

Tentative Minutes of 802.11 Task Group A (5 GHz Task Group)

Chair: Naftali Chayat

Secretary/Editor: Mike Trompower

11 November 1997

meeting called to order at 2:00 by Naftali

Set Agenda:

- approval of Minutes from September Meeting
- review of previous submissions
- criteria and requirements
- HiperLan tutorial
- presentations of new papers
- establish an agenda for January meeting

Motion 1(approved by unanimous consent): motion to approve agenda as established above

Motion 2(approved by unanimous consent): motion to approve minutes of September meeting task group A

Presentation Order for submissions will be the following:

HiperLan 1 tutorial (97/108)

documents concerning new modulations:

- 97/123 - OFDM - by Richard Van Nee (Lucent)
- 97/137 - OFDM - by NTT
- 97/121 - QPSK - by NEC

documents providing additional information on previous proposals:

- 97/111 by Naftali Chayat (BreezeCom)
- 97/130 by John Cafarella (Micrilor)
- 97/145 by Reza Majidi-Ahy (RadioLan)

submissions which are not modulation proposals:

- 97/106 and 97/107 - UNII and WinForum - by Don Johnson (SRDS)

HiperLan 1 Tutorial (document #97/108)

(presented by Peter Ransome and Larry Taylor, Technology Partnership / Tim Phipps, Symbionics)

- Type 1 -- 5 GHz 23 Mbps distributed Wireless LAN began in 1991
- Type 2 -- 5 GHz Wireless ATM
- Type 3 -- broad band wireless local loop
- Type 4 -- high rate wireless (155Mbps)
- more information at <http://www.etsi.fr>
- features: power save operation (store and forward method), encryption, ieee48 bit addresses, transmit priority scheme, packet lifetime priority
- modulations are MSK for low rate, GMSK for high rate (16x low rate)
- 1 msec burst length
- 450 bits of preamble used for equalizer training

document 97/123 presented by Richard Van Nee (Lucent)

- overview of OFDM modulation
- complexity of OFDM system is dominated by the FFT subsystem
- claim of presenter is that OFDM needs 70×10^6 multiplication operations per second versus 384×10^6 operations per second required by single carrier modulation systems
- reference a paper by ??Pollet?? for information on phase noise characteristics
- the presenter provides information on the results of clipping methods which can be used to lower the peak to average power ratio (should stay within a 5dB ratio)
- 16QAM subcarrier modulation provides 33Mbps with rate 1/2 code has better performance than QPSK modulation with higher code rate
- phase noise and frequency offsets have negligible effects for subcarrier offsets under consideration

questions:

- there will be a minimum processing delay of 5usec (2.5 for FFT + 2.5 for trellis decoding)

document 97/137 presented by NTT

- discussion of indoor propagation models used in the OFDM analysis (used measured delay spread data from 2.6GHz band and claim no significant difference from 5GHz)
- paper presents results of PER versus signal energy for various delay spreads and various power amplifier backoff values

questions:

- very similar 'clipping' methods used
- interleaving was also used with coding

adjourn for evening session to start at 7:30

reconvene at 7:35

document 97/121 presented by NEC

- QPSK modulation
- Short preamble?
- Innovative equalizer structure presented

questions:

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document 97/111 presented by Naftali Chayat (Breezecom)

- proposed use of OQPSK and OQAM combined with BCH error coding
- Similarity of many params to HIPERLAN 1 stressed
- Optional OQAM based 40 Mbit/s mode

questons:

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document 97/131 presented by John Cafarella (Micrilor)

- even though 5GHz rules only specify power spectral restrictions (spreading not required), this proposal uses spreading to take advantage of processing gain
- 24 Mbps with 18 Mbps fallback rate
- 24 Mbps rate has a 6dB peak to average power ratio
- 18 Mbps rate has a constant envelope waveform which results in a 6dB power improvement potential. this is accomplished by constraining 3 of 12 bits to shape the waveform

questions:

- the throughput curves shown in the paper assume a 10usec SIFS period with all frames ACK'd
- modulation has properties of 12dB processing gain, 7.4dB Eb/No, and long symbols with low sidelobes all combine to fight multipath
- the spectral efficiency of this waveform is about 3dB worse than OFDM proposal but it results in better multipath protection as mentioned above.

meeting adjourn 9:30 PM

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meeting called to order at 3:10 by Naftali

presentation of documents 106 and 107 by Don Johnson (WinForum SRDC)

- overview of WinForum, its roles, and goals
- description of the U-NII bands
- mobile satellite services and HiperLAN in Europe coexist in lower band
- middle band power is specified as milliwatt/mhz but it is measured differently - this issue is expected to be rectified
- discussion of why more rules are needed
- description of power ratios needed for narrow and wide band systems to detect each other

questions:

- seems a bit paradoxical that SRDC will be writing rules for a MAC of which they know nothing of the PHY (802.11 - 5GHz) and a PHY that they know nothing of the MAC (HiperLan 2)
- SRDC does not have direct input to CEPT only the FCC and US bodies

presentation of document 97/145 by Reza Majidi-Ahy (RadioLan)

- proposes to use L-PPM modulation scheme (16-PPM) to get 20Mbps
- features: power efficient, simpler implementation compared to other proposals
- discussion of types of detection errors which drive the receiver architecture
- chip time will be a fraction of the slot time
- system is not direct sequence based
- RadioLAN has a 10Mbps system approved by FCC in 5.8GHz ISM band
- proposal is also possible for use with 802.11 IR (4 and 16 Mbps)

questions:

- Naftali states that the talk is too general and has not met the criteria of information to bring to this meeting
- occupied bandwidth of about 25 MHz (3 channels per 100MHz with guard bands)
- average pulse width will be 25-25ns
- spacing between pulses will be negative (overlapping PPM scheme is proposed)

- the proposal will have a variable symbol rate (not always 200ns spaced)

discussion of whether to extend the deadline to bring information beyond the January meeting.

Current order is to allow participants to simulate opposing proposals for comparison purposes in order to create the required information for the January meeting. Each proposal is required to bring FULL text for inclusion in the draft.

Reza will be given 15-30 minutes in tomorrow's session in order to present additional technical information on L-PPM in order to allow simulation and comparison.

discussion of criteria and requirements

- Naftali highlights a few changes to document 97/96 as agreed in Monday joint PHY meeting:
 - clarification of traffic assumption, comparison criteria, overhead related parameters, spectral density, cochannel interference criteria added, interference immunity, correction to formulas presented, minimal sampling time for the generation of the channel impulse response, addition of acquisition criteria

- this document will be re-submitted as 97/96 version 1 and should be used by all presenters as the 'bible' containing the required information which to bring to January meeting (in addition to full draft text)

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meeting adjourn at 6:10

13 November 1997

meeting called to order at 1:05 by Naftali

first agenda item was to be presentation by RadioLan to provide additional modulation details in order that his proposal be further considered. Naftali granted a few minutes and the first agenda item will be criteria requirements document 97/96 revision 2

There are total 6 proposals (111-Breezecom, 121-NEC, 123-Lucent, 130-Micrilor, 137-NTT, and 145-RadioLan ??if approved??) for further consideration in January meeting. The main requirement is to bring full PHY text formatted for inclusion in the 802.11 specification.

A modification to 97/96 r2 to state that all information necessary to build a radio using the modulation be described in the text (MIB variables are not required) is required for the January meeting.

straw poll to determine the level of interest for receiving the simulation data:

- beginning of March meeting: 6
- 1 week before March meeting: 5
- 2 weeks before March meeting: 5
- beginning of January meeting: 5

Document 97/96 will be modified to require that the performance data addressing all the points in the criteria should be submitted electronically to 802.11 chair by 1200 UTC on 23 Feb 1998. Vic will post the information to FTP sites for distribution. The proposal sponsors are encouraged to submit their data as earlier as possible.

Proposal by Reza (document #145) to include additional details on L-PPM

- raised cosine with $\beta=0.5$ for pulse shaping
- the encoding will be 4 bits/symbol, differentially encoded, with overlapping symbols
- chip width = 4.25ns , slot width =17ns, symbol rate = 5MHz
- each channel about 26MHz wide
- expected sensitivity in AWGN of -68dBm

questions:

- multipath performance using the agreed upon model will occur before January
- presenter suggests that an equalizer will not be necessary for this implementation
- symbol rate will not be constant
- Naftali's not sure about the corectness of BW-pulsewidth relation - pulse should be 120 nsec?

Naftali suggests to the group that his opinion is that RadioLan has met the criteria to be further considered in January - There are no objections - there will be 6 presentations brought forward for considerations in January.

Other changes to document 97/96 (refer to submission for details):

- multipath and noise performance should be demonstrated for all proposed data rates
- each proposal should suggest center frequency accuracy and tolerance
- modified changes to interference immunity to CW Jamming and Gaussian noise
- the proposer is required to disclose any IP positions

Motion 3(John Cafarella / John Fakatselis): motion to approve document 97/96 revision 2 which contains the schedule and requirements for submission.

motion passes (11/0/2)

establish agenda for January meeting

- Review of Proposals
- presentation of new submissions
- discussion of relevant acceptance criteria

January agenda approved by consensus

meeting closed 3:00