8</sup> But the “double-test” burden is real. For example, amendment 1 to CISPR Pub. 22 requires tabletop testing of equipment with ferrite clamps placed on all cables exiting the test area. Thus to meet FCC requirements an ANSI set up must be configured and a full test set must be performed on the device. Then, a completely new CISPR set up must be configured for a second test set.

## **II. 2.4 GHz OFDM Test Methodology**

In Public Notice DA 02-2136<sup>9</sup> (“U-NII Peak Power PN”) the Commission addressed power measurements for U-NII devices and provided updated procedures for devices employing multi-carrier technologies. Multi-carrier modulation techniques are now permitted for both U-NII devices that operate in the 5 GHz range and for unlicensed devices that operate in the 2.4 GHz range. However, the U-NII Peak Power PN addresses only measurement procedures for 5 GHz devices.

Cisco notes that recently the Commission adopted rules that would permit multi-carrier modulation for unlicensed devices operating in the 2.4 GHz band pursuant to section 15.247 of the Commission’s rules.<sup>10</sup> However, no updated procedures for measurement of 2.4 GHz multi-carrier devices have been issued. In fact, the effect of using the current measurement procedures applicable to section 15.247 direct sequence spread spectrum devices when measuring an OFDM device, for example, would be an artificial reading of the OFDM device’s peak power because the peak reading meter would record very narrowband power spikes characteristic of an OFDM signal. This reading is not representative of the device’s longer-term power characteristics, and therefore is not representative of its potential to interact with other RF devices. Because the characteristics of a given multi-carrier signal are independent of frequency, Cisco believes the procedures given in the U-NII Peak Power PN are equally applicable to 2.4 GHz multi-carrier devices. Therefore, Cisco requests that the Commission issue a public notice that would apply the U-NII peak transmit power measurement procedures to multi-carrier devices designed to operate in the 2.4 GHz band.

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<sup>9</sup> See *Measurement Procedure Updated for Peak Transmit Power in the Unlicensed National Information Infrastructure (U-NII) Bands*, Public Notice DA 02-2138 (August 30, 2002).

<sup>10</sup> See *Second Report and Order*, ET Docket No. 99-231, FCC 02-151 (May 16, 2002) at ¶ 11 (“DTS Report and Order”).

### **III. Antenna Configuration Matters**

A. Unique Antenna Connector. Section 15.203 requires that intentional radiators be designed to insure that no antenna other than the one the device is certified for can be installed. For most devices, the Commission prescribes two alternative ways to accomplish this. One is to design the device with a permanently affixed antenna. The other is to design the device with a “unique” antenna coupling.

Cisco fully understands that the intent of the rule is to prevent device users from installing antennas for which the device has not been certified. But the rule is ineffective for carrying out its intended purpose. The vast majority of consumers are not likely to attempt to modify a device to substitute an unauthorized antenna. By and large, if the device is operating properly, there is no reason to do so.<sup>11</sup> Moreover, even if there were some reason to do so, most consumers would believe rightly or wrongly that the task was beyond their ken.

On the other hand, for the extremely unusual case of the consumer who feels compelled to illegally modify a device, that consumer is not likely to be deterred by a special antenna connector, because such a consumer might just as easily open the device’s case, locate the antenna leads, remove those leads and the connector, and then install a connector (and antenna) of his choosing. In Cisco’s view, illegal replacement of antennas is likely not a widespread problem; but regardless of how common it is, the point is that any end-user sophisticated enough and motivated enough to illegally substitute an unauthorized antenna certainly has the ability to do so regardless of the type of connector used. Thus, the unique connector provision is a pointless, ineffective deterrent to illegal antenna replacement. The only effect of the provision is to increase manufacturing costs by ruling out the most economical components.

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<sup>11</sup> In fact, for device warranty reasons there is a disincentive to modify a device.

Cisco understands that the Commission continues to allow the use of “uncommon” connectors, rather than literally “unique” connectors. However, there is no precise criterion for how uncommon a connector must be, and no list of acceptable antenna connectors. Today, the Part 15 industry only knows what is ultimately acceptable by virtue of the Commission stating what is not. For example, though the local Radio Shack may stock only a few common connectors, a quick search of the Internet reveals electronic supply houses that stock literally hundreds, if not thousands, of connectors. At some point, even “uncommon” connectors may become widely available, even if not quite “common.”<sup>12</sup>

What the unique connector rule has done is place an extreme burden on equipment manufacturers who must produce – or have produced – expensive, one-off connectors that do little to satisfy the intent of the Commission’s rule. Cisco requests that the Commission eliminate the unique connector requirement of section 15.203.<sup>13</sup>

B. Integral Antenna Requirement for 5150-5250 MHz U-NII Devices. U-NII devices share the 5150-5250 MHz band with feeder links for the mobile-satellite service (“MSS”). When the Commission adopted its U-NII rules a particular concern was that U-NII devices not cause interference to MSS feeder links.<sup>14</sup> To accomplish this, it adopted a maximum

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<sup>12</sup> Cisco also notes that § 15.204 of the Commission’s rules expressly limits any modifications – antenna, external power, etc. – to a device authorized as a system.

<sup>13</sup> Cisco also notes that in some cases equipment authorizations specify that a “professional installer” must install antennas or equipment. However, there is no rule or guidance document on who qualifies as a professional installer. Cisco suffers (and believes other manufacturers do as well) an enormous volume of customer calls on who qualifies as a “professional installer” under Commission rules. Though Cisco does not believe it is necessary to tightly define qualifications for a professional installer, it does believe it would be helpful to the industry – and would set customers’ minds at ease – if the Commission were to issue general guidance on “minimum” qualifications for a professional installer. For example, The National Association of Radio Telecommunications Engineers, Inc. (“NARTE”) recently announced its Wireless System Installers Certification Program Study Guide to help candidates study for certification examinations. In 2001, in direct response to § 15.203, NARTE established a program specifically to certify those dealing with the installation of unlicensed wireless systems. See <http://www.narte.org/>.

<sup>14</sup> See *In the Matter of Amendment of the Commission’s Rules to Provide for Operation of Unlicensed NII Devices in the 5 GHz Frequency Range* at ¶ 44, 12 F.C.C. Rcd. 1576 (1998).

EIRP limit and restricted use of 5150-5250 MHz U-NII devices to indoor use only. But in addition to these two conditions, the Commission required devices in this band to be built with integral antennas<sup>15</sup> to ensure that the Commission's authorized power limits are not exceeded.

Cisco believes the integral antenna requirement is an unnecessary restriction that limits manufacturing flexibility and reduces economies of scale. For example, suppose a manufacturer markets a family of products that operate in Band A, Band B, or both bands. Some consumers may require dual-band operation and therefore need a dual-band antenna, but others will not. If much of the electronics in the devices will be the same regardless of the band in which they operate, the most efficient solution might be for the manufacturer to capture economies of scale by manufacturing a single device for all three situations, and then at the time of shipping equip each device with the external antenna that is appropriate for the particular user. The integral antenna requirement would destroy these potential economies of scale and force the manufacturer to some less efficient solution, such as (a) shipping a more expensive dual-band device to everyone, even though many do not need it; or (b) manufacturing completely separate devices for each group of users, notwithstanding the basic similarities among the devices. Either way, the restriction increases the cost to both the manufacturer and the consumer.

Cisco notes that 5150-5250 MHz U-NII devices are already limited to a maximum EIRP of 250 mW and restricted to indoor use. These limitations are widely agreed to be sufficient to protect MSS feeder links, regardless of whether the antenna is integral or external. Having set these operational limitations, the Commission has solved the interference problem and has no need to restrict the ways in which manufacturers satisfy the limits. Moreover, in light of the indoor-use restriction, there is little if any reason for anyone to modify these devices to obtain a

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<sup>15</sup> See 47 C.F.R. § 15.407(d).

higher EIRP in an indoor deployment. For these reasons, Cisco requests that the Commission delete the integral antenna requirement of 47 C.F.R. § 15.407(d).

#### **IV. 5 GHz Antenna Gain Limits**

Cisco notes what is now an inconsistency in the Commission's rules with regard to antenna gain limits applied to 5 GHz unlicensed devices. On the one hand, the U-NII rules permit point-to-point U-NII systems operating in the 5725-5850 MHz band to have a directional antenna gain of up to 23 dBi with no power reduction. However, for upper-band, fixed point-to-point systems with directional antenna gain greater than 23 dBi, a corresponding dB-for-dB reduction in peak transmit power and in power spectral density is required.<sup>16</sup> On the other hand, 5 GHz systems operating pursuant to section 15.247 and used exclusively for fixed point-to-point operations are permitted unlimited directional antenna gain with no corresponding reduction in peak transmit power.

With the Commission's decision to permit digital transmission systems ("DTS") authorized pursuant to section 15.247,<sup>17</sup> there is little distinction between a 5 GHz "15.247" point-to-point system and a 5 GHz U-NII point-to-point system. Neither rule part restricts digital modulation type and both rule parts permit device output power of up to 1 watt. The only real difference between the two rule parts is that an additional 25 MHz of spectrum is identified in section 15.247. Because there are no functional, technical differences in the two rule sections, Cisco requests that the Commission amend section 15.407(a)(3) by aligning it with section 15.247(b)(3)(ii). This adjustment will provide flexibility to those who desire to quickly deploy

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<sup>16</sup> See 47 C.F.R. § 15.407(1)(a)(3).

<sup>17</sup> DTS Report and Order at ¶ 11.

reasonably long links without the delay associated with frequency coordination and formal licensing.<sup>18</sup>

**V. Guidance on SAR Matters Related to Section 15.247(b)(4)**

Finally, while it is not in a position to provide detailed proposals, Cisco implores the Commission to issue further guidance on meeting SAR limits. As the Commission is aware, performing SAR evaluations is the greatest delay factor in obtaining equipment approval. Cisco notes two ways in which the status quo on SAR evaluations requires clarification.

First, the Commission needs to make crystal clear that when test results are at or below the specified limits, the device passes – no ifs, ands, or buts. Unfortunately, Cisco knows of many occasions on which a device has tested below the relevant SAR threshold limit yet has been “detained” for further testing and evaluation simply because it is “near the limit.” The delay to market for such devices represents an enormous expense to manufacturers both in terms of potential lost sales and loss of competitive advantage. Cisco requests that the Commission clarify that the “limits are the limits” and that any device meeting the Commission’s SAR limits will be approved without further delay.

Second, the Commission needs to develop a protocol for testing modular devices that facilitates generic, once-and-for-all testing of components intended for use in a wide variety of consumer applications. At the present time, requests for approval of modular devices are handled on a “case-by-case” basis; that is, a PCMCIA card must be tested with twenty or thirty different laptops even though there is no material difference among these twenty or thirty different configurations for SAR purposes. Cisco believes this is a result of having no clearly

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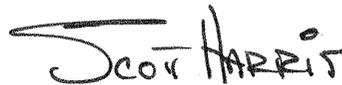
<sup>18</sup> The Commission found previously that permitting such links was in the public interest and decided to adopt point-to-point U-NII with “antenna gains similar to that permitted spread spectrum devices.” See *Memorandum Opinion and Order*, ET Docket No. 96-102 (June 17, 1998) (“MO&O”). The DTS R&O renders the spread spectrum distinction moot.

defined standards on SAR evaluations and how SAR limits would relate to modular equipment and the host devices in which a modular device might be installed. The ability to market modular devices is crucial for the continued growth of this industry, and forcing manufacturers to run twenty or thirty tests on the same device carries with it the possibility for unacceptable delays and unreasonably high testing costs. Since many, if not all, modular devices test well below the SAR threshold limit, a better approach would be for the Commission to publish guidance on generic host device configurations in which a modular device might be tested.

### **Conclusion**

Cisco applauds the Commission and its Office of Engineering and Technology for again exhibiting a forward-thinking, proactive approach to Part 15 regulation. By revising its rules to respond to rapidly changing technology advances and market conditions the Commission continues to foster the growth of the Part 15 high-tech industry. Cisco believes that the small changes it proposes here will serve to assist the Commission in its ongoing efforts to develop “industry friendly” regulations and the growth of this industry.

Respectfully submitted,

A handwritten signature in black ink that reads "SCOTT HARRIS". The signature is written in a cursive style with a prominent horizontal stroke at the beginning.

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