DOCKET FILE COPY ORIGINAL

Law Offices of
John D. Pellegrin, P.C.
9306 Old Keene Mill Road
Burke, Virginia 22015

*(703)*455-6101
fax: *(703)*455-6106

e-mail: jdpc@erols.com
www.pellegrin-law.com

Washington, DC

January *27*, 2003

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
c/o Vistronix, Inc.
236 Massachusetts Avenue, N.E.
Suite 110
Washington, DC 20002

By Courier

Re: ET Docket No. 02-135
Comments of ScoreBoard, Inc.

Dear Ms. Dortch:

On behalf of our client, ScoreBoard, Inc., transmitted herewith are its Comments in response to the Commission's above-referenced docket proceeding and request for Public Comment on its Spectrum Policy Task Force Report.

ScoreBoard, Inc.'s Comments focus on the wireless environment, particularly the 2.4 GHz band and 802.11 issues, including the issue of the "commons" approach to wireless spectrum use as set out by the Commission.

Should you have any questions concerning these Comments, please communicate directly with undersigned counsel.

Very truly yours,

John D. Pellegrin
Counsel for ScoreBoard, Inc.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

in the Matter of	)	
	)	
Commission Seeks	)	
Public Comment on	)	ET Docket No. 02-135
Spectrum Policy Task Force	)	
Report	)	
	)	

Comments **of ScoreBoard,** Inc.

ScoreBoard, Incorporated ("ScoreBoard") submits these Comments in response to the Commissions Public Notice[1] in the above referenced proceeding

Introduction

ScoreBoard's interest in this proceeding steins from its long history and considerable experience in optimising wireless networks. ScoreBoard's portfolio of software tools and engineering expertise is in use by the largest US wireless operators to help isolate, identify and resolve coverage, capacity and service quality issues within the licensed cellular and PCS bands. ScoreBoard recognizes that the challenges and risks in the unlicensed bands will place new demands on

[1] Public Notice, FCC 02-322 (rel November 25, 2002); Public Notice, **DA** 02-3400 (rel. December 11, 2002).

the user community to coordinate and manage the interference issues that will undoubtedly arise. Interference ultimately drives coverage, capacity, and service quality within a wireless network, and interference will grow proportionally with the increased usage of this finite spectrum resource. ScoreBoard's expertise lies particularly in the area of minimizing interference and optimising performance, while utilizing limited spectrum and network infrastructure.

ScoreBoard applauds the FCC's decision to create the SPTF and the process created by the Commission submitting the initial output of the SPTF to public and spectrum user comment. These Comments focus on the material presented in the SPTF Report and in the *Report of the Unlicensed Devices and Experimental Licenses Working Group*[2] (UEWG). Specifically, ScoreBoard presents comments on the existing spectrum for unlicensed devices and the recommendations by the SPTF concerning spectrum rights models, in particular the "Commons" model. ScoreBoard provides here details on spectrum use by certain unlicensed users and how such users, in certain frequency bands, should be provided with sufficient protection that enables them to ensure continued quality telecommunication service to the public.

[2] *Report of the Unlicensed Devices and Experimental Licenses Working Group* (UEWG) to the SPTF (rel. 15 November 2002).

ScoreBoard outlines efforts by the Commission that are necessary for certain users in existing unlicensed spectrum. There is a problem with interference in the 3.4 GHz band, caused by too many unlicensed devices operating within small geographical areas. The impact to the users of these devices is a loss or degradation of service.

Summary

ScoreBoard presents and recommends a registration solution/regulatory approach lor certain devices that will increase awareness and enable simple mitigation techniques to ensure continued service availability and quality.

ScoreBoard docs not recommend the removal of the unlicensed aspect of existing spectrum...indeed, the recent successful use of these bands by devices -- in particular those providing much needed wireless Jnternet access -- is a clear example of the foresight of the Commission in providing unlicensed spectrum. However, unless enforced, there exist the potential for significant abuse.

Discussion

The phrase 'growing by leaps and bounds' does little to accurately present the rapid rollout of Wireless Local Area Networks (WLANs) (particularly Wi-Fi 802.11b) technology in the United States. Indeed, as shown in the Working

Group Report[3], WLAN proliferation continues at an almost unprecedented rate. This is supported by daily news reports on the use and deployment of Wi-Fi networks across the United States. The attached map shows a recent analysis of New York City, illustrating the extensive proliferation of 802.11b nodes.

ScoreBoard believes this continuous rollout in unlicensed spectrum (in particular the multi-allocated 2.4 GHz frequency band'[4]), requires new regulatory scrutiny in order to completely fulfil the promise of responsible unlicensed use. Individuals and businesses making investments in this unlicensed technology for a multitude of worthwhile and even critical applications need to have reasonable certainty their investment and use will not be unreasonably disturbed by the very real potential chaos of unstructured proliferation. ScoreBoard therefore focuses on the Report of the UEWG, sections of the SPTF Report, and the regulatory scrutiny that devices operating tinder Part 15 of the Coinmission's Rules currently require.

---

[3] *Report of the Unlicensed Devices and Experimental Licenses Working Group* (UEWG) to the SPTF (rel. 15 November 2002).

[4] See *US Table of Frequency Allocations*

As required in Scctioii 15.5 of the Rules, unlicensed devices cannot cause interference and are not protected from any interference in regards to licensed operations. Section 15.5 provides:

> (a) Persons operating intentional or unintentional radiators shall not be decined to have any vested or recognizable right to continued use of any given frequency by virtue of prior registration or certification of equipinent.
>
> (b) Operation of an intentional, unintentional, or incidental radiator is subject to the conditions that no harmful interference is caused and that interference must be accepted that may be caused by the operation of an authorized radio station, by another intentional or unintentional radiator, by industrial, scientific and medical (ISM) equipment, or by an incidental radiator.
>
> (c) The operator of a radio frequency device shall **be** required to cease operating the dccice upon notification by a Commission representative that the device is causing harmful interference. Operation shall not resume until the condition causing the harmful interference has been corrected.

As in the UEWG Report. the term "unlicensed devices" refers to intentional radiators. as defined by Part 15'.

Recommendations lor Existing Unlicensed Spectrum in the 2.4 GHz Band

The fastest growing use of unlicensed devices is for WLANs in the 2.4 GHz band. The majority of these unlicensed WLAN devices comply with the Institute

[5] *Intentional radiators* - these are devices that intentionally generate and emit RF energy by radiation or induction. Typical intentional radiators include cordless telephones, remote control toys, garage door openers, and other low power transmitters.

of Electrical and Electronics Engineers (IEEE) 802.11[6]b standard and protocol. 802.11b is also commonly known as Wi-Fi[7], and is an over-the-air recognized and approved industry standard used to wirelessly connect a user to a base station (or access point), allowing users high-speed connectivity[X]. 802.11b has been widely accepted as the preferred technical standard for wireless high-speed access. In the future, the developing 802.11g standard promises even faster connectivity in the same currently limited 3.4 GHz band. Systems and equipment complying with the 802.11b standard are under rapid deployment by Wireless Internet Service Providers (WISPs), small office and home office users, corporate enterprises, large public venues (e.g. malls, stadiums, hotels), as well as industrial and mission critical applications such as hospital, school campus, and warehousing networks.

Unlicensed 802.11b devices operate in 83.5 MI-Iz of radio spectrum from 2400 - 2483.5 MHz. This radio spectrum is shared with Industrial, Scientific, and Medical (ISM)" equipment such as microwave ovens and security systems, and

[6] The 802.11 Working Group of the IEEE is charged with developing technical standards for wireless local area network (WLAN) devices.

[7] Wi-Fi is short for Wireless Fidelity. The Wi-Fi certification is awarded by the Wireless Ethernet Compatibility Alliance (WECA), an industry group dedicated to promoting interoperation among 802.11b products.

[8] Up to 11 Mbps.

[9] 47 CFR Part 18.

under Part 15 with baby monitors, garage door openers, cordless telephones, and more recently "Bluctooth" devices used for wireless personal area networks (WPANs). This particular spectrum is also shared with higher power users such as amateur radio and **FAA** radio navigation aids. Amateur radio operators are allowed, tinder Part 97 of the Rules, to even operate spread spectrum networks up to a maximum power of 100 watts[10]! Because of this congested interference environment, 802.11b devices utilize spread spectrum technology. While this gives these devices some protection from interference, it is not enough by itself. For instance, within the 802.11b Direct Sequence Spread Spectrum (DSSS) channelization scheme, only 3 non-overlapping channels can be utilized in deploying a network. And with the collision avoidance scheme built into the 802.11 physical layer, if excessive energy in the channel is detected a station will defer or avoid transmitting, thus lowering throughput and performance.

ScoreBoard agrees with the assessment of the UEWG that the existing unlicensed bands will become subject to a 'tragedy of the commons'" caused by interference and overcrowding, unless the FCC takes responsible, pro-active

[10] 47 CFR Part 97.311

[11] *Report of the Unlicensed Devices and Experimental Licenses Working Group* (UEWG) to the SPTF (rel. 15 November 2002) at ¶23.

regulatory steps. ScoreBoard proposes that such a potential and very likely tragedy in and to existing and responsible unlicensed spectrum (2.4 GHz) use can be overcome by the use of simple mitigation techniques. While such techniques may increase the 'regulatory burden' on actual unlicensed operations, they can still be handled by the private sector. The resulting and substantial benefit -- in the form of a reduced interference environment -- is particularly beneficial to all Wi-Fi users and is the only meaningful and responsible regulatory scheme that should be seriously considered – and adopted. Another mitigation technique, such as band segmentation, may be employed in regard to the licensed amateur service[12].

Within this 2.4 GHz band, the potential for abuse is significant. Such abuse has serious ramifications to users already operating in compliance with the Rules. Users making unwarranted modifications to manufactured equipment, such as using directional antennas, high power amplifiers, etc. add significantly to the interference potential. (The Commission is familiar with this problem in other services and has taken remedial action when necessary. No less is appropriate in this contest.)

[12] The convergence of devices operating under Part 15 and Part 97 require further Commission scrutiny. Within the 2.4 GHz band, techniques and technologies require sharing and/or co-existence studies leading to prompt, comprehensive, and effective regulatory action.

ScoreBoard proposes that certain changes to 2.4 GHz unlicensed spectrum use will make more efficient use of the existing spectrum for all Wi-Fi devices and users. In these limited and specific Comments, ScoreBoard will not address how the majority of ISM and other unlicensed devices are deployed. However, a specific guideline for the interaction of 802.11 devices within the 2.4 GHz band, given the current rapid and uncontrolled deployment, is absolutely necessary.

Currently, unlicensed devices in the 2.4 GHz band have no interference protection rights, in keeping with the Rules associated with Part 15[13] devices. The Commission should now consider refinement of this protection right, in view of the sub-category of tinlicenscd devices used for WLAN access in the market today. As 2.4 GHz WLAN usage in the United States continues to increase and WLAN networks are deployed in greater numbers, interference and quality of scrvicc become major issues for all users – existing and new. Businesses, schools, hospitals, local governments and communities are making investments in infrastructure utilizing unlicensed spectrum for a variety of reasons, including cost containment. They and all existing and potential users need simple regulatory and technical tools to manage the increased risks associated with operating in unlicensed radio spectrum bands, particularly the 2.4 GHz band. Otherwise,

[13] 47 CFR Part 15.5.

congestion and harmful interference will result from increased usage and proliferation of Wi-Fi devices unless a simple regulatory environment/protocol is established to enable the continued deployment in this unlicensed spectrum. Such new regulations are a natural evolution of current unlicensed regulations. The coordinated effort of interference mitigation, and protection of quality of service cannot effectively be accomplished in the private (vs. government frequency/use) sector in just a voluntary environment. It will work expertly and efficiently if there is a requirement enforced by the Commission

Proposed Rule/Policy Changes

An extension of the existing Part 15 requirements for Wi-Fi 802.11b devices operating at 2.4 GHz should be adopted. This extension is a simplified coordination requirement for Wi-Fi base stations, supported by a location-specific registration process. By virtue of location registration, 802.11b Wi-Fi base stations are given a level of interference protection from other Wi-Fi base stations. Under this regulatory change, registration equals minimally necessary protection. Such required registration is necessary so the appropriate level of use may be protected[11]. Increased deployment of Wi-Fi networks in existing spectrum

[11] This may require establishment of a maximum protected contour level with desired-to-undesired ratio specification or specific rules requiring each registration's intended usage specifications be detailed.

requires this type of control to ensure meeting the quality of service requirements of users and optimisation of the deployment of Wi-Fi networks so these networks can provide reliable and consistent service.

The registration process for Wi-Fi base stations should be simple but mandatory. Unregistered base stations would not be allowed to operate unfettered, while registered base stations would have the right to optimised coexistence with other base stations. Such protection rights may be the result of arbitration and settlement among registered users for a geographical location, as is inherent in the frequency coordination and protection process required by the Commission in licensed point to point as well as geographically specific wireless bands.

A publicly accessible database of registered users will make 802.11b neighbors aware of each other and will facilitate cooperation and interference mitigation. Simple steps can be taken to allow these networks to coexist provided the first step of awareness is **required registration.** A few simple mitigation techniques include FCC-required frequency coordination, power adjustments, antenna selection, and footprint control.

ScoreBoard recognizes this is a departure from the current unlicensed use of the 2.4 GHz band by Wi-Fi devices. However, this simplified coordination process is necessary to maintain the viability of Wi-Fi access and represents a

reasoned, beneficial modification to the "commons"[15] model proposed for assigning spectrum usage rights by the SPTF.

SPTF Recommendation 23

23 Expand the use of both the exclusive rights and commons models, and move away from the command-and-control model, with limited exceptions.

ScoreBoard agrees with policy recommendation 23 of the SPTF Report, and supports expansion of the "commons" model for additional unlicensed spectrum usage. However, a level of interference protection should be available to users in considering the commons model. In particular, unlicensed spectrum can be considered for the virtually ubiquitous deployment of technically similar devices. Such devices, however, may require a minimal level of interference protection, even in "common" spectrum

Band Manager/Frequency Coordinator Proposal Should Be Adopted

SPTF Recommendation 32

32. Consider methods for additional spectrum access for unlicensed devices, which include:
a. Access to new band controlled by a new type of band manager or frequency coordinator.
b. Opportunistic or dynamic use of existing bands – through either cognitive radio techniques to find "white space" in existing bands or use protocols to get out of the way of primary users.
c. Underlay beneath primary users:

[15] Report. Spectrum Policy Task Force at Section VII, ¶1 and 15 (rel. November 2002); ET Docket No. 02-135

i. *Unlicensed devices operate below acceptable interference level (that is, operate on a non-interference basis with licensees); and/or*

ii. *Unlicensed devices can operate at higher powers if negotiate with licensee – negotiations can either take place directly or through private band manager.*

Recommendation 32a proposes the use of a new type of band manger or frequency coordinator when considering additional spectrum for access by tinlicensed devices. As stated by the SPTF Report, the Task Force found that in large area wireless systems, it has been difficult to control mutual interference without entry and technical regulation"[16]. The SPTF goes on to say, "*For new unlicensed bands, access should be controlled by a new type of band manager or frequency coordinator selected by the FCC*". ScoreBoard fully supports this recommendation. This concept is not new to the Commission nor would it be to radio spectrum licensees/users. The FCC has successfully required this in other services, fulfilling its statutory and enabling mandate to regulate radio spectrum usage and interference avoidance/minimization. ScoreBoard also recommends this type of band manager or frequency coordinator concept be used for all existing and future unlicensed spectrum. Such a band manager could effectively manage a registration process for Wi-Fi base stations.

[16] Report, Spectrum Policy Task Force at Section VIII, ¶3 (rel. November *2002);* ET Docket No. 02-135

SPTF Recommendation 35

35. Wireless ISPs (WISPs) and point-to-point microwave systems:
a. Facilitate greater flexibility by making it easier for operators to better tailor their equipment for particular application.
b. Increase power limits for WISPs (and point-to-point systems) in rural areas.

Recommendation 35 advocates the use of greater equipment flexibility and increased power limits for the WISPs and point-to-point microwave systems. This is a reasonable approach. However, some form of protection criteria must also be considered. For example, with intended usage and technical parameter registration, coordination of the footprint can be accoinplished and then protected. Further refinement of this SPTF recommendation is necessary.

Conclusion

The continuing efforts by the Commission to address and reform U.S. spectrum policy as and where necdediappropriate, and keep apace with technological developments/improvements, must focus on efficient, best use of spectrum. The Commission's statutory mandate and time-tested regulatory policies require no less. A major component is interference protection, even when applied to a "commons" approach to spectrum use. ScoreBoard proposes integrated solutions that allow a level of protection while maintaining the necessary unlicensed nature of certain radio bands. This will ultimately result in the peaceful and cooperative co-existence of more and varied devices within the

unlicensed hands, rather than less use and less reliable quality of service that is in no one's interest

Respectfully submitted this 27th day of January, 2003

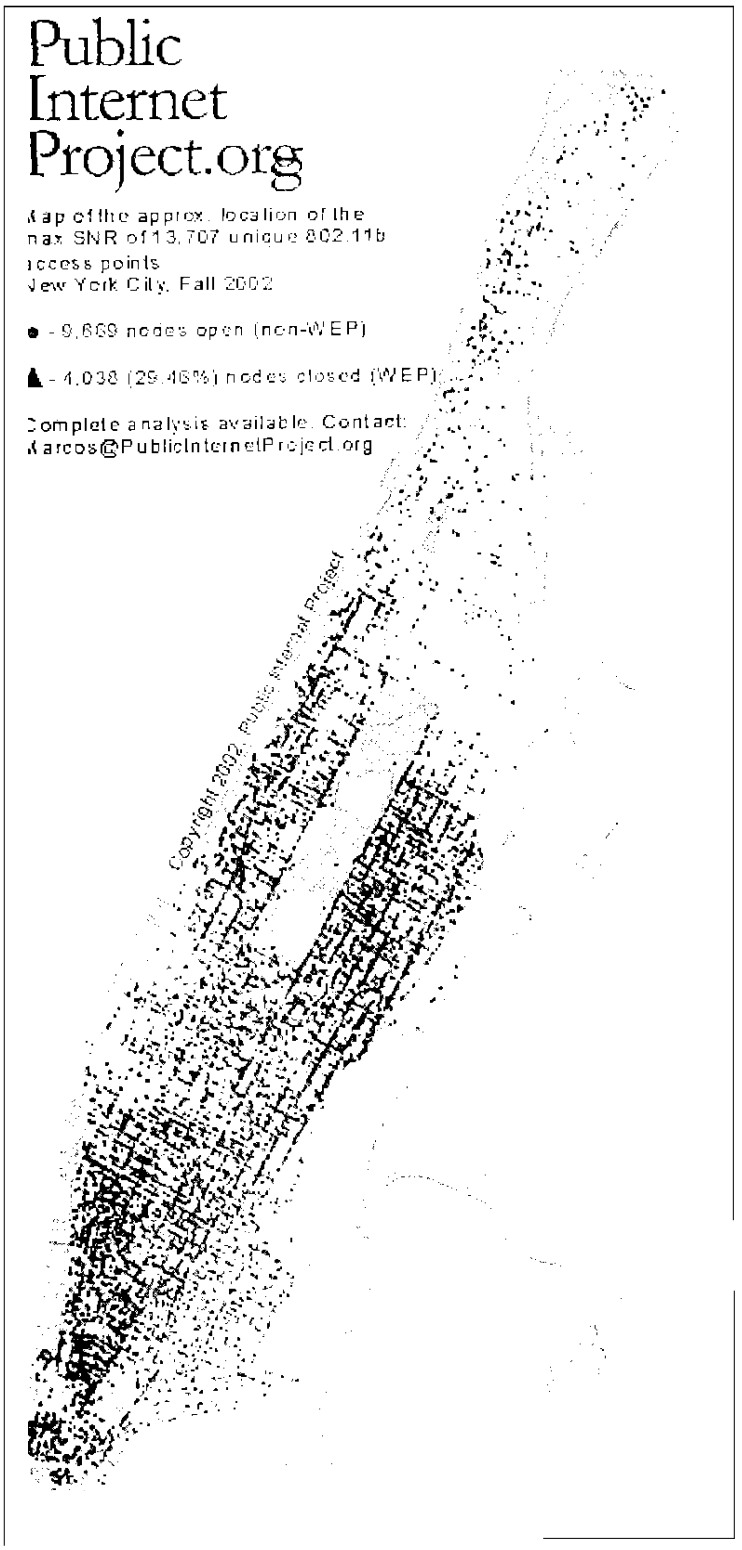
John D. Pellegrin
Law Offices of John D. Pellegrin, P.C.
9306 Old Keene Mill Road
Burlte, Virginia 22015
703.455.6101
fax: 703.455.6106
jdpc@erols.com

Michael K. Morin
Chairman
ScoreBoard, Inc.
13595 Dulles Technology Dr.
Suite 200
Herndon, **VA** 20171-3424
703.713.9755
703.713.9766 (fax)
mike_morin@scoreboardinc.com
www.scoreboardinc.com

James B. Killeather
Vice President, Software Development
ScoreBoard. Inc.
13595 Dulles Technology Dr.
Suite 200
Herndon, Virginia 20171-3424
703.713.9250

James E. Byrd, Jr.
Technical Consultant
Strategic Systems Analysis & Research
11922 Redtree Way
Reston, **VA** 20194
703.471.2066
jarnes_byrd@usa.net

ATTACHMENT -- 802.11b "Hotspots" in New York City (from www.publicinternetproject.org)



This map shows thousands of Access Points (AP's) clustered in close proximity to each other in Manhattan. This illustrates the potential for interference, and the benefits of knowing other user(s) who may be in proximity to the particular APs in question.

Certificate of Service

I, John D. Pellegrin, hereby certify that on this 27th day of January 2003, I caused to be filed and served electronically and by first-class mail (postage prepaid). copies of the foregoing ScoreBoard, Inc. Comments in response to *Commission Seeks Public Comment on Spectrum Policy Task Force Report* (E-I' Docket No. 02-135):

Qualex International
Portals II
445 12th Street, S.W.
Room CY-B402
Washington, DC 20554

Peter Tenhula
Senior Spectrum Policy Advisor
Office of Engineering and Technology
445 12th Street, S.W.
Room 2-C343
Washington, DC 20554

Ed Thomas
Chief
Office of Engineering and Technology
445 12th Street, S.W.
Room 7-C144
Washington, DC 20554

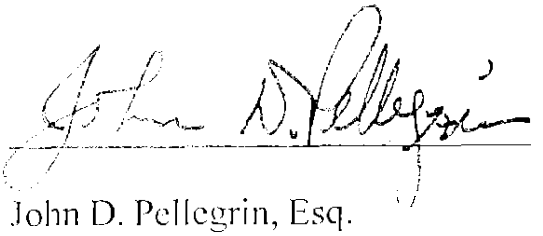
Michael J. Marcus
Associate Chief (Technology)
Office of Engineering and Technology
445 12th Street, S.W.
Washington, DC 20554

Lauren M. Van Wazer'

Special Counsel
Office of Engineering and Technology
445 12th Street, S.W
Room 7-C257
Washington, DC 20554

Marlene H. Dortch,
Secretary
Office of the Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, DC 20554

Courier Delivered
Marlene H. Dortch, Secretary
Federal Communications Commission
Office of the Secretary
c/o Vistronix, Inc.
236 Massachusetts Avenue, N.E.
Suite 110
Washington, DC 20002



John D. Pellegrin, Esq.