Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band	ET Docket No. 13-49

COMMENTS OF RUCKUS WIRELESS, INC.

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INTRODUCTION AND SUMMARY

Ruckus Wireless, Inc. ("Ruckus") hereby submits the following comments in response to the Federal Communications Commission's ("Commission") Notice of Proposed Rulemaking related to amending Part 15 of the rules governing the operation of the Unlicensed National Information Infrastructure ("U-NII") devices in the 5GHz band.[1]

As a global supplier of carrier-class U-NII products and technologies for mobile Internet infrastructure and enterprise wireless LAN ("WLAN") systems, Ruckus provides both advanced indoor and outdoor wireless systems for service provider and enterprise customers to support applications such as WLAN access, mobile data offload, public access, and WLAN services.

Ruckus agrees with the Commission that demand for wireless broadband service will continue to grow in the future.[2] Along with the increased demand, adoption of new technologies such as 802.11ac and more robust solutions for 3G/4G data offload will continue to increase pressure on the current utilization of the U-NII bands. The time is ripe for changes to the U-NII rules and Ruckus supports efforts the efforts of the Commission. More generally, Ruckus asks that the Commission consider the following as it continues its work:

- Harmonizing the rules across all the bands (U-NII-1, U-NII-2, U-NII-3, and the proposed U-NII-3 and U-NII-4) to reduce system complexity, facilitate the adoption of new technologies like 802.11ac that may utilize larger channels, and would provide a clear and consistent set of requirements for manufacturers to meet;
- Permitting higher transmit power and abolishing the restrictions that apply to indoor use only to reflect changed technology conditions and new market demands for increasingly sophisticated portable devices which require higher

[1] *See* Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band, ET Docket No. 13-49, Notice of Proposed Rulemaking, 28 FCC Rcd 1769 (2013) ("Notice").
[2] Notice at ¶ 15.

power for transmitting across greater distances and obviate the need for a distinction between indoor and outdoor devices;

- Minimizing any expansion to existing DFS requirements to facilitate the continued development and deployment of outdoor equipment; and
- Promulgating rules quickly that have the greatest impact rather than waiting to solve all issues simultaneously.

DISCUSSION

I. Unlicensed Operations in the U-NII-3 Bands

Ruckus supports the Commission's proposals related to the extension of the upper edge of the U-NII-3 band from 5.825 GHz to 5.85 GHz to match the amount of spectrum available for digitally modulated devices under Section 15.247.[3] Ruckus agrees with the Commission that the 25 megahertz addition to Section 15.407 will help bring uniformity to the operation in the 5.825 GHz to 5.85 GHz band and reduce the complexity and costs associated with multiple part certifications.[4] Ruckus also supports the Commission's proposal to consolidate all equipment authorizations for digitally modulated devices in the 5.725-5.85 GHz band under the U-NII rules.[5] Ruckus supports removing the 5.725-5.85 GHz band for digital modulation devices from Section 15.247 and agrees with the Commission that by doing so, all digitally modulated equipment can be operated under a similar set of technical rules.[6]

Ruckus supports removing the bandwidth dependent term from Section 15.407 so that the power limit will be 1 Watt.[7] Ruckus agrees with the Commission that removing the power limit would not increase the potential for interference due to the ability for certification currently available under 15.247 to 1 Watt.[8]

Ruckus further supports the Commission's proposal to modify Section 15.407 to require the power spectral density ("PSD") limit used in Section 15.247, so that digitally modulated devices designed to meet this limit will continue to comply with the new PSD

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[3] Notice at ¶ 27.
[4] *Id.*
[5] *Id.* at ¶ 28.
[6] *Id.*
[7] *Id.* at ¶ 30.
[8] *Id.*

requirement in Section 15.407 and agrees with the Commission that this will ease the transition of all digitally modulated devices in the 5.725-5.85 GHz band to authorization and compliance under Section 15.407.[9] Ruckus encourages the Commission's to increase the measurement bandwidth to 1 megahertz to promote consistency between rules and efficiencies during the testing process.[10]

II. Unlicensed Operations in the U-NII-3 Bands

Ruckus supports the Commission's proposal to modify the U-NII-1 band rules to be harmonized with the proposed U-NII-3 rules including increasing the power limits to 1 W; increasing the PSD limits to 17 dBm; limiting out-of-band emissions; and eliminating the restriction on outdoor operation.[11] Ruckus believes that harmonizing the rules for operation in the U-NII-1 and U-NII-3 bands, as well as the proposed U-NII-4 band[12], would provide a clear and consistent set of requirements for manufacturers to meet. Ruckus further believes that harmonizing the rules for all U-NII bands that can be approved by telecommunication certification bodies ("TCBs") can provide large benefits and efficiencies to consumers, manufactures, testing laboratories, and TCB's.

III. Ensuring Compliance with the Rules for the U-NII Bands

A. Security Features

Ruckus supports the Commission's new security rules proposed for Section 15.407 devices to require that manufacturers implement security features in any digitally modulated device capable of operating in the U-NII bands to prevent third parties from reprogramming the devices to operate outside the parameters for which the device was certified.[13] Ruckus believes that use of signed and trusted software can be used to effectively address security concerns, particularly in the case of outdoor equipment where there are greater potential risks with higher impact.

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[9] *Id.* at ¶ 31.
[10] *Id.*
[11] *Id.* at ¶ 40.
[12] *Id.* at ¶ 97.
[13] *See Id.* at ¶ 51.

In response to the Commission's concern that U-NII devices that are not certified under the Commission's rules as software defined radios ("SDRs")[14] might lack safeguards required for SDRs, Ruckus suggests reducing some of the Class II change restrictions currently enforced on SDRs. Specifically from KDB 442812, "Any Class II change (even for adding new antenna types) will prevent the grantee from making future Class III changes."[15] By allowing the addition of new antennas and antenna types via the Class II Permissive Change procedure, while still allowing a Class III Permissive change on an SDR, the Commission will encourage many of the devices of concern to be certified as SDRs, therefore allowing the Commission to have more insight into the measures used to secure these devices.

B. Geo-Location/Database

Ruckus agrees with parties to the extent that they state no additional limits or requirements are necessary for indoor systems with respect to geographic and frequency separations from TDWR.[16] Ruckus, however, does believe that any rules promulgated by the Commission requiring that geographic and frequency separations from TDWR and other Federal radars operating in the U-NII-2C band should be applied only for high power outdoor U-NII devices authorized for operation in that band.

The Commission states that one way to implement frequency and distance separation requirements is to require geo-location and database registration.[17] Ruckus believes that a geo-location/database approach could be effectively implemented for high power, outdoor U-NII devices operating in the U-NII-2C band. For outdoor devices operating in this band, the use of integrated geo-location technologies such as GPS should be encouraged. However, for low power/indoor U-NII equipment, a geo-location/database requirement should not be applied. To extent database registration is required to implement distance and frequency separation, Ruckus proposes that manufacturers be provided with an option to embed the database within operating equipment.

C. Out-of-Channel Emission Limits

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[14] *Id.*
[15] KDB 442812 D01 SDR Apps Guide v02r01 at 7.
[16] *See, e.g.,* Notice at ¶ 54.
[17] *Id.* at ¶ 55.

Ruckus agrees with the Commission's recognition that indoor devices are intended for short-range uses and pose less of a potential risk to TWDR operations than higher power outdoor devices.[18] However, due to the limited number of TDWR locations, Ruckus believes that requiring a -27dBm/MHz or -41dBm/MHz out-of-channel emission limit for outdoor devices may be overly restrictive.[19] Taking into account the types of wideband channels that are being developed with newer technologies, implementing an out-of-channel emission limit does not appear as if it would provide any long term interference mitigation. If out-of-channel emission limits are determined to be necessary for the protection of TDWRs, Ruckus believes these emission limits should be tied to a separation distance between the device and the TDWR along the lines of those contemplated by the Commission.[20]

D. Sensing

To the extent that the Commission requires a U-NII device move more than a set separation in frequency from the TDWR, then Ruckus agrees with the Commission's proposal to require an outdoor U-NII device to sense for radar in the channels adjacent to its occupied bandwidth.[21] Ruckus believes that this approach will move the unwanted emissions far enough away from the TDWR fundamental frequency to prevent harmful interference.

Ruckus believes that any rule for sensing radar signals as a percentage of occupied bandwidth should not be uniformly applied to indoor and outdoor U-NII devices. Instead, Ruckus believes that any rule for sensing radar at or exceeding 100% of occupied bandwidth should only apply to higher power outdoor devices operating in the U-NII-2A and U-NII-2C Bands.

E. DFS Functionality

Ruckus agrees with the Commission that DFS is an important element in allowing U-NII devices to share the U-NII-2A and U-NII-2C bands with government and

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[18] *Id.* at ¶ 61.

[19] *Id.* at ¶ 60, 61.

[20] *Id.* at ¶ 61.

[21] *Id.* at ¶ 62.

other radar systems.[22] Ruckus agrees with the Commission's proposal to require that manufacturers prevent the DFS mechanism from being disabled in devices certified to operate in the U-NII-2A and U-NII-2C bands and that U-NII devices certified to operate in these bands must be operated with the DFS function on.[23]

E. Uniform Channel Spreading

The current rules and measurement procedures require the DFS function provide a uniform spreading of loading over all available channels.[24] Ruckus agrees with the Commission that expected operation over wider bandwidths will cause U-NII energy to be spread throughout the frequency band in which the device is operating as well as other factors which reduce the need for uniform channel spreading as currently required. Ruckus recommends that the Commission permit the U-NII device to select a channel using its own algorithm.

The Commission's current measurement procedures require that system testing be performed with an MPEG test file that streams full motion video at 30 frames per second for channel loading.[25] Ruckus recommend that other channel loading tools, in addition to the current MPEG test file, be permitted as long as the channel loading tool meets the minimum required throughput for channel loading.

CONCLUSION

By issuing the Notice, the Commission has positioned itself to adapt the U-NII 5GHz to ever changing technological improvement and lay the foundation for the continued evolution of the wireless broadband infrastructure. A vibrant and responsive wireless broadband infrastructure will inspire innovation and spark new business investment.

Respectfully submitted,

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[22] *Id.* at ¶ 67.

[23] *Id.* at ¶ 68.

[24] *Id.* at ¶ 74.

[25] *Id.*

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