Tentative Minutes: Joint PHY Meeting held Montreal, Quebec

9 November 1997

Meeting started at 8:40 by Chair Dean Kawaguchi (Symbol)
Secretary will be Mike Trompower (Aironet)

1. Agenda Set
   - state purpose of meeting
   - introductions
   - setting of operating rules
   - discussion of errata to existing PHY sections of standard

2. Purpose of meeting is to discuss the Channel Modeling requirements for proposal submission evaluation in both 2.4Ghz and 5Ghz bands

3. Introductions taken around the room

4. All votes will be voting members only

5. A list of papers for discussion during this meeting is generated
   97/131 - John Caferrella (Microlor) - Multipath Models
   97/??? - Richard Van Nee (Lucent) - Delay Spread Requirements
   97/xxx - Richard Jai (Symbol) - Multipath Issues
   97/96 - Naftali Chayat (Breezecom) - Requirements for 5 Ghz

Summary of 97/131 presented by John Caferralla
- some channels can be line-of-sight with 'impulse' type response (delayed)
- some channels can be 'rayleigh' type with out line of sight and have blurred spectral shape
- some channels can be 'ricean' type

- presentation of several multipath models and assigns applicability to narrow band and wideband signals
- suggests that a developer should identify more than one model and a develop several schemes for verification

questions:
FER is called out by 802.11 as the criteria for conformance. simulation is difficult in the time required to execute all cases in order to gain a statistically accurate sampling.
it was pointed out that several current papers have showed that channel models have exponential decay as opposed to Rayleigh

Summary of 97/125 presented by Richard Van Nee
- delay spread requirements for both 2 and 5 GHz will be discussed
- states that most papers use the exponentially decaying power delay channel model
- simple model uses fixed number of multipath components at equidistant delays each with rayleigh amplitude component

- sophisticated models use random number of paths, cluster of paths, and random delays between clusters
- suggests that the simple model is enough for comparison of different modulation types since the most important issue is the maximum delay spread that the modulation can tolerate
- provides a tables for delay spreads of .8 to 1.5 GHz 1.8 to 2.4Ghz and 4 to 6 GHz recovered from a literature search
- summary is that there is very little difference in delay spread in frequency range of .8 to 6 GHz

questions:
Carl Andren suggests that the group consider two criteria: one for short delay spreads and one for long delay spreads which require more hardware such as equalization. VanNee suggests that for modulations of 20 MHz bandwidth or greater will require some form of countermeasure to cope with delay spreads of greater than 50ns so that one criteria could be used.

How does antenna diversity affect the modeling issues? What results is really an independent trial on the new antenna, but statistically all antennas will see the same range of delay spread

Summary of 97/??? presented by Richard Jai
- similar summary of delay spread as previous presenters

Summary of 97/96 presented by Naftali Chayat
- summarized but not presented, will be deferred for task group A meetings
- the presenter feels that much of the material is duplicated by the previous presenters

Discussion of the multipath papers and what should the modeling criteria be for the purpose of modulation comparison
A compromise between narrowband and wideband signaling techniques is proposed whereby 4 times oversampling would be used for delay spreads less than 50 ns and decrease to 1 sample instances for delay spreads over 200ns

proposal to use exponential decay (independent Rayleigh elements) where T_{SAMPLE} is not greater than the smaller of chip time (1/signal bandwidth) or $T_{RMS}/2$ where T is the sample time and T_{RMS} is the mean delay spread.

Motion 1: (Naftali Chayat / Keith Amundsen) move to accept the use of a model using exponential rayleigh decay where T_{SAMPLE} is not greater than the smaller of chip time (1/signal bandwidth) or $T_{RMS}/2$ where T is the sample time and T_{RMS} is the mean delay spread.
(motion passes: 13-0-6)

"now that we have a channel model, we should focus on a delay spread number"

No objections to Naftali presenting document 97/96 at this time
the paper suggests that comparison be done using the following criteria:
for the 5Ghz phy a 20 Mbit/s using 64 and 1024 byte packets (slower data rate for 2.4Ghz)
comparison will be conducted without antenna diversity
PER of 10% will be used for multipath without noise and for thermal noise case comparison
PER of 20% will be used for multipath with noise
Overhead and related parameters will be itemized (preamble length, slot size)
spectral efficiency (channelization schemes should be presented by each modulation)
adjacent channel interference rejection will be compared
all critical issues and difficulties with the implementation should be addressed

general consensus of group is not to delve into detailed discussions of each item on the above list at this time. there will be an ad-hoc meeting at 1:30 in Gallery 4 for interested parties to discuss the common items between 2.4 and 5GHz comparison items.

adjourn for lunch and plenary meeting at 11:45

minutes of ad hoc meeting
chaired by Naftali Chayat

discussion starting point is document #97/96
Naftali opens the floor for discussion concerning his document

Naftali explains the thoughts behind his selection of 10 and 20 percent packet error rates and the required curves to show the results

A family of curves would result when taking into account different delay spread assumptions
Dean points out that this proposal should be acceptable as it is since all modulations can be directly compared rather than setting limits that each proposal must meet. (each modulation will declare the maximum delay spread that it can tolerate in order to meet the required FER)

Al Petrick states that he thinks the committee ought to set the goal that the modulations should meet in order to be considered

Dean suggests that more information is needed to analyze the proposals. he points out that the use of a longer preamble could allow for better performance in relation to the PER curves in combating longer delay spreads. Overhead items such as Preamble Length, SIFS, and SGT size should be combined into one parameter such as Tavg in order to evaluate and compare the proposals.

question on how to factor in interference immunity into the equation.

question about processing gain and how it relates to performance and to the FCC interpretation against the jamming margin test.

meeting adjourn for full 802.11 plenary meeting