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March 15, 2001

BY HAND DELIVERY

Ms. Magalie R. Salas, Secretary  
Federal Communications Commission  
The Portals, 445 12<sup>th</sup> Street, S.W.  
Washington, D.C. 20554

Re: ET Docket 99-231 /  
Amendment of Part 15 of the Commission's  
Rules Regarding Spread Spectrum Devices  
--- *Ex Parte Filing*

Dear Ms. Salas:

The attached document was distributed on March 15, 2001 to Julius Knapp, Karen Rackley and John Reed of OET during a meeting with Kevin Negus and John Cafarella of Proxim, Inc. and the undersigned. The document should be filed in the above referenced docket.

If there are any questions in this regard, please contact the undersigned.

Respectfully submitted,



Henry Goldberg  
Attorney for Proxim, Inc.

cc: (w/o attachment)  
Julius Knapp  
Karen Rackley  
John Reed

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# Recommendations for Improving the Unlicensed Spectrum Rules in the USA

Proxim, Inc.  
March 15, 2001

# Bands of Interest

- 2.4 GHz
  - HomeRF, 802.11b, Bluetooth, many others
  - Tremendous activities both in wireless LAN, WAN, and PAN development and in widespread deployment of real products and systems
- 5.15-5.35 and 5.725-5.85 GHz
  - 802.11a, HIPERLAN1&2, many others
  - Current focus for wireless LAN, PAN is development
  - Initial phase of widespread deployment for WAN

# Current Rule Status

- 2.4 GHz – 15.247
  - Differentiates between frequency hopping and direct sequence spread spectrum
    - 75 hopping channels at up to 1 Watt; 15 hopping channels at up to 125 mW
    - 10 dB of processing gain at up to 1 Watt
  - Contentious industry interpretations of “complex” rules
- 5.x GHz – 15.401-15.407
  - Sets only inband power and power spectral density limits

# Recent Challenges to the 2.4 GHz Rules

- Wi-LAN
  - Wi-LAN claims that OFDM should be allowed under existing rules because it uses spectrum efficiently
- Texas Instruments/Alantro
  - TI suggests that PBCC-22 should be certified under existing rules because it uses spectrum efficiently
- 99-231 Reconsideration
  - Petitioners assert that limited hopping should be allowed under existing rules because it will “improve the ability of FHSS and DHSS systems to coexist in the band to the benefit of all users of such devices.”

# Common Thread of Challenges

- All desire to reduce the required spreading in the 2.4 GHz band
- Some admission that the FCC's rules are already being subverted.
  - Intersil, in response to TI/Alantro: “While PBCC may claim to have coding gain, it cannot properly claim to have any spreading gain. By comparison, in addition to the 9 dB of processing gain with [sic] results from the use of a spreading code, CCK has approximately 2 dB of coding gain.”

# Do Spreading Requirements Make Sense Going Forward?

- Why require spreading to begin with?
  - To ensure that unlicensed systems in the 2.4 GHz band will operate robustly in the presence of other devices and ISM band interferers ...
  - But this assumes that only PHY layer properties matter to robustness and ignores ingenuity above the PHY.
- The FCC cannot anticipate every way in which systems can mitigate interference.
- But the FCC can and should regulate the amount of interference that any given system will cause.
  - Thus, the UNII rules are a good starting point for addressing the 2.4 GHz rule challenges.

# Proposed Solution

- Add the 2.4 GHz band to the UNII 15.401-15.407 rules
  - Similar to situation for 5.725-5.825 GHz
    - OFDM, PBCC-22, and other non-spread systems would be allowed at 2.4 GHz
    - Bluetooth adaptive hopping proposal would be allowed

# Are the UNII rules sufficiently broad as currently written?

- Some in the industry believe that UNII rules preclude the use of “narrowband” frequency agile systems
- Proxim believes the UNII rules are flexible enough to encompass many approaches including frequency agile systems

# Summary

- Best approach for unlicensed spectrum is usage flexibility in all bands including 2.4 and 5.x GHz
  - Let the industry innovate!!
- By clarifying the existing 15.401-15.407 rules and extending them to 2.4 GHz, all existing requests can be accommodated
  - Leave the 15.247 rules as is
  - Leverage the precedent of dual rules 5.725-5.825 GHz
- Achieving industry consensus on any individual usage change is difficult and controversial
  - Make one major step instead that provides opportunity for everyone and minimizes the need for further changes

# Proposed Rules

- 15.407(a)(4)
  - For the band 2.400-2.4835 GHz, the peak transmit power over the frequency band of operation shall not exceed 1 W. In addition, the average power spectral density shall not exceed 12.5 mW (11 dBm) per MHz. Except as shown below, if transmitting antennas of directional gain greater than 6 dBi are used, the peak output power from the intentional radiator shall be reduced below the above stated values by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
    - (i) Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.