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**IEEE P802.11**  
**Wireless LANs**

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**802.11 Task Group A (5 GHz Study Group)**  
**Tentative Minutes of the March 1998 meeting**

Chair: Naftali Chayat

Secretary/Editor: Mike Trompower

Monday, 9 March 1998

meeting called to order at 8:30 by Naftali

Naftali provides short overview of 802.11 5GHz

Set Agenda:

- approval of Minutes from November Meeting
- create list of current submissions
- selection procedure
- data relevant to the judging of proposals
- discussions concerning data submissions
- perform the selection
- set agenda for May Meeting

**Motion 1**(approved by 17,0,1): (Al Petrick/Carl Andren)  
motion to approve agenda as established above

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

Submissions

New Document list is the following:

General information:

- Bob Ohara (98/104) General considerations for choosing a PHY
- Don Johnson (98/86) Out of band emission requirements
- Steven Zelubowski. (98/105) Spectral regrowth in OFDM
- Naftali (98/106) Power Amplifier Modeling
- Chandros Rypinski (98/110) Selection basis for 5GHz

Modulation evaluation:

- Naftali (98/107) joint NEC-Breezecom proposal
- Naftali (98/108) Tga performance summary
- (98/111) General Partial Response Pulse Shape recommendation
- (98/72) combined Lucent/NTT OFDM proposal
- Kazuhiro O. (98/78r1) Comparison data for QPSK Phy
- Masahiro M. (98/71a) Evaluation results for OFDM
- Naftali (98/76) BreezeCom OQM performance

reserved time for the following

- Reza Ahi (98/134) L-PPM criteria evaluation

Micrilor withdraws its proposal in the 5GHz band because of the 20Mbps data rate requirements puts sufficient restrictions on the modulation that it is deemed not robust enough for this band. Micrilor remains committed to the 2.4GHz band where their proposed modulation has sufficient merit.

Presentation of document 98/104 by Bob Ohara , Informed Technologies

“Further considerations when choosing a PHY”

- MAC management must be considered in addition to the PHY
- Lack of physical layer channelization impacts cell plan leading to:
  - reduced throughput in all cells
  - loss of PCF functionality
  - scanning algorithms are complicated
  - perceived system delays to users

Presentation of document 98/86 by Don Johnson , NCR Corporation

“U-NII out of band emission requirements”

- power spectral density rules as described in 15.403
- out of band requirements are described in terms of power spectral density
- restricted band rules are defined in 15.35, 15.205, 15.209 using EIRP definitions
- conducted limits are specified in 15.207
- due to WinForum recommendations it is expected that there will be several FCC rule changes
- by factoring in the packet nature of the protocol, the lower duty cycle operation yields about 12 dB margin improvement at the band edge restriction requirements
- intermodulation and sideband regrowth should be considered for each modulation (ref doc:97/80)

Presentation of document 98/105 by Steven Zelubowski, M/A-Com

“Spectral regrowth in OFDM”

- output power backoff has been talked about, but no data has been given to date
- issues are channelization and power efficiency

Presentation of document 98/106 by Naftali Chayat, BreezeCom

“Power Amplifier Modeling”

- additional backoff will be required to pass the current FCC band edge requirements
- Naftali expresses opinion that OBO will be required for the OFDM proposals
- Naftali suggests that the issue is readdressed and the comparison be made using Rapp’s Power amplifier model and will be revisited during the selection criteria session

The current list of proposals are the following:

- 1) OFDM by Lucent and NTT (replaces the individual proposals)
- 2) OQM proposal by BreezeCom and NEC (additional to the individual proposals)
- 3) OQM BreezeCom
- 4) OQM NEC
- 5) RadioLAN

Naftali: Is there objection to the presentation of the ‘combined’ BreezeCom/NEC proposal as it has not been previously presented?

The proposal highlights the element taken from the individual proposals and stresses a new pulse shape. Simulations are not extensive.

**Motion 3**(tabled until 7PM): (Carl Andren/ Wesley Brodsky)

move to allow the joint BreezeCom/NEC OQM proposal be accepted as a valid Tga proposal.

Discussion

Carl: This proposal is “in the spirit” of the task group agenda.

Jan Boer: Does the approval of this motion disallow the individual proposals? The fact that BreezeCom and NEC cannot decide, how can the rest of the committee decide between the three proposals.

John Cafarella: echos that the apparent indecision is not a good one.

Naftali: agrees that the points are valid and that NEC and Breezecom will consult and suggests that this motion be tabled until the beginning of the next TGA session (7PM tonight)

**motion tabled until 7PM by consensus**

Presentation of document 98/107 by Naftali Chayat

“Joint NEC/Breezecom OQM proposal”

- common items between proposals were listed
- different items between proposals were highlighted
- the unified proposal will use the following parameters:
  - use smaller amplitude variation in order to improve spectral shape
  - use the SRRC pulse with 50% rolloff
  - retains the multilevel mode
  - the preamble to be used will be 320 usec long
  - interleaving will be used
  - new frequency plan using 20MHz band edge distance obtaining 9 and 4 channels
  - waveform accuracy specification as defined in the NEC proposal with adaptation from QPSK to OQM
  - there will be a 3 tap equalizer to suppress ISI
  - center frequency accuracy will be 10ppm

Meeting adjourned for lunch at 11:55

Meeting reconvened at 7:20 by Naftali

**Motion 3** from the table

Naftali announces that both BreezeCom and NEC agree to abandon their separate proposals in favor of a single joint submission.

**motion 3 passes (20-0-6)**

There are now three remaining proposals to consider: joint Lucent/NTT, joint Breeze/NEC, RadioLAN

Naftali reviews the status of the currently submitted data and items what is still required by each presenter.

Meeting adjourned 8:00

Tuesday, 10 March 1998

meeting called to order at 08:30 by Naftali

begin with review and agenda of submissions today

ask for opinions on whether to extend to the modulation choice deadline until May in order to allow the presenters to bring additional data pertaining to the 'new' power amp modeling criteria and out of band emission criteria.

Presentation of document 98/107 by Naftali

“Joint NEC-BreezeCom Tga Proposal”

basis is OQM proposal with SRRC pulse shape as presented by BreezeCom

data rates are 21Mbps to 100Mbps with expected maximum useable rate of 50Mbps

differential decoding is applied

shortened Hamming code combined with various interleaving levels is defined

320 bit (13usec) preamble defined to allow for better detection and diversity determination

channel spacing of 5MHz is defined giving 9 channels in lower band, 4 channels in upper band

hopping is not specified, however, a 224usec channel switch time is defined

Questions:

Carrier frequency accuracy is defined at 60ppm instead of 120ppm as currently defined

there are two output power back off levels defined in order to meet band edge requirements

Naftali presents the performance data on the joint proposal

questions

meeting adjourned at noon

Meeting reconvened at 7:45PM

presentation of document #74r1 by NEC and accompanied by BreezeCom

supporting material for joint NEC-BreezeCom proposal

presentation of document #111 by Chandos Rypinski

“General Partial Response Pulse Shape Recommendation”

description of the purpose of shaping

used NEC proposal as example of “good” shaping as it requires no guard band

presentation of document # by Chandos

“selection criteria for 5 GHz”

Chan wants to highlight the merits of the remaining proposals with the following criteria:

-out of bound emissions

-frequency reuse

-coding and aggregate system capacity

-acquisition time

meeting adjourned at 9:00

Wednesday, 11 March 1998  
meeting called to order at 08:30 by Naftali

presentation of document #71a by NTT and Lucent  
“Joint NTT Lucent OFDM proposal”  
consult the document for technical details  
20 and 30 Mbps modes are shown to withstand over 200ns delay spread  
large SNR needed for long packets when in presence of large delay spread

information was presented pertaining to solutions to the additional criteria requirements put forth on Monday  
regarding out of band emissions and power amplifier modeling

question regarding mandatory rates, leads to response that 20Mbps is required which forces coherent detection into  
the implementation which uses 3 sub carriers using pilot tones instead of data.

presentation of document #134 by Reza Ahi, RadioLAN  
“5GHz UNII band - L-PPM proposal”  
system is a pulsed RF based modulation  
RadioLAN current product now operates under FCC15.249 low power rules (as opposed to .247 rules)  
states that a rule change is under consideration to allow higher power under these rules  
CCI analysis is under study and will be provided tomorrow – suggests that all modulation use a common channel  
model for the comparison  
A data scrambler method is under investigation

questions:

it was mentioned that operation would be with a 0 or 1dB backoff , the emissions were measured in the lab to be  
compliant

RadioLAN will be submitting additional information explaining how the analysis was performed

meeting adjourn at 12:00

Thursday, 12 March 1998

meeting called to order at 1:15PM by Naftali

presentation by Hitoshi (NTT) outlining additional information added to DOC#71ar1

presentation by Hitoshi (NTT) of DOC#143

“Throughput and Cell Radius comparison of Tga PHY submissions”

comments from Naftali and Reza make points that the data used in the paper do not reflect consistence use of data across all proposals

Naftali provides verbal update of the Joint BreezeCom-NEC proposal (DOC#144)

Breezecom estimates using .3 micron process

300mW with equalizer running in adaptive mode

200mW with equalizer trained only at beginning of frame

chair passed to John Fakatselis

Naftali presents DOC#145

“L-PPM proposal is broken”

The submission is Naftali’s opinion backed by technical information

argument 1- transmitter does not conserve power

argument 2- L-PPM is susceptible to multipath

argument 3- differential encoding loses 3dB sensitivity and is prone to pulse insertion

argument 4- packet length is data dependent

Naftali recommends that this proposal should not be considered further and should be eliminated at this meeting.  
discussion-

Chan claims that Naftali simplified the modulation and the conclusions are not necessarily valid.

Reza shows that the transmitter must be off between pulses, therefore there is a power savings

much back and forth bantering

opinion of group is that RadioLAN MUST provide information regarding the modulation

chair returned to Naftali

Naftali discusses the “down selection” process which will be used to eliminate proposals at the May meeting since the group failed to select a modulation at this meeting. “We are already in violation as No vote was taken and the justification is the additional requirements which were levied on Monday.”

**Motion 4(defeated by 6,15,16):** (Jim McDonald/Chandos Rypinski)

motion not to perform downsizing at May 98 meeting.

required by each proposal are: implementation details for a reference design, DC consumption, transmitter chain,

**Motion 5 (passes by 8,1,15):** (Carl Andren /Wes Brodsky)

move to adjourn

meeting closed 3:00