

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

In the Matter of	)	
	)	
Revision of Parts 2 and 15 of the	)	ET Docket No. 03-122
Commission’s Rules to Permit Unlicensed	)	RM-10371
National Information Infrastructure (U-NII)	)	
Devices in the 5 GHz band	)	

**Comments of Atheros Communications, Inc.**

**INTRODUCTION**

Atheros Communications, Inc. (“Atheros”) respectfully submits these comments in the above-captioned proceeding to address issues raised by the Commission in its Notice of Proposed Rulemaking (“Notice”).<sup>1</sup> Atheros strongly supports opening the 5.470-5.725 GHz band to provide an additional 255 MHz of spectrum for use by wideband digital technology and asks that the Commission act rapidly to open this new spectrum band to U-NII devices. As a leading provider of 5 GHz Wireless LAN technology,<sup>2</sup> Atheros encourages the Commission to

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<sup>1</sup> *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*, Notice of Proposed Rulemaking, 18 FCC Rcd 11581 (2003).

<sup>2</sup> Atheros is a leading developer of networking technologies for secure, high-performance wireless local area networks (WLANs) that operate in the 5 GHz U-NII bands. As the industry innovator and market-share leader in wireless OFDM technology compliant with the IEEE 802.11a, 802.11b & 802.11g specifications, Atheros is driving broadband wireless connections at 55 mb/s plus speeds to provide transparent connections among electronic devices in the office, home and on the road. Atheros’ technology is being used by leading wireless equipment manufacturers, including Accton, Actiontec, ALPS Electric, D-Link, Intermec, Netgear, Proxim, SMC Networks, Sony, TDK and UltraDevices.

ensure that new technical rules and a regulatory conformance regime for the existing 5.25-5.35 GHz U-NII band as well as the new 5.47-5.725 GHz band protects incumbent users without unduly burdening manufacturers, restricting end-users or otherwise hindering competition and innovation in the U-NII bands.

## **RADAR OPERATIONS WILL BE PROTECTED BY U-NII DEVICES**

As the Commission knows, one of the difficult issues successfully dealt with by industry and government during preparations for the ITU WRC-03 conference was agreement on a technical scheme to protect government radar systems that overlap the 5.25-5.35 GHz U-NII band and the proposed 5.470-5.725 GHz U-NII band. Atheros believes that radar detection and Dynamic Frequency Selection (DFS) will fully protect radars operating in these two bands.

The Commission correctly notes that radar detection can be implemented in central controlling devices, such as Wireless LAN access points, and that a DFS requirement is unnecessary for devices operating under the control of such devices. An integral part of the industry/Government pre-WRC-03 agreement is exclusion of “client” devices – such as laptops and personal digital assistants (“PDAs”) – from the radar detection and DFS functions. The framework for ensuring protection using radar detection and DFS is on a system-basis. A client device controlled by a controller (usually an access point) is not permitted to transmit on any channel until the controller initiates communication. This aspect was a point of explicit negotiation and agreement, and is an essential element. The agreement also is consistent with the final ITU Recommendation<sup>3</sup> and European regulations.<sup>4</sup>

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<sup>3</sup> ITU Recommendation M.1652.

<sup>4</sup> ETSI Conformance Test Standard EN 301 893 version 1.2.3 (2003-8).

It also is to be noted that Radar operations occur only in the 5.25-5.35 and 5.470-5.725 GHz bands, and hence the radar detection and DFS requirements are needed only for those two bands. Radar detection and DFS should *not* be required for devices operating in the other two existing U-NII bands at 5.15-5.25 and 5.725-5.825 GHz. Imposing such requirements by regulation where they are not needed could limit future unforeseen innovations and applications. The Commission's radar detection and DFS requirements should be limited to the two bands where they serve a purpose.

While most 5 GHz U-NII devices will operate only under control of an access point, *ad hoc* operations are supported under the 802.11 family of standards for devices to connect directly with each other. The number of devices involved in such configurations at a common location usually is fewer than 10 and operate in this mode only for a short period of time, such as during a business meeting. Such *ad hoc* operations measurably increase the utility of the devices, but would be impractical to implement if radar detection and DFS requirements were imposed on the devices used in laptop computers and personal digital assistants (PDAs) due to battery drain and other technical reasons.<sup>5</sup> Importantly, such requirements are not necessary to prevent interference if the e.i.r.p. of the devices is limited when operating in the *ad hoc* mode. Therefore we strongly suggest establishment of a reasonable power below the general maximum for these devices that would permit interconnection within a room but prevent interference. As a very preliminary matter, we believe operations at 100 mW – a full 10 dB down from the 1 watt maximum – would provide such protection.

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<sup>5</sup> Additionally, we note that currently devices authorized for operation in the 5.25-5.35 GHz U-NII band are permitted to operate in the *ad hoc* mode, so imposing requirements on client devices that would prevent such operations would reduce the utility and flexibility of the devices operating in this band.

## **CHANGES TO THE CURRENT 5.25-5.35 GHz BAND SHOULD BE LIMITED TO THOSE ABSOLUTELY NECESSARY**

Unlike the 5.470-5.725 GHz band being proposed for new use, the 5.25-5.35 GHz band already exists and is being used by equipment deployed in the marketplace and in the supply chain. Therefore any changes to current Part 15 rules for operation in the existing 5.25-5.35 GHz U-NII band should be considered carefully by the Commission separate and apart from its consideration of rules for 5.470-5.725 GHz because an existing market and user-base relies on the current regulatory framework.

We recognize that a requirement for radar detection and DFS for devices using the 5.25-5.35 GHz band is supported by prior work under the auspices of the NTIA and ITU. However, the same is not true with regard to a uniform spreading requirement, nor for Transmit Power Control (“TPC”). These aspects should be considered only for application to the new 5.470-5.725 GHz band.

As indicated in the relevant ITU Recommendation M.1652 and accepted in other regions, implementation of a TPC function for Wireless LAN and future technologies that will operate in the new U-NII band has not been defined on a device basis. The Commission therefore should not impose prescriptive functional or design requirements.

We also note that ITU Recommendation M.1652 resulted from extensive international study and agreement at WRC-03, and indicates that the general goal of achieving an average 3dB mitigation across a population of devices may not require *any device-specific regulatory requirement* or conformance test. In particular, the TPC mitigation measure was based upon a belief that a large percentage of terrestrial mobile devices would operate at or near the regulatory maximum level of 1 watt e.i.r.p. in 5.470-5.725 GHz band. However, it is clear that in practice

this is not the case in the United States or Europe. Regulatory conformance test methods and limits for peak power, power spectral density and spurious emissions, combined with battery powered mobile device limitations, result in U-NII band devices operating at e.i.r.p. levels of at least 3 dB, and often more, below the 1 watt e.i.r.p. limit. This situation will continue for the foreseeable future.

Since it is certain that most devices requiring FCC authorization for operation in the new U-NII band will operate at least 3dB below the regulatory maximum of 1 watt e.i.r.p.,<sup>6</sup> the Commission would not be justified in imposing a TPC requirement. Alternatively, since this can be monitored by the Commission through its equipment authorization process, a TPC requirement might be applied *only* to those devices that are intended to operate at a level within 3 dB of the maximum 1 watt e.i.r.p. limit.

**THE COMPETITIVE MARKETPLACE FOR U-NII PRODUCTS REQUIRES THAT TEST METHODS BE RAPIDLY APPROVED BY THE FCC AND EQUIPMENT AUTHORIZATIONS IMMEDIATELY PROVIDED BY TCBs**

As a practical matter, the wide availability of test laboratories capable of Part 15 conformance testing is crucial to providing U-NII devices implementing the latest technology to users on a competitive basis. Therefore we respectfully request that the Commission make it a top priority to finalize and deploy the new conformance testing and equipment authorization procedures to be applied to devices using the existing 5.25-5.35 GHz U-NII band and new 5.470-5.725 GHz U-NII band. Market forces and industry interoperability requirements will require

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<sup>6</sup> Prior sharing studies in the U.S. and internationally (as well as market experience) demonstrate that mobile terminals in notebook computers, PDA's etc. use inherently lower gain antennas and lower conducted output power, and these "client" devices outnumber the number of infrastructure devices such as WLAN access points. It is only the latter equipment type which may even be capable of utilizing e.i.r.p. levels approaching the 1 watt proposed regulatory maximum for the new U-NII band.

that virtually all WLAN devices be certified for conformance with the revised rules *shortly after FCC authorization becomes possible*.<sup>7</sup>

The transition periods for equipment using the 5.25-5.35 GHz band proposed by the Commission are sensible and necessary.<sup>8</sup> But for the reasons above, the Commission should expect a large demand for equipment authorization that will include the full array and volume of WLAN devices once the rules have been adopted. Having only a limited number of internationally available test laboratories recognized by the FCC to perform radar detection and DFS conformance tests would seriously inhibit the ongoing stream of WLAN products coming to market and harm competition among these products in the marketplace.

Any TCB exclusions related to the new rules would have an equally negative effect on the competitive supply of U-NII devices because the WLAN industry relies heavily on efficient, fast and widely available TCB authorization. Any *de facto* TCB exclusion arising *at the time that new radar detection and DFS rules first take effect* could cause serious delays to market and an unmanageable and rapid increase in the volume of Part 15 certification submissions at the Commission's laboratory.

Accordingly, it is highly desirable for the Commission, NTIA, and other interested wireless industry representatives to agree to a set of sufficient and readily reproducible radar

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<sup>7</sup> Prior experience has shown that competitive forces in the WLAN industry, customer demands for guarantees of future compatibility and/or upgradeability, and the industry-imposed requirement for vendor interoperability all lead to the early adoption of certain standards or rules as soon as they are finalized. There is every reason to believe these same forces will result in the WLAN industry moving quickly to demonstrate compliance and obtain authorization for radar detection in the existing 5.25-5.35 GHz U-NII band and use of the added U-NII band very shortly after new FCC rules are published. This results in the need for early availability of FCC-accredited test laboratories to perform radar detection testing located in the key regions of U.S., Canada, Asia & Europe as well as the need to avoid any new exclusions from TCB authority to test U-NII devices due to radar detection and DFS requirements.

<sup>8</sup> See Notice at para. 26; proposed rule 15.37(1).

detection and DFS test methods and procedures as quickly as possible – even if ongoing verification work will continue after a first Report and Order is adopted by the Commission – and for the Commission to publish the test methods and procedures as soon as possible thereafter. Furthermore, the FCC should work to ensure that TCBs are all given ample opportunity to demonstrate competence to review submissions that include radar detection and DFS test results as soon as possible.

### **DEFINITION OF PEAK TRANSMIT POWER SHOULD BE APPROPRIATE FOR MULTI-CARRIER TECHNOLOGIES SUCH AS OFDM**

The Commission proposes the following definition for Peak Transmit Power:

The maximum transmit power as measured over an interval of time of at most  $30/B$  (where  $B$  is the 26 dB emission bandwidth of the signal in hertz) or the transmission pulse duration of the device, whichever is less, under all conditions of modulation.

However, in public notice DA 02-2138<sup>9</sup>, the Commission recognized the need for measuring transmit power averaged over intervals longer than  $30/B$  for the case of multi-carrier signals such as OFDM (which is predominantly used in the U-NII bands).

The alternative suggested below reflects the test procedure set forth in DA 02-2138 and is more appropriate for ensuring consistent and valid results for a variety of technologies.

The maximum transmit power as measured over an interval of time of at most  $30/B$  (where  $B$  is the 26 dB emission bandwidth of the signal in hertz) or over the transmission pulse duration of the device, whichever is shorter, under all conditions of modulation.

Alternately, averaging power over successive pulses is acceptable and must include only time intervals during which the transmitter is operating at its maximum power level and must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level.

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<sup>9</sup> Public Notice DA 02-2138, Measurement procedure updated for peak transmit power in the U-NII bands, August 30, 2002.

## **CLARIFICATION OF THE PROPOSED DEFINITION OF CHANNEL MOVE TIME**

The Commission proposes the following definition for Channel Move Time:

After a radar's presence is detected, all transmissions shall cease on the operating channel within 10 seconds. Transmissions during this period will consist of normal traffic for typically less than 100 ms and a maximum of 200 ms after detection of the radar signal. In addition, intermittent management and control signals can be sent during the remaining time to facilitate vacating the operating channel. The aggregate time of the intermittent management and control signals are typically less than 20 ms.

This definition states both "required values" agreed internationally (i.e. a 10s Channel Move Time) and "typical values." The latter should not be construed as regulatory requirements, and therefore should be removed from the definition. Atheros suggests the below language to more clearly state the agreed requirement.

After a radar's presence is detected, all transmissions are required to cease on the operating channel within 10 seconds. Transmissions during this period may consist of data traffic for a short period followed by intermittent management and control signals sent to facilitate vacating the operating channel.

## **CONCLUSION**

Atheros urges the Commission to act promptly to open the 5.470-5.725 GHz band for use by U-NII devices in accordance with the above comments. Doing so will foster the competitive

marketplace for WLAN devices and benefit the public with the improved and new functionalities that will result.

Respectfully submitted,

ATHEROS COMMUNICATIONS, INC.

A handwritten signature in black ink that reads "Michael Green". The signature is written in a cursive, flowing style.

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