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doc.: IEEE 802.11-98/168

Critics of IEEE P802.11 response to FCC NPRM 99-149

Naftali Chayat
BreezeCOM
naftalic@breezecom.co.il

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Slide 1

Naftali Chayat, BreezeCOM

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IEEE802.11 response to NPRM 99-149

- The response in document P802.11-99/162 tries to protect the 802.11 investment, which is OK.
- The 802.11 response contains speculative arguments which are inappropriate for IEEE sponsored response.
- The response blocks new innovative uses of the ISM band.
- The response fails to address the potential benefit of wider channels to WPAN

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The FCC NPRM 99-149 in a nutshell

- To allow FH with channels which are either
 - 3 MHz wide, allowed power reduced from 1 W to 330 mW
 - 5 MHz wide, allowed power reduced from 1 W to 200 mW
- To retain 75 hopping channels
 - means overlapping FH channels
- WBFH will be required to hop faster

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Potential uses of wider channels

- Higher data rates are achievable
 - higher signaling rates
 - innovative modulation schemes increase rates even more
- Better sensitivity for FSK due to possibility to use higher deviation
 - today in 802.11 $h=0.32$
 - optimum is at $h=0.7$
 - gain of 4-5 dB in sensitivity and interference robustness
 - beneficial to low power transmitters (WPAN)

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Will WBFH use more power than 802.11 systems?

- The current regulations allow FH and DS 1 Watt
- The proposed WBFH maximal power is 330 or 200 mW for 3 or 5 MHz wide channels, resp.
- The part C of the response of 802.11 claims that
 - 802.11 devices typically use 100 mW
 - WBFH devices will use full allowed power
- This argument is an abuse
 - the power used will be about same (at expense of range)
 - depends on power consumption and amplifier cost

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Wideband FH interference is almost same as NBFH without power reduction

- The NPRM intends to allow less power to WBFH than to NBFH.
- In practice, the power will be similar
 - maximum power is seldom used.
- However, the interference to existing NBFH and DS users is not significantly different from the interference that this users cause to themselves and to each other!
- Following slides address few scenarios.

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Analysis assumptions

- The interferer transmitting from same distance at same power will be received at same total power
 - spectral density will depend on bandwidth
- The desired signal will be received at the power needed for demodulation
 - approximately same spectral density
 - WB signals need more received power, however it does not mean higher transmitted power, it means smaller useful range.

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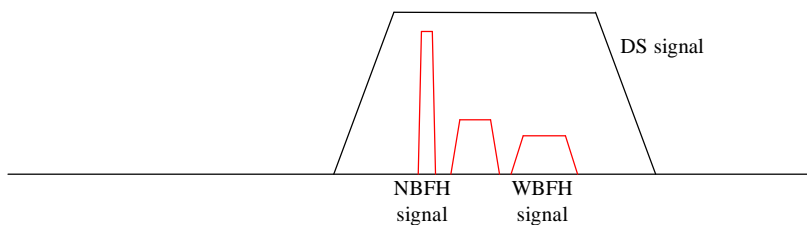
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WBFH interference to DS

- The SINR depends (almost) only on FH signal power, not its bandwidth.
- The DS-FH collision probability depends on DS BW and width of the hopping band, not on FH BW.



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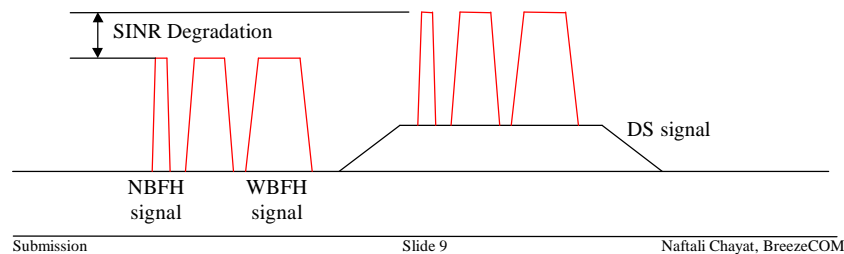
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DS interference to NB and WB FH

- WBFH needs more received power than NBFH, however SINR degradation due to DS jammer is same!
- The DS-FH collision probability depends on DS BW and width of the hopping band, not on FH BW.

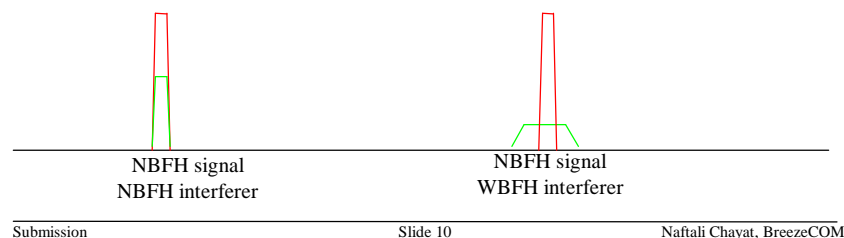


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Interference of WBFH to NBFH

- WBFH interferer needs more received power than NBFH, to fail a desired NBFH signal.
- The collision probability for WBFH is higher, but the percentage of stations within range is smaller

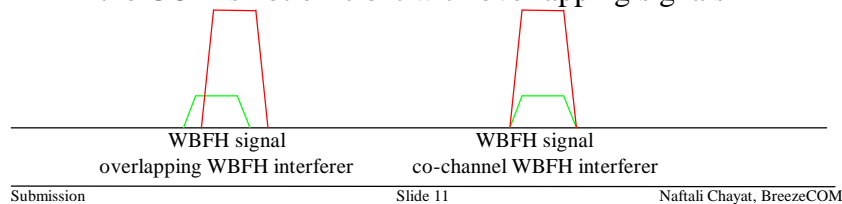


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WBFH interference to itself - overlapping or disjoint channels?

- Overlapping WBFH interferer creates slightly less interference
- The collision probability for overlapping WBFH channels is twice as high.
- Cochannel signals can use CCA to yield to others
 - the CCA is not efficient with overlapping signals



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Summary

- IEEE 802 should not issue a negative response to the FCC NPRM 99-149
 - 802.15 may benefit from it
 - The interference to/from current systems is about same as among current incompatible systems
 - IEEE should not block innovation
- If IEEE decides to issue a negative response, it should remove the misleading assumptions about WBFH system transmit power compared to legacy systems.

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