IEEE 802.11
Wireless Access Method and Physical Specification

Title: **FH Interoperability Option of HR/DSSS PHY**

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Summary of FH Interoperability Method

We propose an FH PHY backward interoperability mode as an option for the Harris HS proposal

- This proposal does not modify the basic modulation format, but it assumes the addition of the HS preamble; wraps around the Harris proposal
- Two fundamental changes required for FH interoperability are
  1) hopping of the wideband DS signal synchronized to the FH hop sequences
  2) using the FH preamble in front of the HS preamble and data

Backward Interoperability to FH

There is a significant volume of 802.11 interoperable FH radios being sold today by a number of manufacturers

- HR/DS/FH will enable FH users to migrate to HR/DSSS
  - Users can maintain investments in low cost FH appliances while also adding rate scaling capability using HR/DSSS
- Option brings together the previously distinct FH and DS camps
  - Any station which can support the HR/DS/FH will also be required to support the basic HR/DSSS, HR/DSSS/short, and by inference legacy DSSS and FHSS

Home centered initiatives coming out with new FH solutions

- HomeRF is based on the 802.11 FH; considering using whatever mechanisms we develop here to provide higher data rates

Coexistence to basic HR/DSSS and DSSS can be improved by additional CCA requirements on HR/DS/FH units

- Use wideband energy detect with timeout or
- Use full bandwidth correlation detection

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Robustness in Interference Limited Environments

Symbol's experiences in the 900 MHz band since 1990 have shown

- Fixed frequency systems will fail in the presence of fixed freq interference
- Changing channels is slow and often does not work
- Our proprietary 900 MHz DS system has evolved into a hopping DS system to provide reliable connection in the presence of interference
- The 2.4 GHz band may eventually be worse than the 900 MHz band since it is the only unlicensed band available worldwide
- Also, non-802.11 systems in this band are already and will continue to be a significant portion of the usage of this band

Hopping of the wideband HS signal will provide protection against a variety of fixed frequency and hopping interference

- As a last line of defense, backing down to 1/2 Mbps FH with 79 1 MHz channels will provide the best chance of operating through interference.

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Limitations

There were some limitations that were pointed out in my original presentation in March 98

- Most efficient use of the band would be achieved by frequency planning in a cellular arrangement such as used by DS
    - However, that requires exclusive use of the band which cannot be guaranteed in the unlicensed ISM band
    - It trades off the efficiency of the cell planning approach for the reliability of frequency hopping and the flexibility of scaling down to a 1 MHz narrow FH signal
- Backward interoperability with the DS PHY necessitates turning off the hopping feature since hopping is not part of existing DS PHY

In addition, we recognize that the FH/DS cross CCA issues must be resolved because this option uses both modes

- I made specific recommendations in the letter ballot 16 comments to add the cross mode CCA requirements to resolve this issue

Goal: Work Toward Consensus

Dateline: March 1998…

- FH and DS interoperability was part of the comparison criteria
- Symbol and Harris presented proposal for FH interoperability option
- Lucent and Micrilor unilaterally accepted same method for in their proposal to provide FH interoperability

Dateline: Today (January 1999)

- The FH interoperability mechanisms have been refined and clarified over the past year but remain essentially the same
- We have 77% approval of the draft and rising
- 6 out of 9 NO-FH votes are from Lucent saying that there are some problems with it so throw it out

Goals: Build on our hard earned progress rather than destroying it

- There are limitations to what this mode can do as we pointed out from the beginning, but it fills a need that goes unanswered without this option