

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C**

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<i>In the Matter of</i>)	
)	
Revision of Parts 2 and 15 of the Commission's)	ET Docket No. 03-122
Rules to Permit Unlicensed National)	RM-10371
Information Infrastructure (U-NII) Devices in)	
The 5 GHz Band)	
_____)	

REPLY COMMENTS OF HEWLETT-PACKARD COMPANY

As a world leader in personal computing, information technology, access devices and imaging/printing, the Hewlett-Packard Company (“HP”) has a strong interest in advancing the availability and robustness of communications capabilities everywhere. As such, HP strongly supports the Federal Communications Commission’s (“FCC” or “Commission”) concerted efforts to increase the amount of spectrum available for unlicensed operations. There is no question that unlicensed technologies enable new and valuable forms of communication, and that the FCC has, through rounds of open communications with all interested parties, identified suitable spectrum and operating environments for the continued growth of wireless local area networks (“WLANs”) and other promising unlicensed technologies.

I. INTRODUCTION

As FCC Chairman Powell recently observed, the Commission has an important policy role to “increasingly become an advocate of trying new and advanced platforms to bring the

promise of broadband into reality.”¹ This conscious policy role articulated by the Chairman is both appropriate and benefits the public. HP supports the Commission’s efforts to ensure that there is adequate spectrum for all unlicensed technologies, including publicly beneficial WLAN offerings. Specifically through its “e-inclusion program” described below, as well as other initiatives, HP seeks to ensure that all consumers, regardless of income or location, realize the full benefits of innovative information technologies.

The long term success of unlicensed technologies largely hinges on whether there is appropriate government policy that understands both the technology’s potential and supports its deployment, without compromising critical licensed communications. The Commission’s *Notice*, as well as the Commission’s recent efforts at the World Radiocommunication Conference (“WRC”), are all steps in the right direction. As reflected in the initial comments in this proceeding, there is great enthusiasm that additional spectrum and adequate rules for unlicensed services will create new opportunities, enabling people everywhere to communicate more effectively.

II. HP IS A WORLD LEADER IN MOBILITY.

A. E-Inclusion helps to connect communities and to break down social and economic barriers.

As information technologies and the Internet are integrated into nearly every aspect of society, the disparities - both social and economic - between those who have access to these technologies and the opportunities and information it provides, and those who do not, will be exacerbated. To combat this effect, in the fall of 2000, HP launched a program called “e-

¹ *FCC Officials Tout Promise of Unlicensed Spectrum for Broadband*, COMMUNICATIONS DAILY, Sep. 9, 2003.

inclusion” to partner with others and work toward narrowing the divide.² HP’s e-inclusion programs focus on sustainability for the communities and HP.

One component of the e-inclusion initiative is the Digital Village program. HP’s Digital Village Program was designed to help three underserved communities fulfill their aspirations for participation in the digital age. The proven value of connecting some of the world’s most impoverished communities with the information economy demonstrates the benefits offered by the wide variety of applications for wireless broadband and other unlicensed spectrum. HP’s mission in this arena is to introduce new technologies to public sector organizations and development agencies and to work with them to ensure they are effectively deployed. This mission will be enhanced by the new opportunities for innovation offered by the proposed new spectrum use of the 5 GHz.

One of these Digital Village communities, the Tribal Digital Village, based in southern California, is focused on wireless access and cultural preservation using Internet-based services. This project illustrates how wireless technologies and e-inclusion can be designed and implemented to reach out to particular communities and to train populations with new skills. More than 7,600 Native Americans live in isolated and scattered rural communities stretching from the California-Mexico border to Riverside County, an area that encompasses several hundred square miles of sometimes rugged terrain. Beginning in March 2001, HP awarded a Digital Village Grant to the Southern California Tribal Chairmens Association (“SCTCA”) to create the TDV. One of the objectives was to connect the 18 separate tribal areas with a high

² E-inclusion encompasses all HP programs that provide technology access and services to the underserved.

speed wireless network using 802.11 technology, operating at 2.4 GHz, to connect to each other and to the Internet.

This project built upon already existing infrastructure deployed as part of the High-Performance Wireless Research and Education Initiative at the University of California at San Diego, funded by the National Science Foundation. Over the course of 2002, the TDV Infrastructure Team expanded the initial number of connected Reservations from 3 to 10. There are now 50 Tribal municipalities connected on 13 of the 18 Reservations. There are approximately 200 miles of point-to-point and point-to-multi-point links, all operating in the unlicensed 2.4 GHz band. This application allowed for the Community Resource Centers on the Reservations to gain Internet connectivity and network together. In addition to supplying some of the wireless access point equipment, HP funding and HP Engineers assisted a team of Tribal Community Members to set up and configure a Backbone Node Tower on the San Pasqual Indian Reservation.

This “last-mile” application of Wi-Fi technologies has allowed for digital preservation and sharing of cultural artifacts, distance learning, and web-based health and community services. The funding also enabled the Tribal Community Youth to be trained in the use of topographic software and GPS mapping to identify initially potential sites for solar-powered, high-speed wireless network nodes.

B. *HP is also a pioneer in developing and deploying commercial wireless LAN applications.*

Wireless broadband technology also has obvious applications in the commercial market. Many retail establishments now offer “hot spots,” whereby patrons can easily access the Internet through a wireless connection or access point. HP solutions enable connectivity in such varied

settings as shopping and hotel complexes, airline operations, hospitals and even entire cities. For example, HP provides the infrastructure whereby customers in approximately 2,300-plus Starbucks stores (2,800 by the end of 2003), use wireless cards to check e-mail and search the Internet. In addition, many companies have invested in WLANs and that trend is expected to continue.³ The Commission's efforts both at the WRC and in this proceeding are both timely and highly significant for the continued development of wireless broadband.

The allocation of an additional 255 MHz of spectrum for unlicensed devices would significantly increase the opportunities for additional commercial applications. The current 5 GHz spectrum currently designated for unlicensed use is 5.15-5.25, 5.25-5.35 and 5.725-5.825 GHz. This spectrum is non-continuous and operation in each sub-band is subject to different permissible power levels. Adding the 5.470-5.725 GHz band would bring in a level of continuity, ease physical layer design and accelerate adoption of new technologies. Nowhere is this more apparent than in the public wireless LAN ("PWLAN") market.

PWLANS are a cost effective way of connecting mobile users back to their businesses or homes. Unfortunately, the growth of PWLANS is hindered by the limited amount of available spectrum in the ISM band. The less-crowded 5 GHz U-NII thus has greater potential for the development of PWLANS. For example, the addition of another 255 MHz of spectrum would provide more continuous spectrum for 802.11(a) and accelerate adoption of unlicensed technologies, such as software-defined radio, and keep the physical layer cost lower. In addition, many large PWLAN venues, such as airports, also have an operational traffic component.

³See Kenneth R. Carter, Ahmed Lahjouji and Neil McNeil, *OSP Working Paper Series, No. 39, Unlicensed and Unshackled: A Joint OSP-OET White Paper on Unlicensed Devices and Their Regulatory Issues* (rel. May 21, 2003).

Having a higher bandwidth in the U-NII would improve operational traffic application response time, enhancing the economic efficiencies gained from this technology.

III. HP SUPPORTS THE PROPOSED TECHNICAL REGULATIONS WITH MINOR MODIFICATIONS.

The spectrum allocated for 5 GHz WLAN devices allows for 13 overlapping channels and therefore a higher density of users can be connected in contrast to the existing limited allocation of 2.4 GHz, which only allows for 3 non-overlapping channels. Additional frequency availability would allow for significant economy of scale benefits to end users. Thus, it is not surprising that the overwhelming majority of commenters, including the Wi-Fi Alliance, Advanced Micro Devices, Inc., the Cellular and Telecommunications and Internet Association, Nokia, Inc. and others agreed that “making additional spectrum available on an unlicensed basis is essential for continued innovation in a wide variety of products and applications that are important to consumers and businesses alike.”⁴

HP agrees with these comments that making 255 MHz of spectrum potentially accessible by unlicensed users is a highly significant and positive step. Several comments on the *Notice* contain a few positive, practical proposals for ensuring co-existence that the Commission should consider. By and large, these relatively minor modifications would lessen the cost of designing compliant equipment, while still providing the necessary interference protection to existing in-band users.

HP and other interested industry members worked closely with the NTIA, DoD and the Commission to develop practical means to allow spectrum efficient unlicensed operations at 5

⁴ Comments of the Telecommunications Industry Association at 2.

GHz. This resulted in the Commission's *Notice*, which proposed the use of Transmit Power Control ("TPC") and Dynamic Frequency Selection ("DFS") to address the interference potential of unlicensed operation at 5.470-5.725 GHz to existing users. HP was an early advocate of, and continues to support, the proposed phase-in of TPC/DFS capable unlicensed devices on an aggressive schedule tied to the adoption of unlicensed rules in the 5 GHz band.⁵

Several commenters addressed how DFS and TPC measures should be applied. Microsoft's comments, for example, urged adoption of a testing procedure for establishing compliance with DFS and TPC. Furthermore, because DFS and TPC already are required by the European HiperLAN standard, Microsoft suggested that the FCC encourage development of a uniform, internationally accepted test procedure that would protect other users without placing "undue burdens" on manufacturers.⁶ As a global manufacturer and supplier of wireless equipment, HP agrees with the Microsoft proposal because it promotes global harmonization of WLAN technology. Indeed, non-uniform test procedures and many variations of testing would

⁵ Specifically, the *Notice* proposed that the DFS requirement for the 5.250-5.350 GHz band become effective for U-NII equipment that is certified after one year from the date of publication of the Report and Order in this proceeding in the Federal Register. The Commission also proposed to require that all U-NII devices operating in the 5.250-5.350 GHz band that are imported or shipped in interstate commerce on or after two years from the date of publication in the Federal Register comply with these standards. In addition, the Commission proposed to require that U-NII equipment operating in the new spectrum at 5.470-5.725 GHz meet all the technical requirements, including DFS and TPC, on the effective date of these rules. 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, *Notice of Proposed Rulemaking*, FCC 03-110, ET Docket No. 03-122, RM 10371, at ¶26 (rel. June 4, 2003) ("*Notice*").

⁶ Comments of Microsoft Corporation at 8-9. See also Comments of Motorola, Inc. at 7 ("These detailed conformance test procedures developed in Europe have been supplied to the informal DFS working group with the hope that it will speed the test plan development process and lead to common testing requirements in the U.S.").

be a very costly burden for both equipment manufacturers and wireless LAN technology suppliers to bear.

The Wi-Fi Alliance (“the Alliance”) comments observed that because mesh network operations at 5 GHz are still being defined, further study of radar detection and DFS implementation by such networks will be needed once this technology is better understood. As ad hoc operations already are used in the existing sub-band of 5250-5350 MHz for unlicensed spectrum, the Alliance stated that it would be “highly desirable” for such operations to continue without DFS requirements in that sub-band.⁷ HP agrees with this suggestion.

Finally, HP agrees with the comments of Intel and the Wi-Fi Alliance⁸ that TPC should not be required for devices that transmit at a power level that is 3 dB less than the maximum power permitted and that the Commission should not specify a threshold triggering mechanism for requiring use of TPC. That issue should be left to vendors to innovate new methods and technologies to yield optimal results.

IV. CONCLUSION

The Commission is to be commended for its efforts in identifying spectrum that can be used by many parties, including government radar systems, amateur radio operators, and unlicensed users, in ways that make efficient spectrum utilization a model for other bands and

⁷ Comments of the Wi-Fi Alliance at 9.

⁸ See Comments of Intel at 3; Comments of the Wi-Fi Alliance at 10-12.

services. The Commission should implement its tentative proposals consistent with the results of the recent WRC and consistent with the relatively minor modifications to interference avoidance and testing procedures that several parties proposed in their initial comments on the *Notice*.

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CERTIFICATE OF SERVICE

I, Cynthia S. Shaw, a legal secretary at Drinker Biddle & Reath LLP do hereby certify that on this 23rd day of September, 2003, a copy of the foregoing “**REPLY COMMENTS OF HEWLETT-PACKARD COMPANY**” was served via first-class mail, postage prepaid, to each of the following:

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