ORIGINAL

ORIGINAL

LAW OFFICES
GOLDBERG, GODLES, WIENER & WRIGHT
1229 NINETEENTH STREET, N.W.
WASHINGTON, D.C. 20036

HENRY GOLDBERG
JOSEPH A. GODLES
JONATHAN WIENER
W. KENNETH FERREE
SHERYL J. LINCOLN
HENRIETTA WRIGHT
THOMAS G. GHERARDI, P.C.
MARY J. DENT
COUNSEL

(202) 429-4900
TELECOPIER:
(202) 429-4912

e-mail:
general@g2w2.com

EX PARTE OR LATE FILED

RECEIVED
FEB 23 2000
FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

February 23, 2000

HAND DELIVERED

Mr. Dale N. Hatfield
Chief, Office of Engineering and Technology
Federal Communications Commission
The Portals, 445 12th Street, S.W.
7th Floor
Washington, D.C. 20554

Re: Amendment of Part 15 of the Commission's Rules Regarding Spread Spectrum Devices, ET Docket No. 99-231, *Ex Parte* Response of Proxim, Inc. to the Wireless Ethernet Compatibility Alliance's January 18 Submission

Dear Mr. Hatfield:

On January 18, 2000, the Wireless Ethernet Compatibility Alliance ("WECA") filed a 79-page document, including a 68-page technical statement, in response to the reply comments filed in this proceeding by the Committee for Unlicensed Broadband Enablement. WECA's filing supplemented the many filings that already had been submitted by WECA and its members in this proceeding.[1]

THE NEED FOR A RESPONSE.

The Commission provided a generous 75-day period for initial Comments in this proceeding. During the comment phase, more than two thirds of the over 100 respondents supported the Commission's initiative. The relatively small number of companies who opposed the Commission's proposal, however, argued that WBFH proponents would be unable to meet their performance objectives and they introduced complex hypotheses and analyses predicting that wideband frequency hopping

[1] Intersil alone has submitted at least six filings in this proceeding. Other WECA members - including Lucent Technologies - have submitted documents and studies in addition to comments and reply comments.

No. of Copies rec'd 0+5
List A B C D E

("WBFH") devices would cause interference to existing types of wireless local area networks ("WLANs") operating in the 2.4 GHz band.

In light of the opponents' technical submissions, several key supporters of the Commission's WBFH proposal filed a technical response during the reply comments period. This response, filed by the Committee for Unlicensed Broadband Enablement ("CUBE"), refuted the opponents' interference hypotheses, where invalid, with detailed engineering measurements of actual systems. Notably, however, it did not take a hard line. In fact on the issue of minimum hopping rates, CUBE's members recognized and conceded that for the specific type of direct sequence ("DS") WLAN products espoused by many of the opponents, increasing the minimum hopping rate for WBFH devices could be detrimental to maximizing the throughput performance of existing DS products. As a result, CUBE urged the Commission to adopt a compromise that satisfies both sides by leaving the minimum hopping rate unchanged from the existing rules governing frequency hopping ("FH") spread spectrum devices.[2]

On January 18, however, a group of manufacturers who collectively are committed to promoting a competitive technology to WBFH made a lengthy *ex parte* filing. In this document, WECA offered a "point/counterpoint" response to CUBE's reply comments. In addition, several other WBFH opponents - including Intersil and Lucent, which also participated in the WECA filing, and Silicon Wave - also have filed supplemental ex parte comments.[3]

While much of the material for WECA's January filing was drawn from the material used by WBFH opponents during the comments period and, thus, is repetitive, certain elements of WECA's filing require a response. Given the importance of the Commission's WBFH initiative and the need to harmonize U.S. FH rules with those of Europe and Japan, Proxim believes a final submission clarifying the flaws and omissions in WECA's most recent submission will assist the Commission in reaching an informed decision.

In addition, a response is needed to clarify what is - and what is not - in dispute in this proceeding. Proxim believes that WBFH and DS proponents are not far apart at all on the most critical issue of interference to existing WLANs in this band, particularly given CUBE's proposed compromise on minimum hopping rate. Proxim hopes that this response will help the Commission bring its initiative on WBFH to a rapid conclusion.

---

[2] See Reply Comments of CUBE, pp. 30-32.

[3] Intersil and Lucent's filings merely re-iterated their previous assertions. Silicon Wave's filing presented useful measured results, but reached misleading conclusions.

DISCUSSION

The Commission has proposed changing the existing 2.4 GHz FH rules by:

1) Increasing maximum channel bandwidth of 3 MHz or 5 MHz, instead of 1 MHz.

2) Decreasing maximum transmit power of 5 dB for channel bandwidths of 1-3 MHz or 7 dB for 3-5 MHz.

3) Increasing minimum hopping rates from 2.5 hops/s to 20 hops/s for channel bandwidths of 1-3 MHz or 50 hops/s for 3-5 MHz.

Because the Commission continues to require at least 75 hopping frequencies in approximately 75 MHz of bandwidth, a further consequence of the increased channel bandwidth beyond 1 MHz is that successive frequency hops would be able to occupy partially overlapping portions of the band.

The following sections consider the predicted effects of these three changes to the FH rules, in terms of interference to existing systems, by examining the material submitted independently by both the supporters and opponents of the Commission's WBFH proposal.

A. THERE IS A COMPROMISE ON MINIMUM HOPPING RATE.

As discussed in CUBE's Reply Comments, the original consideration that led the HomeRF Group to request an increase in the minimum hopping rate was the desire to minimize the impact of a wider frequency channels upon time-bounded or isochronous communications, where the maximum temporal length of interference was the key metric. The proposal reflects HomeRF's focus on the needs of the broadband Internet home where voice, data and streaming media wireless services often require minimal transmission latency.

In the Comments filed by the 802.11 committee, WECA and many of their DS equipment-supplier members, considerable analyses were provided to show that, if maximizing overall system throughput is the key consideration instead of latency, then increasing the minimum hopping rate actually is undesirable.

CUBE recognized the validity of this aspect of the opponents' analyses and, therefore, recommended in its Reply Comments that the Commission not change the minimum hopping rate. WECA's recent *ex parte* filing acknowledges CUBE's concession, which brings the principal parties into consensus on this issue. Assuming

that the Commission will adopt this consensus, the discussion of interference below excludes the effects of increased hopping rate.

B. THE EFFECTS OF INCREASED MAXIMUM CHANNEL BANDWIDTH FOR INTERFERENCE TO EXISTING USERS ARE MINOR AND WELL-KNOWN TO BOTH SIDES.

A number of opponents of the Commission's WBFH initiative stated that allowing increased channel bandwidths of up to 5 MHz would increase interference to existing FH and DS users of the 2.4 GHz band. In some cases these were unsubstantiated assertions, while in others these statements arose from interpretations of analyses assessing how hypothetical WBFH systems might interact with existing WLAN systems. In some of the analyses, the effect of increase channel bandwidth was not obvious given the much more important issue of increased hopping rate, which is now settled.

CUBE's Reply Comments included detailed measurements of existing FH and DS systems subjected to interferers of varying modulations and channel bandwidths, including the 802.11-approved existing FH system, the 802.11-approved and WECA-endorsed existing DS system, and the HomeRF-proposed WBFH system. These measurements were made specifically to isolate the effects of channel bandwidth, independent of hopping rate or power level, and now have been commented upon by WECA. Proxim believes the consensus apparent between CUBE and WECA that becomes apparent on close examination of WECA's January submission should enable the Commission to resolve this aspect of the WBFH NPRM quickly.

First, consider the effect of increased FH channel bandwidth upon existing DS systems. Both extensive analysis and Table 2 from CUBE's Reply Comments, repeated here as Table 1, show that the increased channel bandwidth aspect of WBFH does not cause any increased interference to existing DS systems. WECA accepts the validity of these measurements and concurs with this conclusion.[4] This is an important point. Both CUBE and WECA explicitly have stated that the wider modulation profile aspect of WBFH compared to existing FH does not increase interference to the existing DS systems promoted by WECA.

---

[4] See WECA *Ex Parte* Filing, Jan. 18, 2000, pp. 64,65, e.g. "It must be reiterated that the concerns of the DS manufacturers are not related to the PSD [Power Spectral Density] of the WBFH signal per se, but rather to the degree of compatibility of the to [sic] radio technologies."

Offset Frequency from center	Signal to Interference Ratio (dB)		
	CW	802.11FH	WBFH (as measured)
- 8 MHz	3	2	3
- 6 MHz	6	6	6
- 4 MHz	8	8	8
- 2 MHz	8	8	8
Center (0)	9	9	8
+2 MHz	8	8	8
+ 4 MHz	8	8	8
+ 6 MHz	6	7	7
+ 8 MHz	2	3	3

Table 1: Measured Signal to Interference ratio requirements of an existing DS receiver when subjected to various sources at different relative center to center offsets (from CUBE Reply Comments Table 2)

Next, consider the effect of increased channel bandwidth upon existing FH systems. This analysis is complicated somewhat by the fact that different existing FH systems have very different interference rejection characteristics, especially for out of channel interferers. CUBE chose a Proxim OpenAir device as the existing FH target to be subjected to the various interferers. This seemed a reasonable choice given the proliferation of approximately 1 million OpenAir devices already in the field - more than any other WLAN system in the 2.4 GHz band.

The actual measurements, as presented in Table 1 of the CUBE Reply Comments, show that potentially severe interference can occur in three relative channel locations of an OpenAir device, whether an existing FH system is the "interferer" or a proposed WBFH system is the "interferer." Ironically, the worst situation for an existing FH system actually is due to interference from the existing DS system supported by WECA.[5]

In the worst case of co-channel interference, the increase in required signal to interference ratio was only 4 dB. Neither WECA nor CUBE disputes this conclusion. In fact, WECA points out that this result is in complete agreement with both Intersil's simulations and Silicon Wave's measurements.[6] This is another important industry

[5] See CUBE Reply Comments, p. 35. Table 1 clearly shows that for an IEEE802.11b DS interferer, an existing FH device has at least 11 overlap channels in a row where severe interference (interferer of less power than the desired signal causes unacceptable error rate) will occur.
[6] See WECA *Ex Parte* Filing, Jan. 18, 2000, p. 6.

consensus point that the Commission should note in bringing this matter to rapid closure.

C. THE MATERIAL SUBMITTED BY BOTH CUBE AND WECA SHOWS THAT THE COMMISSION'S PROPOSED TRANSMIT POWER LIMITATIONS ARE SUFFICIENT

It is obvious that neither CUBE nor WECA is urging the Commission not to decrease the maximum transmit power for WBFH as proposed. However, on the issue of whether the Commission's proposed decreases are sufficient, CUBE and WECA still disagree, especially with respect to interference to existing FH devices.

It is important to note that the Commission's proposal to decrease maximum transmit power for WBFH already is in sharp contrast to the situation in Europe and Japan, where WBFH already is permitted. In Europe, WBFH channel bandwidths up to 4.175 MHz can use the same maximum transmit power as 1 MHz devices (+20 dBm EIRP).[7] In Japan, the situation is similar: a 5 MHz wide channel bandwidth device can use the same maximum power as a 1 MHz device (~ +24 dBm).[8] The Commission's proposal, in contrast, allows 1 MHz devices to use up to +30 dBm while a 5 MHz wide WBFH device is restricted to below +23 dBm.

Assuming, however, that the Commission will adopt the proposed power restrictions despite Europe's and Japan's more permissive approach, CUBE has already assessed the adequacy of the proposed power limits. Consider first the case of WBFH upon existing DS systems. CUBE showed by a variety of analyses and actual measurements that, once the issue of hopping rate is removed, the relative interference effect of WBFH versus existing FH upon high rate DS systems is basically *zero*, even without any transmit power limitations. Thus for the case of WBFH on DS, the Commission's proposed decrease in maximum transmit power is much more than sufficient.

Now consider the case of WBFH upon existing FH systems. In the case in which maximum interference usually occurs, co-channel FH on FH or WBFH on FH, both supporters and opponents of the Commission's proposal agree that the WBFH on FH case is 4 dB higher in signal to interference ratio than the FH on FH case. Since the Commission proposes to decrease the maximum transmit power by 5 to 7 dB, compared to zero by European or Japanese regulators, one could reasonably conclude that the Commission's proposal should be acceptable to all. However, WECA continues to argue for more drastic reductions.

---

[7] See Section 5.1 of ETSI 300 328.
[8] See ARIB Standard Version 1.0, Chapter 3.

WECA's first "argument" is an unsubstantiated assertion. They contend that most existing FH WLAN devices are operating at or below +20 dBm and, thus, the Commission's reductions in maximum transmit power are not actually reductions at all. For FH device manufacturers such as Proxim, these unsubstantiated assertions are, quite frankly, exasperating. Proxim knows from both publicly-available market research reports and first-hand knowledge that the majority of the 2.4 GHz FH devices currently being shipped in the USA have transmit powers ranging from +24 to +28 dBm nominal (to meet +30 dBm maximum under all conditions). Despite WECA's assertions to the contrary, the Commission's proposed requirements will result in typically 5-7 dB lower transmit power for products with 5 MHz channels, once real manufacturing tolerances and temperature/voltage effects are considered.

WECA's second "argument" stems from comparisons of adjacent or alternate channel overlaps for WBFH on FH versus for FH on FH. Unlike the predictable worst-case co-channel situation already discussed, these situations - in which the absolute interference is generally much less - are very implementation dependent. But such comparisons can produce impressive "sound bite" figures like "10 dB worse" or "20 dB worse" due to WBFH.

For example, Intersil's analysis of Bluetooth on Bluetooth versus WBFH on Bluetooth for adjacent channel overlap produces the conclusion that WBFH creates 10 dB worse adjacent channel interference.[9] However, CUBE's detailed measurements on an OpenAir receiver show only 3 dB change for the same scenario (in fact, a 4 dB decrease once the Commission's transmit power limitations are considered).[10] The difference, as correctly pointed out by WECA, is in the channel filtering choices made by the manufacturer. Ironically, the "better" a receiver copes with adjacent channel interference (the Bluetooth device is nearly 10 dB less affected by WBFH than the OpenAir device), the higher this "X dB" worse number gets.

The emptiness of this argument becomes apparent simply by applying it equally to situations other than WBFH. For example, consider the effect of high speed 802.11b DS upon an existing FH system like OpenAir or Bluetooth, compared to the baseline of FH on FH. From the measurements of CUBE, the interference of 802.11b DS upon existing FH (OpenAir) is seen to be 28 dB worse than FH on FH for the alternate channel (or about 12 dB worse than WBFH on FH).[11] For the case of Bluetooth, where channel filtering is tighter still, the interference of 802.11b DS upon Bluetooth is closer to

---

[9] E.g. Comments of Intersil and others based upon Zyren and Gandolfo, "*Effects of WBFH Interference on Bluetooth Reliability*", as submitted to OET regarding ET Docket 99-231.
[10] See CUBE Reply Comments, p. 35.
[11] See CUBE Reply Comments, p. 35.

40 dB worse than an existing FH system on Bluetooth for this alternate channel case.[12] Proxim is very skeptical indeed that WECA would encourage the Commission to use this adjacent/alternate channel interference logic if the Commission were considering potential reductions in power for high-rate DS systems and was basing the proposed power reductions on the premise that existing FH systems must not experience increased interference relative to an FH on FH baseline.

Further evidence that WBFH interference will not differ substantially from existing FH interference also was provided by CUBE in the form of real system throughput measurements in the field when subjected to different interference sources including WBFH.

For unknown reasons, WECA somehow concluded that the WBFH device was placed in a position further from the target networks than the other interferers, such that the results are slanted in WBFH's favor.[13] In reality, the opposite is true. To portray WBFH in the worst possible light, the WBFH prototype demonstrator actually was placed in the closer Access Point position. And unlike the other interferers, all traffic came from the Access Point position with a device placed in a continuous transmit mode.

Despite this disadvantage, WBFH was seen to cause no measurable difference in interference characteristics to the adjacent target networks (FH or DS) compared to interference from existing FH networks. These results are repeated here as Figures 1 and 2. They show clearly that a co-located WBFH network does not cause additional interference to either a Bluetooth connection or an 802.11b WLAN beyond that caused by an existing FH network. Preparing these extensive measurements was very time and labor consuming. WECA can choose to ignore these results if they wish. But the Commission can see from these results that WECA's claims of serious interference from WBFH to existing FH or DS networks are completely overstated.

The hard engineering evidence from both CUBE and WECA shows that the Commission's proposed substantial decreases in maximum transmit power are more than sufficient to account for the interference characteristics of WBFH compared to existing FH when the CUBE/WECA compromise of unchanged minimum hop rate is instituted. Given that regulators elsewhere already allow WBFH devices to operate at maximum transmit powers equal to the 1 MHz FH case, the Commission's substantial limitations on WBFH transmit power to protect existing users of the 2.4 GHz band are even more commendable.

---

[12] Proxim estimate based upon the Intersil analysis by Zyren and Gandolfo, "*Effects of WBFH Interference on Bluetooth Reliability*", as submitted to OET regarding ET Docket 99-231 and the measurements reported in the *ex parte* filing of Silicon Wave.
[13] See WECA *Ex Parte* Filing, Jan. 18, 2000, p. 65.

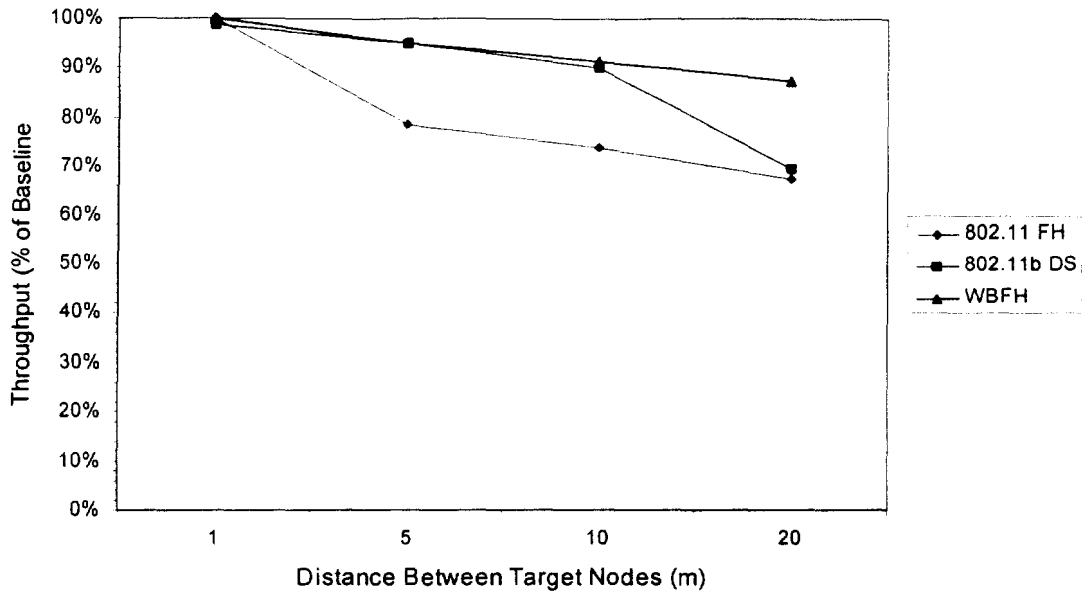
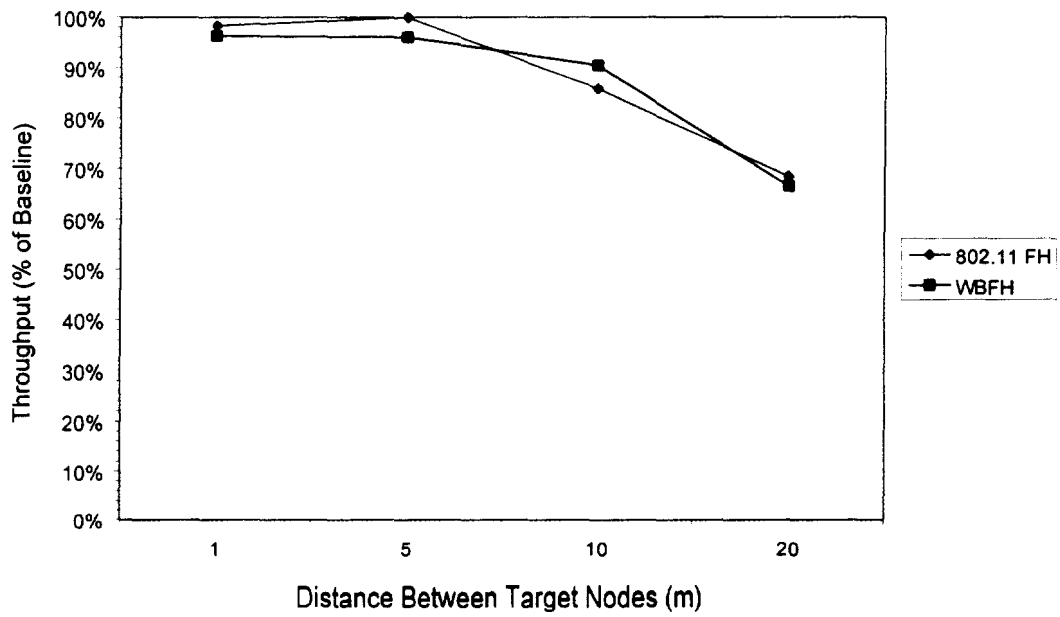


Figure 1: Measured throughput of a Bluetooth connection with different co-located



interference sources as a percentage of a no interference baseline.

Figure 2: Measured throughput of an 802.11b WLAN with different co-located interference sources as a percentage of a no interference baseline.

D. THE COMMISSION EASILY CAN RESOLVE THE TWO REMAINING POINTS OF CONTENTION BETWEEN CUBE AND WECA.

On the core issues of transmit power and channel bandwidth as it relates to existing system interference, the Commission can act expeditiously from the consensus information now available to adopt its channel bandwidth increases and maximum transmit power decreases as proposed. This assumes that the Commission further adopts the CUBE/WECA compromise of not changing the minimum hop rate. However, on two other issues associated with the Commissions WBFH initiative, CUBE and WECA appear to be polarized. The first issue is WECA's assertion that WBFH systems as described by CUBE or HomeRF will simply not function adequately for home use at all. The second issue is WECA's (and other opponents') belief that the partially overlapping channels resulting from the 75 hop requirement in the Commission's proposal will lead to substantial harm for the users of the 2.4 GHz band. Together these two issues, which are largely unrelated to the core issues of channel bandwidth and transmit power, represent much of the volumes of disputed material now before the Commission in this matter.

1. WBFH Does Work in the Home as Promised.

Some of the opponents of the Commission's WBFH initiative have made many disparaging predictions about the ability of a simple low-cost FSK WLAN with 5 MHz channel bandwidth to operate reliably as promised in the home environment. WECA even contends that WBFH devices will interfere more with existing systems than existing FH does now because WBFH will have to be operated at substantially higher transmit powers than existing FH systems to overcome this hypothesized poor WBFH performance.[14] However, the logic of how WBFH manufacturers will substantially increase transmit power when the Commission is actually mandating decreased transmit power is never explained.

As shown in the CUBE Reply Comments, Proxim already has built a WBFH demonstration hardware platform. A photo of the device is repeated here as Figure 3. This demonstrator consists of an existing OpenAir consumer version (Symphony) radio with modifications to use a non-optimized Field Programmable Gate Array (FPGA) version of the new wider channel bandwidth modulation and demodulation functionality. After the FPGA, raw bits are off-loaded to separate processor to communicate with the host computer exactly as will be done in custom silicon for the

---

[14] See WECA *Ex Parte* Filing, Jan. 18, 2000, pp. 64, e.g. "It is worth mentioning that the concerns of the DS manufacturers are not related to the PSD [Power Spectral Density] of the WBFH signals per se, but rather to the very high power levels they will be required to operate at to support the applications cited by proponents."

final product. Note that this demonstrator can be operated in both 5 and 10 Mb/s modes. The typical transmit power of the demonstrator is about +20 dBm which is consistent with a product that must never exceed +23 dBm under any condition.

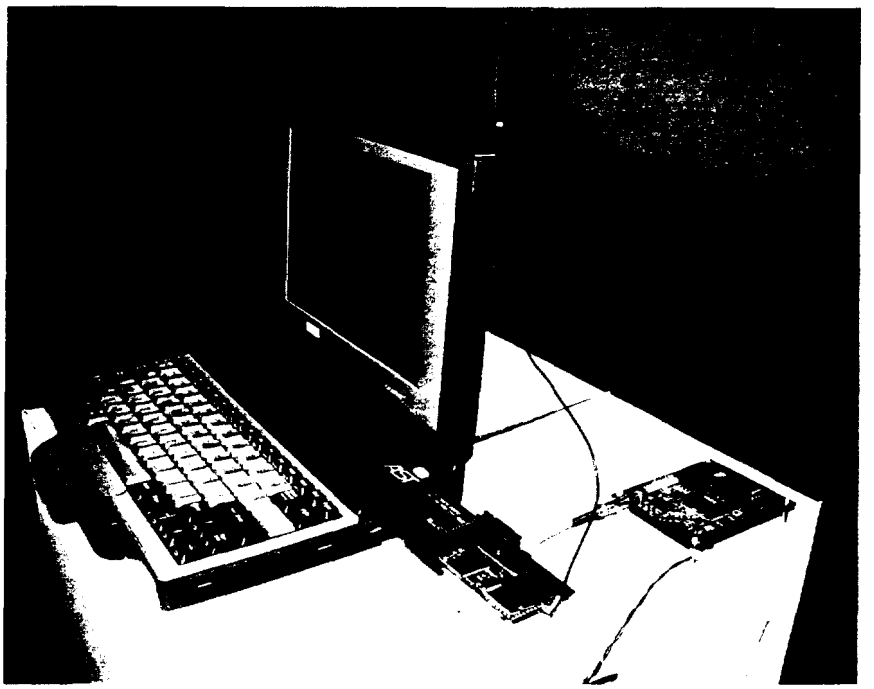


Figure 3: Photo of WBFH Prototype System used for Interference Testing and Throughput Testing in the Home

The most demanding measure of raw performance for a WLAN device used in a HomeRF network is successful transfer of maximum length 1500 byte (12000 bits) Ethernet packets. Figure 4 shows the raw packet completion rate of the Proxim initial WBFH demonstrator versus distance indoors averaged amongst several typical California homes. As evident in Figure 4, at 5 Mb/s even without antenna diversity the performance is flawless from one corner of a home to the opposite. At 10 Mb/s, antenna diversity alone improves the raw packet completion rate from excellent except at extreme range to excellent throughout the entire home. Antenna diversity is extremely simple to implement and adds less than $1 to the cost of the product.

Figure 4: Measured Results for WBFH Demonstrator Averaged Amongst Several California Homes

Note again that these results are obtained using the same low cost radio architecture and components as used in products shipping today for consumer applications. The only difference is the slightly wider receiver filter bandwidth and the

changes to the modulation and demodulation within the digital baseband processor chip. Proxim is continuing to evaluate this prototype WBFH system in a number of operating environments including situations with high interference due to microwave ovens, other 2.4 GHz WLANs or 2.4 GHz cordless telephones (and homes outside California where more than 60 feet indoors is possible!).

Although the initial demonstrator lacks many of the intelligent interference mitigation features that will make the production WBFH devices even more robust, the interference performance is already very good compared with existing FH products. This is due in large measure to the much shorter packet duration of WBFH. A 1500 byte packet payload at 10 Mb/s is only about 1.2 ms long versus 7.5 ms long for an existing OpenAir FH system. This gives the WBFH system excellent immunity to time-varying interference characteristics typical of microwave ovens and other WLAN devices.

2. Partially Overlapping Channels Do Not Cause Significant Additional Interference to Existing Users.

WECA's complaints about the deleterious effects of partially overlapping channel bandwidths under the Commission's WBFH proposal revolve around two fundamental issues. The first concerns the self-interference of multiple WBFH networks in hypothetical co-location or overlapping-location scenarios. This is another endless debating point upon which the two sides likely will never agree. In reality, this is a very complex issue that is intimately related to the characteristics of the WLAN protocol. The supporters of the Commission's WBFH initiative plan to use innovative techniques to avoid most of this problem while simultaneously improving the overall interference immunity. The Commission's opponents simply conjure a worst case scenario and then produce sound bite results like "50% worse" collisions due to partially overlapping channels. The opponents further attempt to link these hypothesized collisions to increased re-transmissions and hence greater interference to existing users of the band.[15]

However, in the real world there are mitigating factors that make WECA's argument unfounded. First, the WBFH systems are operating at much higher data rates than the comparison point of existing FH system interference. Thus the probability of two 1500 byte packets on adjacent networks colliding with each other actually is reduced with WBFH compared to existing FH. Furthermore, co-located WBFH networks (plus some other networks that supposedly will be interfered with) is completely unrealistic in typical home. In business applications, where partially overlapping wireless networks are common today, if WBFH trial testing demonstrated that performance would be poor, computer network system administrators would

[15] See WECA *Ex Parte* Filing, Jan. 18, 2000, p. 15.

simply not deploy WBFH equipment. This issue, like other predictions of dire performance by WBFH, can easily be settled in the marketplace.

The second major concern the opponents raise about partially overlapping channels is that a 3 MHz channel bandwidth occupies an existing FH device's channel "3 times more" or 5 MHz "5 times more". The theory behind such statements is that the adjacent and/or alternate channels of the existing FH device might have more interfering energy in them from WBFH interference than from existing FH interference (since both hop identically).

As the CUBE Reply Comments showed in great detail, the reference point for making such comparative statements is crucial. In fact when the Commission's substantial transmit power limitations are considered, CUBE clearly showed that both FH and DS systems that are legal today can produce considerably more interfering energy into the adjacent and alternate channel positions than that of HomeRF's WBFH proposal. For example, even the IEEE802.11b specification endorsed by WECA contains a mode description where a high rate DS system occupying about 20 MHz channel bandwidth can hop across the 2.4 GHz band at 50 hops/s and +30 dBm transmit power. The interference this IEEE802.11b-compliant system would then legally cause to existing FH systems like OpenAir or Bluetooth far exceeds what would result from the WBFH proposal.

The actual interference from a WBFH system to an existing FH system is further mitigated in practice by the must shorter packet duration of WBFH. For example, a 1500 byte packet payload is only 1.2 ms long at 10 Mb/s instead of 7.5 ms long today at 1.6 Mb/s. This leads to an interference overlap of "5 times less" on a per packet basis for WBFH (not "5 times more") compared to the baseline case of existing FH on existing FH.

It is, however, clear at this point that industry consensus on this issue is unlikely and thus the Commission must make its own best decision. Proxim recommends that the Commission move forward with its proposal amended only by the CUBE/WECA compromise of unchanged minimum hopping rate. If, however, the Commission decides to further modify its proposal and adopt non-overlapping channels, the Commission should not simply adopt the same rules that apply in Europe, which require at least 20 non-overlapping channels. Instead the Commission should allow 3 or 5 MHz channels with reduced maximum transmit power as already proposed and then stipulate that the total span of consecutive non-overlapping channels must be at least 75 MHz. Also, for consistency, the time spent on any non-overlapping WBFH channel should not exceed .4 sec for every period of 30 sec divided by the channel spacing in MHz.

CONCLUSION

Proxim commends the Commission for providing vision and leadership to enable low-cost voice, data and streaming media wireless networking for the broadband Internet home. Adoption of the Commission's WBFH initiative would bring the United States in line with similar, though not identical, regulations that already enable WBFH in Europe and Japan.

Despite volumes of contradictory material, the path forward at this point is quite clear. WBFH, as proposed by the Commission and modified by the CUBE/WECA compromise of no increase in minimum hopping rate, will not cause additional interference to exiting users of the 2.4 GHz band compared to existing narrowband FH devices commonly produced today. As Proxim already has demonstrated, WBFH devices really can deliver reliable high speed communications of 5-10 Mb/s throughout the home using the same extremely low cost and low power radios used today in 1.6 Mb/s WLANs or cordless telephones. Above all else, Proxim urges the Commission to act quickly.

Respectfully submitted,

PROXIM, INC.

By: Henry Goldberg

GOLDBERG, GODLES, WEINER & WRIGHT
1229 19th Street, N.W.
Washington, D.C. 20036
(202) 429-4900

Its Attorneys

Attachment

Certification of Kevin J. Negus

I, Kevin J. Negus, am the Vice President, [redacted] Business Development of Proxim, Inc.. I am the person responsible for the technical analyses supporting the Proxim letter response to the Wireless Ethernet Compatibility Alliance's January 18 submission to the Federal Communications Commission. I have reviewed the Proxim letter response and hereby certify that the technical analyses contained therein are true and correct to the best of my knowledge.

K. J. Negus 2/23/00

Kevin J. Negus Date