

## Tentative Minutes of the IEEE P802.11 Working Group

Plenary meeting  
Denver, CO  
July 12-15, 1993

**Monday, July 12, 1993, 3:30 PM**

The meeting was called to order at 3:30 PM Vic Hayes, chairman IEEE P802.11<sup>1)</sup>, in the chair. John McKown vice-chairman, Carolyn Heide secretary. Ed Turner managing document originals and copying, Ed with help from John McKown managing distribution and pigeon hole organization. Jerry Wyatt handling the attendance list. The agenda document for this meeting is 802.11-93/92.

### Objectives:

- accept new MAC proposals and converge to solution;
- close submission of MAC proposal after July meeting;
- continue on MAC/PHY interface;

1) The officers of the Working Group are:

|  |   |   |
|--|---|---|
| <b>Mr. VICTOR HAYES</b><br>Chairman IEEE P802.11<br>NCR Systems Engineering B.V<br>Architecture & Systems Mngmnt<br>Zadelstede 1-10<br>3431 JZ Nieuwegein, NL<br>E-Mail: Vic.Hayes@Utrecht.ncr.com<br>Phone: +31 3402 76528<br>Fax: +31 3402 39125 | <b>Mr. JOHN McKOWN</b><br>Vice Chairman IEEE P802.11<br>Motorola<br><br>3209 N. Wilke Rd<br>Arlington Heights, IL 60004, USA<br>E-Mail: mckown@whitefish.rtsg.mot.com<br>Phone: +1 708 632 6551<br>Fax: +1 708 632 3462 | <b>Ms CAROLYN L. HEIDE</b><br>Secretary IEEE P802.11<br>Spectrix Corporation<br><br>906 University Plaza<br>Evanston, IL 60201-3121, USA<br>E-Mail: 71041.3262@compuserve.com<br>Phone: +1 708 491 4543<br>Fax: +1 708 467 1094 |
| <b>Mr. DAVE BAGBY</b><br>Chair IEEE P802.11-MAC<br>Advanced Micro Devices<br>PO Box 3453<br>Sunnyvale, CA 94088, USA<br>E-Mail: david.bagby@amd.com<br>Phone: +1 408 987-2423<br>Fax: +1 408 987 2800  | <b>Mr. LARRY VAN DER Jagt</b><br>Chair IEEE P802.11-PHY<br>Knowledge Implementations Inc.<br>32 Conklin Rd<br>Warwick, NY 10990, USA<br>E-Mail: kiilvdj@attmail.com<br>Phone: +1 914 986 3492<br>Fax: +1 914 986 6441   | <b>Mr. ROBERT ACHATZ</b><br>Editor IEEE P802.11<br>US Department of Commerce<br>NTIA/ITS<br>325 Broadway<br>Boulder CO 80303, USA<br>Phone: +1 303 497 3498<br>Fax: +1 303 497 3680   |
| <b>Mr. CHANDOS RYPINSKI</b><br>Editor IEEE P802.11<br>LACE Inc.<br>655 Redwood Highway #340<br>Mill Valley CA 94941, USA<br>E-Mail: rypinski@netcom.com<br>Phone: 415 389 6659<br>Fax: 415 389 6746  | <b>Mr. NATHAN SILBERMAN</b><br>Editor IEEE P802.11<br>Wireless I<br>21513 Conrardia Ct<br>Cupertino CA 95014, USA<br>E-Mail: nsilberman@mcimail.com<br>Phone: +1 408 253 5066<br>Fax: +1 408 253 5066                   | <b>Mr. FRANÇOIS Y. SIMON</b><br>Editor IEEE P802.11<br>IBM<br>P.O. Box 12195 MS E87/B673<br>ResearchTrianglePark NC 27709, USA<br>E-Mail: fygs@vnet.ibm.com<br>Phone: +1 919 254 4584<br>Fax: +1 919 254 5410                   |

- work on DSSS and IR, make schedule;
- define modulation scheme for FH PHY.

## 1. Opening

**1.1 Roll Call:** People in the room were invited to introduce themselves.

**1.2 Voting rights:** Voting tokens were distributed in the attendance book to be picked up by voting members during attendance list circulation. There is a paper describing voting rights and information for new members, IEEE 802.11-92/00, 00.1 and 00.2. In subgroups everyone can vote.

**1.3 Attendance list, Registration:** The attendance list was distributed - 75% attendance according to the attendance list is required to qualify for attending the meeting as a whole, so make sure to sign the book. Copies of the attendance list are handed out before the end of each meeting.

**1.4 Logistics:** Document distribution is done using pigeon holes - you will find your copies and messages in the referenced location in the expanding file folders in the slot *in front of* your name. Breaks will be at 10:00 AM and 2:45 PM, and lunch is approximately 12:00 to 1:00 PM.

**1.5 Other announcements:** none

## 2. Approval of the minutes of the previous meeting

**2.1 Baltimore meeting, Document IEEE P802.11-93/44:** approved by consensus

**2.2 Wilmington meeting, Document IEEE P802.11-93/87:** approved by consensus

**2.3 Matters arising from the minutes:** none.

## 3. Reports

### 3.1 Report from the Executive Committee, by Vic Hayes

- IEEE 802.8 will get a new chair: Terry Bowen left , Paul Chipland (note of chair: should have been Chip Benson) taking over.
- SC6 secretariat and US Support:
  - SC6 secretariat saved from being dropped from the US support.
  - Jack Wheeler is the new chair of ISO/IEC JTC1/SC6.
- Operating rules and transition to LMSC
  - to LAN/MAN Standards Committee
  - from a Technical Committee (Computer Communications) sponsored to a Standards Board sponsored committee
  - Updated version of Operating rules passed Letter Ballot
  - Transition delayed, but will be implemented this week.
- Document subscription service
  - Only for future mailings, use document order form for the past mailings
  - over 100 subscriptions, mostly 802.11

- Standards distribution:
  - 802.1k, Supplement to 802.1B, Discovery and Dynamic Control of Event Forwarding
  - 802.6k, Supplement to 802.1D, Distributed DQDB Subnetwork of a MAN
  - ISO/IEC 8802-3: 1993, CSMA/CD including
    - \* Layer Management
    - \* System considerations for 10 Mbit/s baseband Networks
    - \* 10 BASET
    - \* Maintenance ballot 1
  - ISO/IEC 10038: 1993, MAC Bridges, including
    - \* FDDI supplement
    - \* Source Routing Supplement

Use the SPA System

Metric policy

### 3.2 Financial Report from Wilmington meeting, by Priscilla Crowder

Attendees = 78

Meeting Fee = \$75.00

Income = \$5,850

|           |                |            |
|-----------|----------------|------------|
| Expenses: | Meeting Rooms  | \$1,450.00 |
|           | Breaks         | 1,376.93   |
|           | AV Equipment   | 327.04     |
|           | Copying        | 646.66     |
|           | Printer Rental | 94.25      |
|           | Extra Plugs    | 100.00     |
|           | AX Fee         | 20.26      |
|           | TOTAL          | 4,015.14   |
|           | CARRY-OVER     | 1,834.86   |

Main reason for carry-over was a lot more people attended than anticipated.

**Motion #1:** Approval of financial report from Wilmington meeting.

Moved by: Tom Baumgartner

Seconded by: Paul Eastman

Motion Discussion: none

Approved: 34

Opposed: 0

Abstain: 1

**Motion #1 passes**

### 4. Registration of contributions to be presented

Assigned to the MAC/PHY joint meeting: 93/94, 93/105, 93/108

Assigned to the PHY subgroup: 93/60, 93/76, 93/97, 93/98, 93/101, 93/102, 93/104, 93/83r1

Assigned to the PHY IR ad hoc group: none

Assigned to the MAC subgroup: 93/50, 93/61, 93/95, 93/99 & 93/100 (submitted but no one here to present the papers), 93/106, 93/107

Assigned to full working group: 93/103

## 5. Adoption of Agenda:

Dave Bagby (chairman MAC) suggests that Wednesday PM may not be not enough time for joint MAC/PHY group papers. Larry van der Jagt (chairman PHY) says PHY will not be ready before that. Decision is to leave as is.

François Simon and Leon Scaldefferri have a meeting scheduled with 802.10 Tuesday night to make text for draft standard resulting from security issues closure. People wanting to join that group - about 10. Vic will try to find another room.

## 6. Unfinished Business:

**6.1 Comments on updates of draft standard:** none because there was no new version.

### 6.1 Intellectual property statement

Vic read aloud IEEE Standards 1993 Operations Manual, section 6.3 Patents. This policy will be copied and distributed by Vic.

**P802.11-93/103, title, by Bill Stevens**

This is responding to the request at the Wilmington meeting for intellectual property disclosure. This is a single page submission noting two Apple patents for LocalTalk technology. Bill is not empowered to make a definitive statement, but schemes that use RTS/CTS for collision avoidance are covered by those patents. Patent numbers and names are in the submission.

#### Others

Dr Kamilo Feher: submission 93/97 is based on patented technology.

Vic: representing NCR - wants to make statements to this committee, but hasn't made it through the NCR bureaucracy yet. Next meeting.

Tom Baumgartner: has something to say about a Spectrix patent relating to wireless local area networking, but can't until the policy has been passed out. Will take action next meeting.

## 7. New Business

### (1) Reply comments

Some time ago there was an NPRM from the FCC concerning spectrum to be assigned for PCS, one part for licensed users, one for unlicensed. FCC was looking for coexistence rules to adopt. While we are making interoperability standards, the FCC wants to make coexistence rules, this is different.

There were 2 late filings to the FCC, one from WinForum regarding the co-existence rules and one other from UTAM regarding the move of incumbents out of the band. The FCC immediately asked for comments on those - that is called an NOI. The comment period has been closed. One comment specifically asked for limitation to isochronous access only. Then there is a reply comment period when you can send comments on the comments. That is where we are now - we would like to comment on the latter comment.

Who would like to work on preparing filing for FCC - about 13. Vic will apply for other evening rooms to work on this.

The WinForum response document plus the associated commentary document will be circulated.

### (2) Subgroup attendance

Subgroup sizes approximately, according to a show of hands: PHY-38, MAC-42.

**8. Adjourn for subgroups - 5:05 PM**

**Tuesday AM & PM, 13 July, 1993  
MAC and PHY subgroups**

**Wednesday AM, 14 July, 1993  
MAC and PHY subgroups**

**Wednesday PM, 14 July, 1993  
Joint MAC/PHY**

**Wednesday (remainder of) PM, 14 July, 1993  
MAC and PHY subgroups**

**Thursday AM, 15 July, 1993  
MAC and PHY subgroups**

**Thursday AM (remainder of) & PM, 15 July, 1993  
Full Working Group**

The meeting was reconvened at 11:03 AM, by chairman Vic Hayes, with Carolyn Heide secretary. John McKown Vice-Chairman and François Simon editor - see François when you have information for the issues list.

**9. Opening, Roll Call**

**9.1 Announcements**

Standards distribution for all registered attendees now

**9.2 Document update:** Vic reviewed documents distributed this meeting. Make sure Vic gets electronic copy and make sure that all documents have proper headers and footers.

**9.3 Agenda Adjustments:** none

**10. Reports from sub and ad-hoc groups**

**10.1 MAC, by Dave Bagby**

**Papers Presented and Discussed:**

- 93/95: WMAC synchronization and power management mechanisms. (Symbol/NCR)
- 93/61: Wireless LAN MAC to MAC interface (IBM)
- 93/106 - Updated version of GRAP (KC Chen)
- 93/107 - Performance of GRAP in multicell WLANs (KC Chen)
- 93/53: Rev MAC requirements & decomposition approach (Shipstar)
- 93/109: Importance of sw time in MAC performance (Lannair)
- 93/110: How to overcome sw time Overhead (Lannair)
- 93/50: BPF MAC (Shipstar)

**Papers expected for next mtg.**

- CSMA simulation from (KC)
- 93/115: Internal layering comments (Child Systems)
- NCR/Symbol/Xircom MAC/PHY partition paper.
- Criteria etc re NCR/Symbol

**Progress on July 93 Agenda Subjects.**

- Expected additional MAC proposals

The expected flood of last minute proposal did not arrive.

- Review of improved comparison question set.

Not done (the chair did not get the question set revamped before the meeting).

- Discussion of IP disclosures.

Some IP disclosures announced.

no discussion as actual Patents not available at meeting.

**Progress on July 93 Agenda Subjects.**

- A Finite MAC proposal set!

Future efforts will be directed at deriving a compromise solution from the existing set of MAC proposals.

- Issue working.

- Used 5 smaller breakout groups to process issues in parallel.
- Many Issues looked at.
- Recommendations for closure made.
- Not enough time to review recommendations in full MAC group at this mtg.
- Anticipate closures at Sept mtg.

**Issues Processed at May 93 meeting.**

- No formal decisions to be ratified at this meeting.

But just wait until September

**MAC Agenda Subjects and Goals for Sept 93 mtg.**

- Issue working -

Increased use of small breakout groups to handle issues.

- Will drive toward creating a MAC proposal which derives from the current proposals.
- Drafting of text for insertion into draft standard to reflect closed issues.
- Discussion of impacts of July IP disclosures.
- MAC/PHY layering and interface.

## 10.2 PHY, by Larry van der Jagt

## New issues

- (1) What are the values in the template defined in the current version of 93/83 relating to DSSS PHYs.
- (2) What are the values in the template defined in the current version of 93/83 relating to FH PHYs.

## Processed motion

To put forward in full to the PHY subgroup all proposals for the DSSS PHY by the Sept. meeting, alternative proposals will only be considered after 50% approval by the PHY subgroup.

## Other needs

Need Vic to start the process with the executive committee to relax 1 Mbit/s constraint of the PAR to lower level.

Dave Bagby: worried that we may get below the 1 Mbit/s mark as a result of things compensated for. We should not be not aiming there.

Larry: what we want is that if at some time we find we can increase throughput by going to a lower data rate we don't want it to be out of the question.

Dave B: why don't we ask when we have decided it's needed?

Larry: there would be a delay of several meetings that way, at least.

Larry displays the text of the motion shown below. The main advantage is simplest possible scheme consistent with 1 Mbit/s raw signalling rate and FCC part 15.247. Main disadvantage is there may be schemes that offer higher signalling rates without higher complexity.

Dave B: changing rate is not considered to be a different PHY?

Larry: personally would consider it a different PHY, achieved through a different modulation method. But group didn't discuss that question.

Bob ?: group discussed switching to a different modulation scheme which is implementally very similarly to this. The idea is we are in the near field.

Dave B: dynamic switching between signalling rate is the intent?

Bob ?: yes.

Larry: we adopted for further study stations being able to identify what type of modulation is being used and be able to switch during the incoming PHY header to what he sees.

Dave B: is the hope to hide the switching so the MAC never knows?

Larry: let the PHY figure it out and deliver it.

Dave B: only thought about this for a few minutes, so don't have a strong position, but do have concerns about dynamic changes in signalling rate. If hidden in PHY and MAC never knows, if reflected up, it's not nice to think about APs that have to choose rate per packet. Several protocols in the MAC group have assumptions that for at least some portion they can get information to all stations. Would be more comfortable if it was less dynamic, a different PHY.

John McKown: sense in PHY was definitely not that everything got hidden in the PHY. Expecting consequences in the upper layers. Also agree many MAC proposals haven't mentioned this topic because no one ever thought about it. Advantage is that you could have 802.11 compliance and higher performance, perhaps proprietary schemes recognized. Capability for interoperability. At least one CAI specified and others can be implemented. No matter what you do the AP will probably have to keep a list of parameters for each correspondent - for instance what antenna to use. If you have list why not add this?

Nathan Silberman: Dave's concern is valid. MAC will have to deal with higher data rates as a parameter. The joint group will have to decide these data rates. There is an impact at system levels, the CF or AP will have to negotiate what is the best speed for each connection. That is an issue to be worked out.

Kerry Lynn: before we travel too far down this road, we need a joint session to talk about this.

Larry: that's a good way to implement the further study.

Dave B: distinction - agree that the MAC needs to deal with higher data rates. But the issue is not high/low rate, it is whether the rate is static or dynamic. Thinks we have been assuming static. The concept of a base rate then do what you want (as John said) - a lot of people are here because multi-vendor interoperability is important. It is a question of degree - one rate is easy, 2 is a bit complicated, the more you get the less chance you have a vendor interoperability. The complexity isn't worth it. Do we attempt to standardize all rates?

John: jumps in speed will be substantial in the list of rates. The number of choices doesn't matter as long as you can support it.

Mike Rothenberg: idea is have dual mode static receiver. In the future, maybe close, a scheme that allows more rates will come. Transceivers which support high rate need to be compatible with those that support the lower rate. There is always a rate which is common to all, then 2 transceivers that support higher rate can use that high rate between them. Static rate for each conversation. Voted against this motion in the PHY group - this is a poor political compromise of a good scheme. GMSK is a good scheme. To overcome the political barrier of 1 Mbit/s we are getting a poor model providing poor performance. The real throughput would be higher with 800 kbit/s rate than this. Suggest table this motion until we get direction from the executive committee, and if we can downgrade the speed. That gives more time to get more information on higher rates with higher performance.

Dick Walvis: comment to Dave - would be highly disappointed if the MAC that did not support multiple data rates. Might be helpful to tell what kind of vote margin was in the PHY group

PHY group: 1. straw poll of voting members (16,4,2); 2. motion vote (39,5,5).

**Motion #1: Original:**

All 802.11 FH PHYs shall be capable of operating using GFSK with BT=.5 and a minimum deviation of 160 kHz with a data rate of 1 MBIT/S.

A means for negotiating a switch to higher data rates from the data rate defined above is also for further study.

**After amended by amended motion #3:**

802.11 2.4 to 2.5 GHz FH PHYs shall be capable of operating using GFSK with BT=.5 and a minimum deviation of 160 kHz with a data rate of 1 MBIT/S.

A means for negotiating a switch to higher data rates from the data rate defined above is also for further study.

Moved by: Dick Walvis

Seconded by: Peter Cripps

**Motion #1 Discussion:**

Bob C: agrees if rate negotiated on association or connection basis, might not be the end of the world. But if every time you received a packet - that's not what LANs are. Heard political compromise mentioned - that we have 2 rates due to a political compromise that allows choose one now and work on a better one. Would rather hear motion that says this is what we choose now but if we can make it better we will..

Larry: Personally thinks more likely to be back asking for change from 1 Mbit/s to 800 kbit/s.

**Motion #2: to amend motion #1 to remove 2nd and 3rd paragraph.**

Moved by: Bob Crowder

Seconded by: none



Bob C: the sense of motion #1 is incorrect. If you will come back later and ask for a second rate say that.

Larry: the sense of the motion is exactly what it says.

Bob ?: question is higher rates can be built upon the foundation of the first paragraph with the caveats expressed here (thinks the PHY group feels). Stress interoperability, and higher rate is a later option.

Chandos Rypinski: we're not recognizing the true mistake. Has been opposed to an FH PHY for some time. The problem is that at 1 Mbit/s we can't offer an effective LAN - it will be less successful than 1BASE5. If we fix the modulation we are comparing functionally adequate modulation of 800 kbit/s or so, with another that will do better. Really wonder if we're fixing this by playing with small parameters.

Dave B: after more thought, sees this as not only a case of dynamic rate changing but 2 rates simultaneously the system must handle. From PHY viewpoint it's no problem - negotiate and get them to run at a higher/lower rate. But think about APs and stations - that is one to many. At the one point what rate does it run? It has to change depending on who it is talking to. There be dragons here. Is concerned about the motion - it says "all 802.11 FH PHYs shall be capable of". What does capable mean - they can, do all degrade to that ... Would be happier if friendly amendment to say instead of "all", "first PHY we are working on" or something.

Larry: weakness in motion is that FH PHY in 2.4 GHz conforms to 15.247 which is the only thing being worked on now.

**Motion #3:**

**Original:**

to amend motion #1 by:

- (1) replace "FH PHYs" with "2.4 GHz ISM FH PHYs operating under FCC 15.247";
- (2) remove first word "all".

**After amended by motion #4:**

to amend motion #1 by:

- (1) replace "FH PHYs" with "2.4 to 2.5 GHz FH PHYs";
- (2) remove first word "all".

Moved by: Dave Bagby  
Seconded by: Paul Eastman

**Motion #3 Discussion:**

Mike R: against this amendment. Dave's concerns are exaggerated. Directional antenna have to be dealt with, so rate can be handled the same way. This may produce companies' equipment that are not interoperable. If these words are added we have a decrease in degree of interoperability and cost.

Jim McDonald: suggest to be more general say "2.4 to 2.5" instead.

Dick: what about if it said 19.something and the international equivalent?

Larry: how about 15.247 and international equivalents?

Jim M: wide frequency band of ETSI is not exactly equivalent.

Larry: we don't have a work item to work in any band but this.

**Motion #4:**

to amend the amendment of motion #3 to:

- (1) replace "2.4 GHz ISM" with "2.4 to 2.5 GHz band";
- (2) remove "operating under FCC 15.247".

Moved by: Jim McDonald  
Seconded by: Paul Eastman

**Motion #4 Discussion:**

Dave B: calls the question motion #4, seconded by Bob Crowder. Vote (35,0,1)

Approved: 33      Opposed: 0      Abstain: 3      ***Motion #4 passes***

**Return to Motion #3 Discussion:**

Dave B: calls the question motion #3, seconded by Jim Schuessler. Vote (31,2,2)

Approved: 34      Opposed: 0      Abstain: 4      ***Motion #3 passes***

**Return to Motion #1 Discussion:**

Dave B: with clarification now understands the intent of motion #1. Still has concerns but we can work around them. Calls the question motion #1, seconded by John McKown. Vote (32,5,3)

Approved: 30      Opposed: 4      Abstain: 7      ***Motion #1 passes***

**Other Meeting**

Interested people in higher data rate PHY will meet around San Francisco on August 23, 1993. Wayne Moyers is contact.

***Motion #5:***      **to adjourn for lunch until 1:30**

Moved by:      Leon Scaldeferri

Seconded by:      Paul Eastman

**Motion Discussion:**

Bob C: approximately 80 copies of Bob's MAC proposal paper are in a pile at the back of the room - it will mailed, so please leave them for MAC subgroup first.

Approved: a lot      Opposed: -      Abstain: -      ***Motion #5 passes***

**IR PHY ad hoc group report, by Tom Baumgartner**

Well attended - nothing to do Monday AM at Plenary syndrome.

No submissions.

Talked about those items that cross the boundary between the IR PHY and the MAC - there is a list in the minutes - I suspect it is not complete yet.

We agreed that we will concentrate on diffuse IR first initial specification, but that we need to keep aware of the docking station type of application

Talked about the proposed modulation methods- they are BPSK, Manchester, PPM, and RZBI.

Larry van der Jagt, being the chairman of the PHY group has input that must be recognized. He is big proponent of not using baseband modulation - he would accept Manchester as a subset of BPSK.

The two companies at the meeting that spoke up are building products based on and are proponents of baseband modulation

We developed a list of items that each modulation method will be measured against and proponents of each method are encouraged to come to the next meeting with answers to these items

We agreed that first specification will probably be 1 Mbit/s but I believe that over time higher data rates will be added.

The only preamble length proposed was 3 octets.

Our goal is a draft standard by November meeting but many of most directly involved expressed time constraints that will limit their ability to contribute as much as they would like.

**Discussion:**

Arnulf Simmon: would like to add to the IR group next agenda. Like to open the scope so we're not boxed in with respect to high populations. We need lower and higher data rates, and we need multi-channel support.

Tom Phinney: cautionary note for whoever proposes bit stuffing (which has a Hamming distance of 2), there is and 802 functional requirement for a Hamming distance of 4 that can't be satisfied with that. The executive committee has turned down all previous requests for relaxing that requirement. This would be a major obstacle to overcome.

### 10.3 Joint MAC/PHY, by Vic Hayes

Papers heard: 93/94, 93/108, 93/104.

Comments from the PHY group about the need to work with the MAC on the convergence layer.

Alert from PHY group about the closing of the issue on FH modulation to come at the plenary.

### 10.4 Regulations Committee, by Dave Bagby

Met two evenings this week.

**Motion #6:**

That 802.11 authorize the filling of FCC reply comments, (text to be finalized by the usual editorial, exec com and legal review process) relating to the comments filed re the WINForum and UTAM proposals.

Said filling to convey the following positions:

1) Reiterate our previous key positions including

a) that more spectrum is needed than the amount proposed.

b) the spectrum is needed now.

2) That any exclusively isochronous allocation does not meet the needs of 802.11.

Moved by:

Dave Bagby

Seconded by:

Chandos Rypinski

**Motion Discussion:**

Larry van der Jagt: should you mention that we haven't even been working on a standard for the band they gave us because it's not enough?

Dave B: we want to say thank you very very much, we are very grateful, but we need more. We don't want to imply that we don't even want what they gave us

John McKown: would like to point out the wiliness of our opponent (who says it should be all isochronous), who gave as a reason that we said 20 MHz was not enough meant we were saying we don't want it, take it.

Dave B: the work under draft goes out of it's way to not to make that impression.

John: Larry, why did you say what you did?

Larry: because there's still a lot of regulatory wrangling, and because with the small amount granted we haven't had a push for the PHY to work in that band.

John: we didn't take any motions that said we didn't care about it.

Larry: you are quite right, we are very interested. Should we have more bandwidth allocated no doubt we would immediately begin planning for use of that band.

Dave B: that's what we are trying to say - boy, would we go after that if you made it more.

Approved: 33

Opposed: 0

Abstain: 1

*Motion #6 passes*

Final text will get a document number and be in a future mailing.

## 11. Unfinished Business

**11.1 Recap of Output Documents:** only the document Dave Bagby talked about, to go through the executive committee and get ready for filing to the FCC.

**11.2 Recap of Document Distribution:** please make sure files and originals, with headers and footers, are given to Vic for this meeting's submissions. Also ask all authors to give Vic copies on diskettes. The electronic copies will go onto the FTP server, which is called atg.apple.com.

Bill is putting documents up there (on the FTP server) in the format received.

### 11.3 Next Meeting

(1) Objectives for next meeting - see the PHY and MAC subgroup reports.

#### MAC

- working on issue list
- driver towards creating a MAC protocol
- drafting text for insertion into standard
- discussion on impact of July intellectual property disclosures
- MAC/PHY interface

#### PHY

- closing 24.11 PHY headers and preambles
- work on wording of FH PHY specification
- closing proposals for DS PHY specification
- continue work on IR and DS template

(2) Last Mailing Date:

For first mailing, July 26 1993, in Vic's hands.

For last mailing August 26, 1993, in Vic's hands.

**11.4 Other Intermediate Meetings:** Ad hoc meeting on higher data rate FH PHY in San Francisco area on August 23, 1993. Contact Wayne Moyers if interested.

### 11.5 Future Meetings:

Sept 20-23, Atlanta, host LXE.  
Holiday Inn Buckhead  
2240 Peachtree Road, NE  
Atlanta, GA 30326

Phone: +1 404 231 1234  
FAX: +1 404 231 5236

|          |                    |                                |
|----------|--------------------|--------------------------------|
| Contact: | Deborah Lee Pastor | +1 404 447 4224 extension 3222 |
|          | Frederica Carter   | +1 404 447 4224 extension 138  |

Meeting fee approximately \$43.83.

Accommodation \$84.50 (including tax). Reserve before September 3, 1993 - please reserve early as there is another conference at the same time.

**11.6 Intellectual property statement:** refer to the paper passed out - IEEE Standards 1993 Operations Manual, section 6.3 Patents.

## 12. New Business:

### 12.1 Press and meeting fees

At the last plenary the ExCom voted that everyone, including members of the press, had to pay the fee if they were here attending meetings. They take up a place and use the facilities just like everyone else. Again this meeting Vic got a question from the 802 chair asking if the vote happened again would Vic vote again that everyone has to pay. So Vic would like to see if he represents the group in this.

Ron Bjorklund: if the idea is to allow or encourage the press to attend, that would inhibit a lot of free discussion - it does everywhere else in the world. Don't make it easier for the press to attend than anyone else.

Loring Wirbel: unofficially representing the press - this was not brought up with a skin-flint intent. Someone had heard that other committees had such an arrangement. As far as open discussion in front of the press, don't worry - we don't print scurrilous or obscene material.

Straw poll - everybody pays fee full including press: (51, 0, 6)

### 12.2 What's going on with the 100 Mbit/s PAR(s)?

Chandos Rypinski wonders has the vote in ExCom on the 100 Mbit/s PAR come up yet? And, is it something we should be discussing here?

Vic: maybe but I'm not prepared to do so. The vote will be tonight. Have seen two PARs - 100 Mbit/s system within 802.3, and another to make 802.12 100 Mbit/s demand traffic service.

Dave Bagby: has heard that 802.12 could overlap the problems we are trying to solve. Maybe you need to know sensitive issues before you vote on this.

Paul Eastman: it has nothing to do with wireless.

unidentified: has been keeping up with this. Briefly - one proposal is to turn up the speed on Ethernet to 100 Mbit/s, shrink clock and reduce distance to be between station and hub. That would go into 802.3. The other is 100BASE-VG, which is an entirely new MAC protocol that includes synchronous service similar to what we call isochronous here (which really isn't). It is a station to hub approach. The first leverages over FDDI especially TP-PMD, even using 4b5b code, category 5 wire, while the second targets category 3 wire and uses 4 pairs instead of 3.

Larry: from my point of view I doubt whether we could have anything to say about what they want to do. 802.1 proposal they want to define a hub that handles asynchronous and isochronous over area of 100m - don't believe there is anything 10 Mbit/s oriented in that. Sounds like demand assigned TBS that our MAC has been doing. We have 802.9 that is isochronous and hub based. We have 802.11 working on a hub thing. Now we have 802.12 too. But doubt we can do anything about it.

Wayne Moyers: 100BASE-VG used 4 twisted pair unshielded with amazing results, full duplex. It's got a very impressive set of operating characteristics.

Loring Wirbel: 802.3 recommended 802.12 to the ExCom. Wanted to keep the first 100 Mbit/s proposal in 802.3 and create a new group for the other. In March by 2/3 vote the group decided to reject all non CSMA proposals, but companies said they were building them like it or not. Wired line and structured hub use only - so overlap with 802.11 is minimal.

Tom Phinney: characterizes 100BASEvg as "Ethernet in frame only".

Tom Tsoulogiannis: rumor that higher rate 200 Mbps token ring being proposed too.

#### **Motion #7:**

**Vic should not be constrained by this group as to how to vote on PARS 100BASE-X and 100BASE-VG.**

Moved by: Paul Eastman  
 Seconded by: Wayne Moyers

**Motion Discussion:**

Tom Phinney: calls the question, Chandos Rypinski seconds. Vote: (36,1,4)

Approved: 25      Opposed: 6      Abstain: 2      ***Motion #7 passes***

Straw poll

Pro 100BASE-X: (22, 2, 29)  
 Pro 110BASE-VG: (7, 17, 36)  
 Pro both: (5, 19, 32)

Bob Crowder would like to point out that, he has sat in a lot of 802.3 meetings, and it is a normal tactic for them to first attempt to vote out proposals, then submit something like this that says all or nothing. If they try to block you - vote it all out. They'll come back.

**12.3 Facilitating request for lower data rate**

Tom Phinney suggests submitting the following to the executive committee, the motion text as well as the background text:

Background

IEEE 802.11 wishes to extend its PAR to cover the additional data rate range of 100 Kbit/s - 1 Mb/s, after co-ordinating that extension with the standards agencies now chartered to work in this data rate range (e.g., ISA SP72)

This extension is needed

- a) to permit  $\geq 1$  Mb/s modems to fall back to lower (sub-1 Mbit/s) data rates when necessary, and
- b) to permit ANY form of operation in highly-congested areas, and in countries where only narrow band channels are available.

IEEE 802.11 is still intent on producing a  $\geq 1$  Mbit/s standard as its initial output.

**Motion #8:**      IEEE 802.11 requests permission of the IEEE 802.0 Executive Committee to begin the process of co-ordinating this PAR extension with the affected standards groups (e.g., ISA SP72).

IEEE 802.11 also requests an early indication from the Executive Committee of whether this PAR extension will be granted if the necessary co-ordination with the affected standards groups succeeds in gaining their permission for IEEE 802.11 to develop wireless standards in this data rate range.

Moved by: Tom Phinney  
 Seconded by: Bob Crowder

**Motion Discussion:**

Kerry Lynn: is there a danger that they would come back and say yes but only if you use it this way?

Tom P: probably not - they don't tend to interfere technically.

Ron Bjorklund: if we pursue this with any vigor, what about the affects on the WLAN market in general when we push lower speed than what the end user is wanting?

Tom P: reality is that the 802 parameters are in terms of raw data rate, not throughput. Most users are interested in throughput.

Dave Bagby: hears both sides, but speaks against the motion- would rather keep the motivation to solve the problems, rather than create a loop hole.

Wayne Moyers: speaks against the motion. Has been shown there are ways of getting reasonable throughput at 1 Mbit/s. We should not have to admit defeat to the world. ETSI RES 2 and 10 and Japan standards are higher - why should America take such a retrogressive stand. Falling back and admitting defeat is not the right thing.

Tom Tsoulogiannis: agrees with point (a). Doesn't like it if this allows people to have a low speed and fall back even lower.

Dean Kawaguchi: there are applications where less is acceptable.

Tom P: be aware that the group that holds the charter for this has a strong need for wireless in this speed range. The industrial group. The first LANs were for industrial process control. From the SP72 standpoint they would like a solution for this. Technology that works in 802 may scale backwards, but people will not develop for them if they are not chartered. There are people with a lot of money to pay for this in the industrial area.

Dave B: there are applications for lower rates, true, but that's not justification for this. Talk to the lower data rate people for that.. Expanding your turf is not good justification.

John McKown: intent is that 802.11 compliance requires you can send at 1 Mbit/s in addition to anything lower?

Tom P: that is not covered here. This just asks for permission to explore.

John: if intent is that compliance = 1 Mbit/s, then that's what we want. Then we have met the PAR and optional modes don't violate the PAR. Those modes wouldn't be in the standard and wouldn't be interoperable. If there is interoperability at lower rates there will be an affect on the market. You have fragmented interoperability.

Ron: echoes John. We had an earlier discussion about higher rates that said the same thing.

Chandos Rypinski: it is desirable for 802.11 to pick scale-able methods in MAC and PHY - reach rate constant, no magic reach. Also points out it is no trivial process to make antennae work at multiple rates. Hope we pick scale-able technology that the people outside of 802 could take and jump down on their own.

Arnulf: system should be driven by the market place. We are now using different rates in different systems. Standardization by default is always a bad standard.

Dean: to the application going down in rate is very simple in digital design. To make extensions that allow it within 802.11 is in the failure of meeting the market.

Wayne: we have passed a modulation constellation motion that limits us to 1 Mbit/s as is in FH PHY with great compromises to link margin. Larry van der Jagt has indicated to me that the real hidden agenda of this motion is to enable the use of coherent modulation. That gains us  $10^{-2}$  or  $10^{-5}$  in BER. If that's the purpose then recommends we do this, then select modulation scheme that does that.

Tom P: that's not my position, I have no hidden agenda. I produced this because people within 802.11 (not Larry) asked me "is there a way out of this box?". After thinking about it I thought maybe this was a way to do it.

Wayne: would like to amend the motion to say "to facilitate achievement of better link integrity".

Tom P: you are restating point (b). When there are 10 million of these out it may be hard to find any radio that works without fallback. Sees no reason to foreclose implementation possibilities.

Kerry: affect of motion seems to separate the political issue from technical issue, so it would be a good thing to pass this. Everytime we talk about lower rates the issue of the PAR comes up. Relaxing of this constraint would remove the political issues and allow progress.

Kerry Lynn calls the question, seconded by Carolyn Heide. Vote (28,2,1).

Approved: 8

Opposed: 17

Abstain: 3

*Motion #8 fails*

Bob C.: if you take this motion later, after you pass it there could be 9 months before you got permission to do this. The point was to remove the lag from the technical discussions.

**Motion #9:** to adjourn.

Moved by: Dave Bagby

Seconded by: Leon Scaldeferri

**Motion Discussion:** none

Approved: all

Opposed: -

Abstain: -

*Motion #9 passes*

13. Closure - meeting adjourned at 3:25 PM.

### Tentative Meeting Schedule

| Date  | Month | Year | Place               | Type    | Location                     | Host                       |
|-------|-------|------|---------------------|---------|------------------------------|----------------------------|
| 20-23 | Sept  | 1993 | Atlanta, GA         | Inter   | Holiday Inn Buckhead         | LXE                        |
| 08-12 | Nov   | 1993 | W Palm Beach, FL    | Plenary | Ramada Resort                |                            |
| 10-13 | Jan   | 1994 | San Jose area       | Inter   | TBD                          | WiSE,<br>NSC, or<br>Symbol |
| 07-11 | March | 1994 | Vancouver, BC       | Plenary | Hotel Vancouver              |                            |
| 09-12 | May   | 1994 | Oshawa, Ontario     | Inter   | GM of Canada                 | GM                         |
| 11-15 | July  | 1994 | Orlando, FL         | Plenary | Walt Disney Swan             |                            |
| TBD   | Sept  | 1994 | TBD                 | Inter   | TBD                          | Open                       |
| 07-11 | Nov   | 1994 | Incline Village, NV | Plenary | Hyatt Regency, Lake<br>Tahoe |                            |
| TBD   | Jan   | 1995 | TBD                 | Inter   |                              | Open                       |
| TBD   | Mar   | 1995 | TBD                 | Plenary |                              |                            |
| TBD   | May   | 1995 | TBD                 | Inter   |                              | Open                       |
| TBD   | July  | 1995 | TBD                 | Plenary |                              |                            |
| TBD   | Sept  | 1995 | TBD                 | Inter   |                              | Open                       |
| TBD   | Nov   | 1995 | TBD                 | Plenary |                              |                            |

We received invitations to host a meeting from DEC to Boston area, and ICIL to Hong Kong.



## Appendix 1 Attendance list

|                           |                               |   |    |
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# Appendix 1

## Attendance list (continuation)

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# Appendix 1

## Attendance list (continuation)

|                        |   |  |    |
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# Appendix 1

## Attendance list (continuation)

|                         |                                  |   |    |
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## Appendix 1

### Attendance list (continuation)

|                         |   |  |    |
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# Appendix 1

## Attendance list (continuation)

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## Appendix 2 Document list

### Documents distributed

|          |  |
|----------|--|
| #93/41R  | Indoor Wideband Propagation data, (Achatz, NTIA)   |
| #93/50   | MAC architecture proposal. MAC Protocol Proposal & Evaluation for BPF MAC - Best Features of Proposals (Bob Crowder, Ship Star)  |
| #93/53   | A Review of MAC requirements and a proposed decomposition method for selecting a WLAN MAC protocol (Bob Crowder, Ship Star)  |
| #93/60   | Frequency Hopping Pattern Set (PHY paper) (François Le Maut, IBM)  |
| #93/61   | MAC Framing (MAC Paper) (Frederic Bauchot, IBM)  |
| #93/76   | GFSK As a Modulation Scheme for A Frequency Hopped Phy (Jerry Socci, NSC)  |
| #83R1    | Draft Proposal for a FH and DS Spread Spectrum PHY Standard (Editor, Nathan Silberman)   |
| #93/ 94a | Slides for: Importance of Power Management in the MAC (Wim Diepstraten, NCR)   |
| #93/95a  | Slides for: Distributed access of WMAC and synchronization and power Management (Wim Diepstraten, NCR and Greg Ennis, Symbol Technologies)   |
| #93/97   | FQPSK: A modulation-power efficient RF amplification proposal for increased spectral efficiency and capacity GMSK and $\pi/4$ -QPSK compatible PHY standard (Dr. Kamilo Feher, University of California) |
| #93/98   | NTIA Data Extraction Tools (Larry van der Jagt, KII)   |
| #93/99   | CSMA-Radio Mobile MAC proposal (Philippe Jacquet, INRIA and  |
| #93/100  | CSMA-Radion Mobile meeting criteria (Paul Muhlethaler, Philippe Jacquet, INRIA)  |
| #93/101  | Capacity Radio Spectrum (Chan Rypinski, Lace Inc.)   |
| #93/102  | Discussion of modulation parms for the 2.4 FH PHY (Jim MacDonald, Motorola)  |
| #93/103  | Notice of Patent applicability (Bill Stevens, Apple)   |
| #93/104  | An RF Data Transport Protocol - The RF Adaption Sublayer and RF Physical Layer Specifications for Slow Hopping Spread Spectrum Radio LAN (Ed Geiger, Apple)  |
| #93/105  | Hidden terminal problem in Wireless LANs (Dick Allen, Apple Computer)  |
| #93/106  | Updated version of GRAP (KC Chen, )  |
| #93/107  | Performance of GRAP in multisel WLANs (KC Chen, )  |
| #93/108  | The need for a flexible standard (David Bantz, IBM)  |
| #93/109  | The importance of TX/RX time on the MAC protocol (Pablo Brenner)   |
| #93/110  | Some ideas on how to overcome TX/RX overhead (Pablo Brenner)   |
| #93/111  | Enhancements to the PHY layer proposal (Juan Grau, Proxim)   |
| #93/112  | Complex Impulse response measurements of a Warehouse (Bob Achatz, NTIA)  |
| #93/113  | Winforum etiquette (Dave Bagby, SUN, liaison)  |
| #93/114  | Interference immunity measurements on a 2 level CPSK transceiver (T. Blaney, P Chadwick)   |

Appendix 3  
Document list

Document number assignments

|         |  |
|---------|--|
| #93/115 | Protocol layering alternatives for practical implementation (M. Fischer)                         |
| #93/116 | Reply comments   |
| #93/117 | Tentative minutes of the full Working Group meeting held July 12-16, 1993, Denver, CO            |
| #93/118 | Tentative minutes of the joint MAC/PHY groups meeting held July 12-16, 1993, Denver, CO          |
| #93/119 | Tentative minutes of the MAC Group meeting held July 12-16, 1993, Denver, CO                     |
| #93/120 | Tentative minutes of the PHY Group meeting held July 12-16, 1993, Denver, CO                     |
| #93/121 | Tentative minutes of the IR PHY ad-hoc meeting held July 12-16, 1993, Denver, CO                 |
| #93/122 | Tentative minutes of the DSSS PHY ad-hoc meeting held July 12-16, 1993, Denver, CO               |
| #93/123 | Tentative agenda for the IR PHY group at the September 20-23, Atlanta, GA, meeting               |
| #93/124 | Tentative agenda for the interim meeting of the Full Working Group, September 20-23, Atlanta, GA |
| #93/125 | Venue for the September 20-23, Atlanta, GA, meeting  |
| #93/126 | For joint MAC PHY (Larry Zuckerman, Integrated Circuit Systems Inc) joint MAC PHY                |
| #93/127 | For joint MAC PHY (Henry P. Ngai, D-Link Systems)  |