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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

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January 16, 2001

Ms. Magalie Roman Salas
Secretary
Federal Communications Commission
The Portals, TW-A325
445 12th Street, SW
Washington, DC 20554

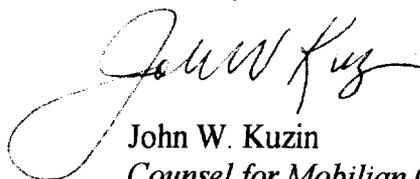
**Re: *Ex parte* Notification – ET Docket No. 99-231
Amendment of Part 15 of the Commission's Rules
Regarding Spread Spectrum Devices**

Dear Ms. Salas:

On December 5, 2000, Manpreet Khaira and Jim Lansford of Mobilian Corporation, David Hilliard and I from this law firm met with Julius Knapp, Karen Rackley, Neil McNeil, and John Reed of the Commission's Office of Engineering and Technology to discuss spread spectrum technology. Dr. Lansford presented Mobilian's views regarding the pending Petition for Reconsideration in the above referenced docket. Copies of the enclosed presentation were left with the FCC Staff, and a copy was left with Dr. Michael Marcus.

Should any question arise concerning this matter, please do not hesitate to contact me.

Sincerely,



John W. Kuzin
Counsel for Mobilian Corporation

Enclosure

cc: Messrs. Marcus, Knapp, McNeil, and Reed; Ms. Rackley

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**Comments on Adaptive Hopping
Petition for Reconsideration
ET Docket: 99-231**

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Summary

- **Discussion of issues in adaptive hopping petition**
 - **Key issue: The details of this petition open the door for increased interference by FH systems**
 - **15 channel proposal at 2.4GHz not consistent with 900MHz and 5GHz rules**
 - **Uses a much smaller portion of the band**
 - **Appears to be based on parameters of WBFH Initial Report and Order, rather than engineering basis**
- **Industry is working on technical solutions to coexistence**

Issues

- **Current situation - most interference is manageable using technical methods**
 - **Adaptation, retransmission, coding, etc.**
- **Petition is not consistent with other ISM bands**
- **Narrowband FH systems can cause excessive interference even with adaptation**
 - **Narrowband systems cannot sense wideband signals easily**
- **The rules proposed by the petition can allow systems that do more harm than good**

This petition needs more study before any changes are made to the recently adopted WBFH Report and Order

Petition vs. Current Situation

- **ISM bands currently allow some adaptation**
 - **At 900MHz, must cover $25/52=48\%$ of band**
 - **At 5.7GHz, FH systems must cover $75/125=60\%$ of band**
 - **However, the proposal in the petition for reconsideration covers only $15/83.5=18\%$ of the band**
- **Current regulations allow interference avoidance through adaptive hopping**
 - **HomeRF modifies hop pattern to avoid “double bad” hops**
 - **Coding techniques can be combined with adaptation to improve robustness**
 - **Since adaptation isn't perfect, FH systems shouldn't be allowed to concentrate their energy to small segments of the band**

Adaptive hopping can be useful in an ISM band, but parameters must be reasonable

Adaptive narrowband FH systems can cause significant interference to existing DS systems

- 802.11b uses 22MHz bandwidth channels
 - Assume +20dBm (most systems are 13-18dBm), -83 dBm sensitivity
- FH Cordless phones and Bluetooth have at most 1MHz channels
 - Assume 1MHz, +20dBm, -83dBm sensitivity
- With these parameters, FH system has a 13.4dB link margin advantage because of narrowband channel filter
 - 0dBm Bluetooth removes this advantage
 - Required processing gain for DS does not recover this
- Result: DS systems can suffer interference from FH at over 4 times the distance* that FH can detect DS and initiate adaptation
- The problem increases for -70dBm FH sensitivity: >16x distance**
- Restricted hopping BW dramatically increases collision rate

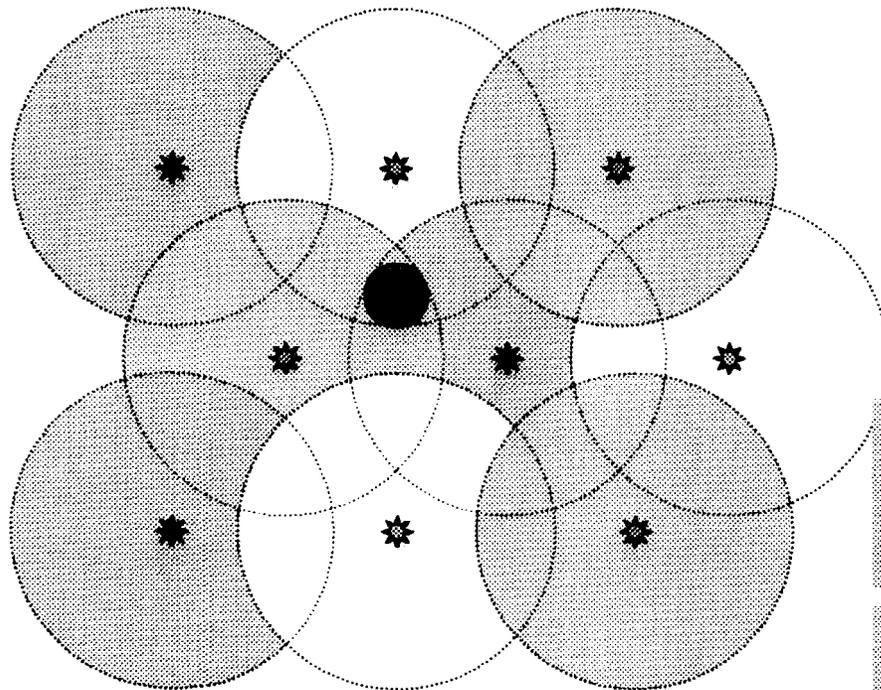
15 channels makes the problem 5 times worse than today - adaptive FH must be spread out over a larger segment of the band

*12dB=4x distance in free space

**24dB=16x distance in free space

Adaptive hopping in office or multi-family dwelling can cause worse interference

802.11b Access Point deployment



•Three channels

•(Shown as red, green, blue here)

•AP radius: 50m

•AP distance: 70m

•(allows smooth handoff and load balancing)

In a cell surrounded by adjacent AP's:

•Two or Three cell Overlap: >30%

•Three cell Overlap: About 15%

Newer AP's can have multiple channels, making the situation worse

In multiple AP environments, adaptive hopping systems can be "boxed in," reducing FH capacity and increasing interference

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Adaptation needs many channels - 15 is too few in the 2.4GHz band

- **In an ISM band with WLAN, cordless phones, microwave ovens, etc., adaptive FH will frequently be pushed to the minimum number of channels**
 - **This reduces the overall capacity of the FH systems because of FH-FH interference**
 - **It significantly increases power spectral density because the FH system will occupy a channel 5x as often (75 channels vs 15 channels) - and processing gain drops from 18.8dB to 11.8dB**
- **The current rules in 900MHz and 5GHz are more consistent with sharing the band with other FH systems as well as DS systems**
 - **15 channels is too few in the 2.4GHz band**
 - **Proper power levels have not been studied**
 - **The implementation issues have not been reviewed by the public at large**

Summary

- **Current petition for reconsideration needs further consideration**
 - **Grafted onto 99-231 without appropriate public debate**
 - **Number of channels and power levels chosen arbitrarily - not consistent with other ISM bands**
 - **Technical methods exist to control interference between FH and DS systems that do not require changes in the rules or “clarifications”**
 - **IEEE 802.15.2 will publish “Recommended Practices” by end of 2001**
 - **Physics of radio design make make if difficult for FH to sense DS and adapt before the DS system has been crippled - 15 channels makes this situation intolerable**
 - **Not all FH systems are Bluetooth - other users could invoke these rules to make the situation in the band worse**
- **Revision of §15.247 should be comprehensive and aim for a stable regulatory environment that fosters innovation**
 - **Set guidelines that allow and encourage industry to solve interference problems through innovation, not regulation**