Tenative Minutes of the PHY Working Group, May 1994

IEEE 802.11 COMMITTEE

Minutes of the PHY Working Group held at the Holiday Inn, Oshawa, Ontario, Canada.

Chair: Larry van der Jagt
Secretary for the meeting; Jim McDonald

Meeting convened at 1:30 PM on Monday May 5, 1994. A joint Mac/Phy meeting had been held on the morning of May 5 1994.

The first issued addressed was the agenda.
Having reviewed the total list of submissions categorized as PHY related by the PHY Chair of the Mac-Phy Joint meeting, the following submissions were determined by the Chair, with consultation of the PHY Working Group, as appropriate for review by the overall PHY group.

Relating to Packet Length
94/127(originally numbered as 94/94),109,117,
Relating to Preamble
94/128(originally numbered as 94/93)
Relating to propagation simulation data from John McKown
Relating to definition of primitives
94/122
94/84 This is a Michael Fisher submission. Michael was not able to attend the Oshawa meeting. Therefore, review of this paper will be postponed until next meeting.
The agenda was based on this prioritized listing and was approved by voice

Paul Struhsaker moved that the PHY Working Group Minutes from the Vancouver meeting be accepted.
Peter Chadwick seconds
Being no discussion, the vote to accept the minutes was:

In favor:	26
Opposed:	0
Abstaining:	0

Motion Passes

Organization of the draft specification
An extended discussion took place between the editors of the draft specification, Ed Geiger and Dean Kawaguchi and the Phy Working Group Chair, Larry van der Jagt, concerning format issues relation to the draft specification, 94/068. The Chair recommended that the following changes be made to the outline of the draft specification:

1. Section 2-2.5 of 94/68 be removed and placed in a section of the overall 802.11 specification, 94/02b0, as specified by the Mac-Phy Interface subgroup. Section 7 is suggested.
2. Section 8 of 94/68 should contain primitives common to all PHYs
3. Section 9 of 94/68 should contain primitives specific to the Frequency Hop Phy
4. Section 10 of 94/68 should contain primitives specific to the DSSS Phy
5. Section 11 of 94/68 should contain primitives specific to the IR Phy

Wayne Moyers suggests that doc: 92/122 is a summary of the Chairs viewpoint of this issue.

A straw poll was taken at this point to determine the position of the Working Group relative to the proposal to move sections 2.0 to 2.5 of 94/68 to the Mac-Phy Interface subgroup.

In favor:	10
Opposed:	7
Abstaining:	8

The number of people indicating that they did not have enough information for the above vote: 11

The Chair directs that further discussion of the issue be postponed until the Mac-Phy interface meeting scheduled for the evening session.

Submission 94/127 (originally numbered as 94/94) was presented by Ronald Mahany. This submission considers the effects of both microwave ovens and motion of transceivers as well as objects in the environment and concludes by recommending that the maximum MPDU be 3 milliseconds.

Because of the reference to diversity considerations in 94/127, the Chair directs John McKown to present his propagation simulation data. This data illustrates through the use of ray tracing techniques, that signal strength can change by many dB in a very short distance in an indoor application. John concluded therefore that the value of diversity is very significant.

Submission 94/109 was presented by Jim McDonald. This submission considers the effects of microwave ovens on the choice of maximum MPDU size. This submission concludes that when microwave oven noise is present, 1.5 mS is the optimum maximum MPDU size. As a compromise between operation when the ovens are on and maximizing throughput when there is no oven noise present, 400 Octets (3.2 mSec at 1 Mb/s) is recommended.

Submission 94/117 was presented by Jan Boer. This paper considered propagation in environments where the propagation coefficient was in the range of 3.5. Based on a channel primarily limited by AWGN, it is concluded that the optimum maximum

MPDU would be 2000 Octets. Considerable discussion followed this submission relative to the general applicability of the channel assumptions.

The Chair directs that the choice of maximum MPDU size be determine individually for each Phy, and that this be done as first priority in the Phy subgroup meetings to be held on Tuesday morning.

The meeting is adjourned for Monday, May 9, 1994.

Meeting reconvenes on Thursday, May 12, 1994 at 8:50 AM

The Chair directs that the Working Group review its agenda and determine how the morning will be utilized. The Chair indicates that the DSSS and IR subgroups had requested time to work with the overall Phy Working Group to address draft specification document issues. The Frequency Hop subgroup, however, had requested time to meet as a subgroup, noting that subgroup time had been curtailed because of joint Mac-Phy meetings.

Paul Struhsaker suggests that the agenda for the July 1994 meeting have sufficient time planned for document issues. He further suggests that the subgroups are capable of closing their particular technical issues and preparing a template.

Ed Geiger comments that the standards document is a better format than the templates for documenting the decisions on the technical issues.

As the discussion expands, the Chair notes that the discussion is using the limited time available. A straw vote on continuing the discussion is 9 in favor and 8 against.

The Chair directs that the agenda for today's meeting must take precedence.

The Chair identifies four topics for the agenda:

A. Discussion of document generation approaches
B. Construction of a report to the Plenary
C. Timing of events to prepare draft and procedure
D. Individual meeting of the subgroups

The Chair proposes the following agenda

9:00 to 9:30 AM:	Items A & C
9:30 to 11:30 AM	Item D
11:30 to 12:30 AM	Item B

Motion to accept this agenda made by Ed Geiger and seconded by Barry Dobyns:

In favor:	22
Opposed:	0
Abstaining:	2

Motion passes

Discussion of A and C

Paul Struhsaker: We must focus on the resolution of format issues.

Dean Kawaguchi: The management issue is the principle concern. Can this be done on the reflector? Submissions should be used for major changes to the text. The planning discussion in the frequency hop subgroup had concluded that the text for the draft standard will not be ready until Nov. 1994.

Larry van der Jagt: Regarding organization of the standard each Phy will have its own section.

Ed Geiger volunteers to be the editor for the Mac-Phy interface.

Larry van der Jagt: There will be four documents. The Phy Working Group approves these and then the Plenary approves the total package of four unless they require a vote on each.
Editors are:
Ed Geiger and Dean Kawaguchi for the Frequency Hop Phy
Paul Struhsaker for the DSSS Phy
There are two editors for the IR Phy
Layer Management of each Phy will be different. The same headings are to be used but the MIB tables will be different.
Phy management for each Phy will be in the Mac. For example, the frequency hop table is a Mac management issue.

John McKown suggest the use of email for distribution of drafts for comment.

Jeff Rackowitz: Where will layer management be?

Larry van der Jagt: Section 7 and in each Phy section. Section 9 is Frequency Hop, 10 is DSSS, and 11 is IR.

Michael Rothenberg suggest the use of weekly updates from the editors

Dean Kawaguchi: We are not using that process. Editors cannot make substantive changes to the documents. Weekly editions are not planned.

Michael Rothenberg indicates that with Ethernet there was a review of the text and paragraph by paragraph voting. With email it can be faster.

9:30 AM adjourn to subgroups

11:40 AM Phy Working group reconvenes to prepare and review reports to Plenary.

Frequency Hop Subgroup Report presented by Jim McDonald with corrections and changes suggested by the PHY members as appropriate. Key items of that report are:

-FH subgroup regrets the resignation of Peter Chadwick as Chair and thanks him for his service. Jim McDonald is the new Chair

- Max MPDU motion passed: The motion reads: The PHY will provide an indication of the maximum packet length to the Mac. for the 1 Mb/s 2.4 GHz PHY, this maximum length shall always be greater or equal to 400 Octets. If a single length MPDU is demanded by the MAC group, the maximum MPDU length shall be 400 Octets for the 1 Mb/s 2.4 GHz PHY

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-A motion to use block coding to avoid generation of low frequency baseband energy was passed. This resolution will prevent the possibility of killer patterns as discussed in previous meetings. The motion reads: The FH subgroup adopts the FH packet formatting method presented in submission 94/069 with 16, 32, or 64 bit blocks and stuffing inversion beginning with the first block following the PLCP header, the block size to be determined at a later meeting.

-Open Issues
*CCA
*Block size for inversion coding
*State Machine relative to collision recovery
*Multiple rates - resolution of state machine issues required
*Transmit Power Control
*PMD parameters
*Text Editing
*PLCP format
*MIB
*PHY LME

-Schedule
*Resolve all open issues in July meeting
*Complete text edit in September meeting
*Final edit, voting and presentation to PHY and 802.11 Plenary in November

IR report presented by Roger Samdahl, the IR Chair, with inputs and suggestion from the PHY Working Group. Key points of that report are:

-The IR motions from the March meeting were not confirmed by the PHY Working Group because of time restrictions. These motions went directly to the Plenary, where they were accepted subject to eventual confirmation by the PHY Working Group.

-These motions are:
*Moved that this group recommend that Peter Blomeyer be appointed liaison for the infrared matters between DKE/CENELEC/IEC and IEEE 802.11, to provide information of what we are doing and bring back information about what they are doing.
*Moved that this committee assures through its chairman that there is an issue list item regarding the development and completion of the IR template.
*The following motions were numbers by the PHY Chair for convenient reference.
#1.
Moves that group adopts the following IR PHY structure: from 0-5 MHz is reserved for baseband, 5-15 MHz reserved for coexistence, 15-30 MHz is reserved for multi-carrier.
#2.
Move that infrared PHY will adopt one or more of the following data rates-1 Mbps, 2 Mbps, 4 Mbps and 10 Mbps.
#3
Move: That the IR PHY Subcommittee produce two PHY definitions, one for baseband operation from DC to 5 MHz, and one for carrier modulated operation from 15 MHz to 30 MHz, subject to the provability of the mutual non-interference of the two PHY definitions, and reserving a coexistence band from 5 MHz to 15 MHz.
#4
Moved: IR PHY adopt FQPSK as modulation format for Carrier modulated IR Communications.
#5
Moved: That the IR PHY subcommittee adopt as it's baseline encoding technique, 16-PPM for the 1Mbps bitrate, and 4-PPM for the 2 Mbps bitrate, with all conforming receivers required to operate at both bitrates, and all conforming transmitters required to operate at the 1Mbps bitrate.
#6
Moved: That the IR PHY Subcommittee has specifically rejected all other proposals for carrier modulation and baseband encoding.
#7
Moved: The carrier modulated system will be capable to operate at 4Mbps and 10 MBs.
#8
Moved: Reference P802.11-94/92r, Page 2, frame 3: It is the intention of the IR PHY Subcommittee to develop standards for PHYs which can deliver frames whose maximum size is on the order of 2000 octets including phy-specific overhead.
#9
Moved: That the IR PHY accept P802.11-94/130 as the working template for the BASEBAND IR Physical Layer specification.
#10
Moved: that the IR PHY accept P802.11-94/131 as the working template for the Modulated IR Physical Layer specification.
#11
Resolved:
That the IR PHY Subcommittee can provide CCA like functionality in three categories:
1) Energy Detection

2) Like Phy Detection
3) Bit Recovery

And the IR PHY requests of the MAC-PHY interface Subcommittee and the MAC subcommittee that the CCA functionality which will ultimately be required of any PHY fall into one or more of these categories.

We can further advise the MAC-PHY Interface Subcommittee and the MAC Subcommittee regarding the timelines and quality of each of these, to wit:

1) Energy Detection is available earliest and is of lowest quality
2) Like Phy Detection is available many microseconds after energy detection and is of better quality
3) Bit Recovery is available many microseconds after Like Phy Detection, at the end of the PLCP header, and is of the best quality.

#12

Moved: That the IR PHY Subcommittee directs the editing teams of the two PHYs to produce and distribute their draft standards, including the templates, to the members of this subcommittee by FAX or email no less than seven days before the next meeting of this body

Regarding Intellectual Property, IP, rights associated with FQPSK, the IR Chair reports that this was the only approach presented to the committee that was acceptable. The Chair states further that the IR group is looking for direction from the PHY or the Plenary with respect to further investigation of approaches that would not have an IP issue.

Ed Geiger asks why there will be two IR approaches

Barry Dobyns responds that there is a distinct constituency associated with each approach. The modulated PHY can be channelized and yield 4 and 10 Mbps performance. The Baseband approach has a significant low power consumption advantage while providing 1 and 2 Mbps rates. He further indicates that all other methods of encoding and modulation have been rejected and will not be reopened.

The IR Chair references the frame size decision presented to the Mac-Phy interface meeting the previous evening of 2000 Octets and that 94/130 and 131 will be the working templates.

John McKown asks if the IR group has come to the opinion that the CCA functionality can be performed in the PHY with only a single clear busy line being supplied to the Mac.

Barry Dobyns responds that they have not.

Ed Geiger indicates that they are looking for the Mac Group to provide some guidance in written form.

Ed Geiger indicates that the issues was discussed before in Jim McDonald's paper. Most committee members feel the CCA issue is not closed but very open.

Wayne Moyers comments that the IR status is two groups of two not one PHY with four speeds.

Wayne Moyers comment that the number of bits for speed control is 3 but that only one is needed.

Barry Dobyns moves that the PHY Group ratify conclusions of the IR Ad Hoc Committee as presented.
Bob Buass seconds

IR motions are numbers by the PHY Chair (as indicates above)

Discussion follows

Ed Geiger offers a friendly amendment to remove #11 from the Motion

John McKown moves to call the question. W seconds
In favor: 18
Opposed: 0
Abstaining: 3
With the question called the vote to amend the motion to delete #11 is:
In favor: 12
Opposed: 6
Abstaining: 3

With no discussion the vote on the amended motion is:
In favor: 16
Opposed: 0
Abstaining: 4
The amended motion passes.

The question is raised: what does the PHY want to ask of the Plenary, to ratify #11?

Ed Geiger's issue with #11 is the state machine requirements. The Mac Group will come back to the PHY and ask for state machine ideas.

Discussion with 30 second que follows

Wayne Moyers moves that the PHY Chair request inputs from the Mac Group

No Second

The IR Chair suggests that since there is a lack of support on #11 in the PHY he request that the PHY for a suggestion.

John McKown suggest a one line solution to the CCA issue and don't transfer the problem to the Mac Group. He further suggests that the PHY Chair direct the Ad Hoc Groups to prepare one line solutions in the July meeting

The IR Chair indicates support of this suggestion

Ed Geiger proposes a motion of John McKown's suggestion.

Bob Buass asks whether or not the Mac Groups has actually said in writing that they wanted only one line

Peter Chadwick seconds
In favor: 11
Opposed: 7
Abstaining: 2
The motion passes

Ron Mahany moves that the topic be tabled until July
Seconded
Being no discussion:
In favor: 14
Opposed: 3
Abstaining: 4
Motion passes

Bob Buass moves that we tell the Plenary that we are having a spirited internal discussion on CCA and plan to resolve this in July.

Dean Kawaguchi seconds
Being no discussion the vote is:
In favor: 14
Opposed: 0
Abstaining: 2

The PHY Chair indicates he will report a spirited discussion.

The IR Chair suggest that #11 be removed from the report to the Plenary

The PHY Chair indicates that the report is for information purposes only and that #11 could remain.

Jim Renfro suggest that the IP issue be pointed out to the Plenary

The PHY Chair discusses his plan for the organization and sequence of the report to the Plenary

DSSS report
The outline for this report is not available for inclusion in these minutes. Please see the Plenary minutes of the PM of May 12.

One important issue of the DSSS report is that the issue of channel assignments was reopened and closed

PHY agenda for the July meeting
Sunday PM 802.11
Monday
AM Full PHY
PM Plenary
Even M/P Interface

Tues.
AM subgroups
PM subgroups
Even M/P Interface

Wed
AM to 11 subgroups
AM 11 to 12 PHY
PM M/J

Thur.
AM to 10 subgroups
AM 10 to 12 PHY
PM Plenary

The meeting adjourned at 12:45 PM