Tentative Minutes of the IEEE P802.11 Working Group

Interim Meeting
Chapel Hill, NC
January 13-16, 1992

Monday, January 13, 1992, Full Working Group

8:30 am - 12 noon.

The meeting was called to order at 8:30 AM, Vic Hayes, chairman of IEEE 802.11[1] being in the chair, Dick Allen note-taker, Vic Hayes final production of minutes.

1. Opening

Vic Hayes announced that the Vice Chairman position is open and will be filled in March. Bob Crowder will keep the attendance record. Marvin Sojka volunteered to keep the document collection and maintain it for the meeting.

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[1]The officers of the Working group are:

Mr. VICTOR **HAYES**
Chairman IEEE P802.11
NCR Systems Engineering B.V.
Architecture and Systems Management
Zadelstede 1-10
3431 JZ Nieuwegein, NL
E-Mail: Vic.Hayes@Utrecht.ncr.com
Phone: +31 3401 76528
Fax: +31 3402 39125
Telex: 47390

Mr. JAMES **NEELEY**
Vice Chairman IEEE P802.11
IBM
LAN Systems Design
POB 12195
Research Triangle Park NC 27709, USA
E-Mail: neeley@ralvmk.iinus1.ibm.com
Phone: 919 543 3259
Fax: 919 543 0159

Mr. MICHAEL **MASLEID**
Secretary/Editor P802.11
Inland Steel Co. MS 2-465
Process Automation Department
3210 Watling Street
East Chicago IN 46312, USA
Phones: 219 399 2454
Fax: 219 399 5714
E-Mail: masleid@pa881a.inland.com

Dr. JONATHON **CHEAH**
Editor P802.11
HUGHES Network Systems
10790 Roselle Street
San Diego CA 92121, USA
Phone: 619 453 7007
Fax: 619 546 1953
E-Mail: oscar!sv.dnet!jcheah@nosc.mil

Mr. CHANDOS **Rypinski**
Editor P802.11
LACE Inc.
921 Transport Way
Petaluma CA 94952, USA
Phone: 707 765 9627
Fax: 707 762 5328

François Simon (IBM) made the arrangements for this meeting.

1.1 **Roll Call**: All people in the room were invited to mention their names and affiliation.

1.2 **Voting rights.** The chair gave a brief summary of the voting rights rule and requested voting members to obtain their token for voting from Bob Crowder.

1.3 **Attendance list.** The attendance list is passed around mornings and afternoons. Initial the attendance list at the current morning or afternoon meeting.

1.3 **Logistics.** Document distribution at the meeting is done using pigeon holes (a file system) and will be maintained by François Simon. Note that you may use the pigeon holes for mail.

1.5 **Other announcements.** None

2. Approval of the minutes of the previous meeting

2.1 **Ft Lauderdale meeting** November 1991, Doc.11/91-131 - As there was no quorum, the minutes could not be approved.

2.2 **Matters arising from the minutes None.**

3. Reports

3.1 **Report from the Executive Committee meeting** Vic Hayes reported on the executive committee meeting held on 14 November 1991. The executive committee approved the en banc hearing document (11/91-132) as proposed by the Working Group. IBM, Apple and NCR provided the resources for legal review. The output of the reviewers was approved by the chairs of 802.11 and of 802. It was filed December 4, 1991 (11/91-136).

4. Registration of contributions

Appendix 2 lists the documents relevant for this meeting. Up to doc: 9 were available or announced to be available at this meeting.

5. Adoption of the Agenda

The agenda was amended (as reflected in those minutes) and subsequently approved.

Larry van der Jagt asked about members of the press in attendance at the meeting. Vic Hayes stated that meetings are open and anyone can attend. The information is in the public domain. The chair asked if members of the press would make himself known; nobody responded.

6. Liaison bodies

6.1 **Reports**

- T1

Rick Dayem could not attend this meeting, Chandos Rypinski announced that Rick would give a written report to the Irvine meeting.

- ETSI

Simon Black, our ETSI liaison (doc: 11/92-06) reported that ETSI had approved the establishment of STC RES-10 to work on HIPERLAN, i.e. a LAN for 100-1000 Mbit/s/hectare, >10 Mbit/s. Project team funded by ETSI will attend as formal liaison. Two subgroups have been formed: - 10S is requirements; - 10R is Radio. RES-10 will meet in March as a steering group. Target is a late 1994 draft standard specification.

- Japan

No report available.

- CCIR TG 8/1

Chandos Rypinski reported that Roger Fudge (British Telecom, UK) has filed a late contribution in rebuttal to adding Data PCS to FPLMTS.

6.2 Determine need for ad-hoc meetings

There was no need to establish an ad-hoc group for Liaison matters.

7. Regulatory bodies

Further distribution of letter to Administrations

Vic Hayes asked about further distribution of letter to administrations. Bill Stevens commented on the high value of sending it out. The sense of the meeting was to send it, asked by the chair, there were no objections. Vic has the ITU list.

7.1 US

Larry van der Jagt reported on the en banc hearing of the FCC. There were four panels of experts. The hearing opened with a statement by the Chairman of the FCC on the grave material importance and strong import on future competitiveness of the nation. He solicited input. Cable TV, cellular, telephone..all of these. All got their ideas on the table. Apple presented the case for data. It appeared to Larry that there was a need to solve both problems.

Dick Allen commented on the policy statement of the FCC calling for 1992 allocations in the 1.8-2.2 GHz band and including Data-PCS.

Vic Hayes noted that there were 75 requests for presenting and only 16 were chosen. We didn't make it. Our written submission was accepted and was filed on December 4.

No reports were available from **Japan or Australia**

- **Europe**

Simon Black reported that CEPT is considering a 5.2 GHz band as the current favorite. ETSI asked for 150 MHz. 17 GHz is also being discussed. Vic Hayes reported that next week the CEPT project teem meeting would study the 5.2-5.7 GHz band for RLANs on either a co-use or primary use basis. Vic will attend.

Category 1 LANs are low rate ISM band and are generic low power devices at 2.4-2.5 GHz. The Subcommittee RES 2 is working on measurement standards.

7.2 Determine need for ad-hoc meetings

There was no need to establish an ad-hoc group for regulatory bodies.

8. WLAN Requirements

8.1 Reports

Ken Biba reported: At the last meeting applications on a common metric were presented. Ken presented that at the meeting and took on the task of beginning to organize it. He solicited additional comments. Some were included in document 92/01 (distributed around the Holiday season as 92-xx), others were too late. He believes that the updates are not inconsistent with the intentions of the document. This is a draft work in process.

Ken based his work on the 802 Functional requirements. on the 802.11 PAR and on the Wireless Application surveys (54 scenarios) of applications in terms of MAC service requirements. The MAC measurements are: MSDU size distribution. MSDU arrival distribution. MAC transfer delay and standard deviation and maximum delay. MSDU loss rate (detected). Service initiation time (time for first MSDU to get started in the pipe.) Station speed (movement). % traffic destined for wireless stations.

From the 54 applications, Ken took the collected figures and "munged" the data using Excel spreadsheets. Look to median values for guidance as some large numbers biased the mean. MSDU "jitter" is the ratio of the standard deviation of the transfer delay to the transfer delay. So for all values the mean value window to receive is 2 times the transfer delay (a normalization of the standard deviation).

Dick Allen noted that the 50% of off-wireless traffic seems high. Bob Crowder stated that the industrial group are asking for high data rates and very efficient MACs. Vic Hayes suggests that in a column for units be added in all figures.

Ken Biba further reported that he plotted MSDU jitter vs normal transfer delay and found two categories: Jitter <1 (synchronous traffic which is intolerant of delay) and Jitter >=1 (asynchronous traffic which is tolerant of delay). This introduces the notion of tightly coupled to time or not tightly coupled to time.

It was questioned whether the minimum speed could be 2 Mbit/s and maximum 4 Mbit/s. Ken agreed. It was felt strange that the maximum transfer delay was the same as the nominal delay.

Ken reorganized the data in Fig. 3.9 on the basis of stations/hectare and he divided it into 4 classes:

<=10	21 or 5000;	100 m median	819 m mean
<= 100	36 or 1000;	100 m median	230 m mean
<=1000	45	50 m median	159 m mean
>1000	116 or 5000	15 m median	42 m mean

The big numbers are mostly from campus applications. Based on these observations it would seem that a BSA is less than or equal to 100 meters, with 10-50 as a typical size BSA, and that the ESA would extend to 1000 meters. Colocated nets were required to operate with disjoint administration. He added the following additional issues: Data security, Integrity, Service Desired, Authentication.

Chan Rypinski indicated that he had a problem with the definitions. He preferred to see histograms of the observations rather than mean or median values. He undertook to make histograms based on spread-sheet data made available by Ken.

Wim Diepstraten felt that roaming could not be achieved at the MAC layer. Ken disagreed and stated that roaming in an ESA can be accomplished by the MAC. Chan Rypinski suggested that roaming be changed into mobility.

Vic Hayes introduced doc: 92-3, received from a UK consultant through the help of Alan Flatman. The document states that hospitals would have a much higher range of applications. He pointed out that voice is too much of a burden and may kill the prime applications. Finally the requirements document is missing market data. Ken Biba responded that the original work did include marketing data, however, as it made no difference in the conclusion he took it out. The meeting would be interested to receive data regarding the specific MAC service attributes for inclusion in the survey. It was agreed that the chair would ask the author for specific data.

Vic Hayes noted that Alan Flatman commented on an old document? Wim Diepstraten asked how the document would be maintained. He indicated that he had additional information on retail. Ken Biba responded that his document should be used to guide our work and be updated. Bill Stevens reminded that comment from Tim Kwok on Multimedia that bandwidth should be included. Ken Biba requested that Tim rewrote the multimedia section.

Dave Bagby asked if Ken would have a facility to make change bars. Ken will see to a possibility.

8.2 Establish ad-hoc group

It was agreed to devote the Tuesday morning to an ad-hoc group for the Requirements document.

9. **PHY subgroup**

9.1 Terms of reference Larry van der Jagt explained (doc 91-133) that the last PHY meeting had a contribution on channel characteristics and had decided to break the PHY Layer in two sections: - a media dependent interface and a convergence layer to adapt the MAC to the PHY. He drew the attention to the PHY Template Document (92/04) and information available from the work in 802.4L (doc 92/05).

9.2 Goals The group will continue their work at this meeting.

10 **MAC subgroup**

10.1 Terms of reference Bob Crowder reminded that the MAC group (doc 91-138) has six topics to pursue: access methods, MAC/PHY interface, exported MAC Services, output architecture and routing issues. They identified 21 point to evaluate proposals for a MAC.

10.2 Goals The group will hear more proposals this week: Ken Biba's, Chan Rypinski's, Jonathon Cheah's (through Simon Black) and KS Natarayan's.

11. **Adjourn for subgroup and ad-hoc meetings** The meeting was adjourned around noon.

Monday, January 13, 1992, PM
Meetings of the PHY and MAC groups

Tuesday , 14 January, 1992, AM
Meeting of the WLAN Requirements document

Tuesday , 14 January, 1992, PM
Meetings of the PHY and MAC groups

Wednesday , 15 January, 1992, Full Working Group, AM

0. **Opening.** The meeting opened at 8:30am.

0.1 Announcements Vic Hayes had prepared an attendance list (92/18) and asked the members to review for mistakes and give him corrections. If you have a fax or email address please add it to the list.

For the May meeting we have arranged for a block reservation of 50 rooms which will be cancelled if reservations aren't made asap. Add wording to your reservation: "Pls reserve one of the block of 50 rooms for the IEEE P802.11 meeting organized by NCR." Not all the clerks are aware of the arrangement with IEEE so be sure to mention NCR. Answering questions, Vic Hayes indicated that the deadline for reservations were given in the venue, that there is a high demand for rooms because of a landscape/flower conference, and that therefore early reservations is a must. He will find roundtrip prices to the Netherlands'.

Chan Rypinski announced that he is trying to assemble a session for a WLAN for Vancouver in June of this year. If anyone would like a forum to present his views he would be welcome. He will put out the sheets. IEEE Vancouver, BC. Vic Hayes pointed out that the IEEE conference conflicts with another session in Paris at the same time.

François Simon announced that Jim Neeley sent him a call for papers for Dayton OH, Sept 17-18.

0.2 Temporary document list update

The document list now ends with number 18.

0.3 Agenda adjustments agenda item 12 A will be taken after all other reports.

12 Reports from sub and ad-hoc groups

12.1 Requirements Vic Hayes reported that the Requirements group met Tuesday AM. They reviewed documents 3, 8, 9, 15 and noted that comments were addressed to a previous version and had been incorporated in Ken's latest version. One submission drew our attention to additional applications in the hospital and Vic will call to get more information. Larry made editors instructions for the PHY section which will be given to Ken.

Then we discussed the procedure for the maintenance of the document. We agreed to make the requirements part formal and the appendices informal. We agreed to send it out for letter ballot and repeat until 75% approval is reached but it is preferred if there were no NO votes. Updates will be made by 75% vote at plenary meetings. So we changed the word living to something like working sessions at the plenary will change the document. Then we went to page-by-page mode and only got to page 2. The requirements group has requested more time at this plenary to continue.

The proposal is to go ahead with looking at this document immediately following this plenary meeting.

Dave Bagby felt that the process of going through the document page by page would produce a lot of trauma. It might be best to send it as it is and collect all the comments. You'll get back more coherent comments. Larry van der Jagt was concerned that the document would receive wide circulation. The world will see it once you send it out for letter ballot. Vic Hayes mentioned that it would only go to 802.11 plus executive committee. Chan Rypinski indicated that just the executive committee was a non trivial event. Vic Hayes reminded that members with voting rights have an obligation to vote. If you miss two times you may lose your voting rights.

Ken Biba: I've now drafted two versions. Few people have commented. Few have shown up at meetings to integrate those comments. I'd personally prefer to put this out for comments by a date certain. I'd like to take Dave's suggestion to force those constructive comments. Elsewhise, my experience suggests that we will not get the quality of review that we desire.

Bob Crowder proposed that we spend the rest of this morning to take specific comments that people have thought out. Ken Biba I'd like it not to go much longer. I'd like to scope that before the end of this time to allow me to give you a scope of how long. The chair concluded that we would spend the remaining two hours on important comments.

Ken Biba: The comment on how we use this and maintain it and evolve it is the most important. I acknowledge the imperfections but let's act.

Vic Hayes asked if the group could decide on the text of the letter ballot sheet. Bob Crowder thought that the chair should write the text. Vic Hayes will bring it to tomorrow afternoon's plenary meeting here.

12.3 PHY

Larry van der Jagt reported that the PHY group so far:

1. Reviewed PHY section of requirements document and discussed the softening statements in the requirements and asked that they be removed and replaced with more precise statements if they are found to be necessary and are possible to generate.
2. Reviewed the architecture as it existed in the PHY template and the methodology to define medium and MAC/PHY layer and the convergence layer.
3. Worked on how to parameterize the channel by: a. listing parameters; b. discussed possible models; c. attempted to define types of interference and parameters of that interference.

4. Discussed approaches for verifying conformance and generating the softening statements.

Liaison issues identified:

1. If the MAC/Distribution system transmits from multiple access points simultaneously, e.g. to improve illumination of an area will make work more difficult. This is because channel models will need to account for normal operation with multiple transmitters and a single receiver. It changes the multipath characteristics and requirements on transmit oscillators. Wim Diepstraten wandered if he meant simultaneously and synchronized; Larry van der Jagt confirmed. Then Wim Diepstraten asked if he included adjacent different cells. Larry van der Jagt confirmed again.

   Bob Rosenbaum asked if he meant different antennas. Larry van der Jagt said that if you mean different antennas from same source fed with coaxial cable from a central local oscillator that's one thing. If all the antennas have their own oscillators they won't be synchronized.

2. Is there a way we can settle in the near future on tools? i.e. Modeling software we can both use to minimize work involved. Bob Rosenbaum asked for any suggestions on simulators. Larry van der Jagt thought that we have a start on that by people who are trying to use Extend. Some of these take a day or two to run. Others have brought up Comdisco but that's very expensive. Dr. Rappaport will sell us ($1500) his but it isn't so suitable.

   Bob Rosenbaum knew that there were many groups that simulate waveforms but he did not know of anybody who has tried to simulate a MAC. Ken Biba mentioned that there are early simulations used by 802.3 and 802.5, but Bob Rosenbaum thought that they are very naive. Ken Biba had some skepticism as the measurements on real nets tend to follow the simulations.

   Ken Biba thought that it is possible to decouple MAC and PHY simulations. If we need a specialized tool for PHY simulations we can decouple it. Larry van der Jagt thought that if we could do both it would be better.

   Orest Storoshchuk sees three options: 1. use simulator 2. write code; 3. use SPICE derivatives e.g., delay lines, etc.; 4. find a simulator that does it for you. Even the high priced simulators require you to do a lot of your own functions. Ken Biba: One of the key things I discovered is that it forces you to make explicit assumptions about the interface between MAC and PHY. I suggest that the two groups define that. Need to characterize the media.

12.2 MAC

Bob Crowder reported that the MAC group heard two of 4 proposals we have before us: - K. Biba's and - Chan Rypinski's. During Ken's presentation most questions were answered. There were some remaining questions on Chan's. We plan to hear in March proposals from J. Cheah and KS Natarajan. Bob Crowder said that we may see possible additional future proposals from D. Bagby and Photonics.

The MAC group intends to do in the time remaining here: - develop questions to the PHY; - agree on procedures for evaluating proposals; - e may hear Simon's summary of Jonathon's paper. The group decided that they would make an evaluation of the proposals vs the 21 points when the proposals are complete. They will need to decide on whether to wait for more proposals or set a date.

12A Architecture

The chair gave the floor to Greg Hopkins chair of Windata, a little company in Northboro MA. He wanted to introduce to what they have been doing with apologies for differing terminology. Many of their requirements are different from what .11 are doing. Details of the protocol will be given in doc 92/71, copies available at noon today.

Requirements: Maximum possible data rate and packet throughput because of needs of serious enterprise-wide. Service areas like wired LANs. Support for standard wired lans and reliability consistent with wired lans. Customers tell them that needs are increasing dramatically 4>16>100. Needs of a workstation over 1 Mbit/s. More demanding net applications and more communications between applications, more graphics, more I/O and more multimedia. Goal was 10 Mbit/s with packet Throughput like Ethernet.

Service areas: 100 meters is a magic number. wiring schemes are based on that. Less than 50 meters would require more infrastructure. Support overlapping service areas. Design goal was 80 meters with overlapping service areas we could use a "crow flies" argument to handle the 100 meters requirement.

Support for 802.3 and 802.5 interfaces. The world is dominated by this. Customers are making commitments and software consequences are large. We didn't want a new interface.

Unlicensed operation: We got feedback that licensing and mobility were antithetical. We support all attempts to get new spectrum but pragmatically the bands we have now are not optimal but the ISM or low power are what we have. We chose 2.4 and 5.8 GHz. It looks like Japan will choose something to 2.4 GHz because more bandwidth was available and international compatibility.

Augment wired LANs vs replace them.

If a customer were building a new building I'd recommend that they install wiring. We must therefore connect to devices designed for wired LANs and provide easy connections.

Reliability: Raw bit error rate consistent with wired lans and adjust system operation due to changes in environment. Strong initialization to disallow or allow marginal stations. This drove them to an access point in their system.

AP (Hub) downlink at 5.8 GHz with uplink at 2.4 GHz makes receiver design easier. All spread spectrum and all time off 5.8 GHz stream. That simplifies transceiver design. There are 3 receivers in hub (Rake receivers). It is DSSS and they rely on CDMA to have overlapping hubs. They do power level control of 2.4 GHz transmitters so hubs see same power level. Can adjust clock rate from access point to transceiver. System operates at 6 mbit/s up and 6 mbit/s down data rates. At hub they have bridging function and SNMP net management functions. At transceiver have 10BaseT or AUI with Token Ring to follow. That is tricky because they change protocols on their system. Complexity of transmitter and receiver are discrete radios. IF and signal processing are single chips. Most are conversion from standard protocol to theirs. Multilevel PSK. Real time adjustment of Rake receiver so they can move boundaries to take advantage of the channel changes. 4-5 techniques including CDMA and registration to avoid locking onto wrong hub. Hubs run asynchronously but don't sync to each other initial implementation.

They could not build a high performance spread spectrum system without a hub. This band is a sewer and they have to provide clean water. Wiring hubs were selected over peer level systems because of reliability, segmentation, net management and ease of wiring. Even wired nets have moved to hubs. Theoretically doubles service area. Allows simplification of transceiver vs access point. continuous link on 5.8 GHz channel allows better initialization access and error control.

Power consumption is the dominant issue. SS at these data rates (6 and higher) and use of 5.8 GHz they can not make 50 mA but in foreseeable future can't our goal is AUI power. He is uncomfortable with 1 Mbit/s for LANs talking to real customers. He thinks a hub would still help in a portable system. Hub could do wake up function. They have not looked seriously at mobile stations. Pedestrian speeds should be ok but he is concerned about higher than that speed. He is also concerned about multipoint problems with delay spread. He has looked at IR systems they're looking at applications to help them out too. They will move to supply products to support a standard.

Plans: In process of putting together a system document and protocol. Their protocol looks a bit like Jonathon's. They have done a lot of channel modeling with Worchester Tech. It is a reservation scheme. Performance numbers they have now is better performance for larger packets less for shorter packets than Ethernet. They do some fragmentation.

Vic Hayes requests Greg, and other providers of submissions, to supply documents in standard format for 801.

header:

{month year} IEEE P802.11-92/n

footer:

Submission {page number} {name}

Times Roman, bold, 14 point

13. **Any other ad-hoc meetings to be established** There is no need for other ad-hoc groups

14. **Adjourn for subgroup and ad-hoc groups** The chair announces that we now discuss requirements until lunch, continue with MAC/PHY in afternoon and tomorrow morning and be back into plenary Thursday PM. The meeting adjourned at 9:42.

Wednesday , 15 January, 1992, AM
Meeting of the WLAN Requirements document

Wednesday , 15 January, 1992, PM
Meetings of the PHY and MAC groups

Thursday , 16 January, 1992, AM
Meetings of the PHY and MAC groups

Thursday PM, 16 January, 1992

0. **Opening** The chair calls the meeting to order around 1:00 pm.

0.1 Announcements on request from the floor the chair conducts a roll call.

0.2 Temporary document list update No updates required.

0.3 Agenda adjustments It was agreed to deal with agenda item 15 after agenda item 17.

16. Reports from subgroup ad-hoc groups

- Requirements

The group held a section by section review, agreed changes were recorded and will be used by the editor to update the document. The resulting document will be sent out for letter ballot with a ballot letter and a recap of the rules for balloting.

- PHY

Larry van der Jagt reported that the PHY group reviewed symbols that might be passed across the MAC-PHY interface. This was in the vein of attempting to enumerate possibilities and probabilities.

{PAD-IDLE}	
{a1,.....an}	some number of data symbols
{S/N1.....S/Nn}	some number of levels of signal to interference ratios
{P1.....Pn}	some number of levels of received power or transmit power levels
{SQ1,.....SQn}	some number of squelch level
{CH1,.....CHn}	some number of channel select signals
{D1,.....Dn}	some number of diversity select signals

{AP1,.....APn} some number of aperture select signals
{Carrier Detect}
{Symbol clock lock}
{Silence}
{n frame}

They also developed the concept that a "data" pipe and a "management" pipe that can operate simultaneously in the MAC-PHY interface are required.

Objectives for next meeting:
* work on channel characteristics
* work on issues arising from todays MAC group meeting
* accept proposals if any are offered
* work on MAC-PHY interface definition

- MAC

Dave Bagby reported that the MAC group spent some time to see what was wanted from the PHY. The issue of where to put the complexity was discussed and then what is the absolute minimum on the interface? The bare bone minimum seems to be all the data the MAC at other end needs. But then who should control possible directional antennae? A list of things that might to go forth and back was prepared.

We need simulations of MAC protocols and therefore request for information to all recipients of this paper. Two packages were mentioned: Extend and Bones. However, one did not know their usefulness.

Bob Rosenbaum reminded that at the Ft Lauderdale meeting Comdisco made an offer for their package. Orest reported that they would be willing provide services at the University tariff of US$ 400.-- per hour.

Mathlab was mentioned, however it was not felt appropriate for MAC simulations. Nobody knew any tools running on IBM PC

Objectives for the next meeting:

More time was required than the session would permit....

* review proposals from Dr. Jonathon Cheah and Dr. KS Natarayan by giving short review followed by stack up against 21 criteria. and some interactive time.

* review additional proposals if any. Proposals from Sun and Windata are expected.

A discussion arose as to how members could be guided to as to which document will be addressed at the meeting, as the working group has already an impressive file with a wealth of data. The chair proposed to make a current document list and replace all "older" packages at the document order center. This could include the danger that we throw away valuable information. It was felt better to make half year packages and keep all docs current.

NOTE from Chair: The host of a meeting, or a member living close to a Plenary meeting will be invited in the future to bring all documents to the meeting place. Chan Rypinski will bring a full set to Irvine.

Larry van der Jagt asked to go back to PHY and reported that they intend to develop sets of "realistic" channel models and channel scenarios that can be used to harden/soften the PHY characteristic statements.

The degree to which these actually represent reality is dependent on how closely the particular instance of medium matches the "realistic" models.

The chair asked whether the two groups would make their own, separate mailing lists. At this time it was not good to separate, therefore 802.11 continues with a single mailing list.

17. **Review of document list**

17.1 Approval of output documents

Requirements document

Dave Bagby **moved**, second by Simon Black: **To send the next version of the WLAN Requirements document out for letter ballot with the ballot letter as modified.** result: 8Y, 0N, 1A, ***The motion passes***

17.2 Destination of input documents

Those documents distributed at an earlir mailing were voided.

15. **Tentative Meeting schedule**

Date	Month	Year	Place	type	Location	Host
13-16	January	1992	Raleigh, NC	Inter	Omni Europa	IBM
9-13	March	1992	Irvine, CA	Plenry	Irvine Marriott Hotel	
11-14	May	1992	Leiden, Netherlands	Inter	Holiday Inn	NCR
6-10	July	1992	Bloomington, MN	Plenry	Radisson Plaza South	
14-17	Septemb	1992	Chicago area	Inter	TBD	Motorola
9-13	November	1992	La Jolla, CA	Plenry	Hyatt Regency Hotel	
TBD	January	1993	Los Angeles area	Inter	TBD	Xircom
8-12	March	1993	?New Orleans/ Hilton Head?	Plenry	TBD	
TBD	May	1993	Baltimore area	Inter	TBD	Ship Star
12-16	July	1993	Denver, CO?/	Plenry	Sheraton Denver Tech Center	
TBD	Septemb	1993	TBD	Inter	TBD	Open
8-12	November	1993	?Ft. L'dale, FL	Plenry	Crown Sterling Suites	

Invitations pending from GM to Oshawa and LXE to Atlanta.

15.1 Objectives for the Irvine, CA, meeting The following objectives for the March meeting were established:

* Review Letter ballot results on Requirements
  - Consider Security/Authorization Req.
* Continue MAC/PHY interface def.
  - Review existing and new protocol proposals,
  - work on channel characterization
* Review the schedule to come to standard
* reaffirmation of officers

15.2 Last Mailing date Documents for distribution should be in Vic's office on or before 7 February.

15.3 Any other intermediate meeting needed? It was agreed to plan for Monday, 9 March, AM. meetings for the MAC group and for the PHY group.

15.4 **Confirmation of the May meeting** The meeting was confirmed. The chairman reminded that the following sentence would be helpful in the reservation. "Pls reserve one of the block of 50 rooms for the IEEE P802.11 meeting organized by NCR."

On request the chair gave the following information re air fares:

Air fares via KLM , fixed booking, paid in full 30 days before departure, minimal 7 days, maximal 21 days

	week	FRI,SAT,SUN	
ATL-AMS	806	866	round-trip
LAX-AMS	876	936	round-trip

(use sum of halves for segments in differing times) One was suggested to contact Mr. YOGEL, President of Atlanta Company travel 404 255 8323 for discount fares or group travel.

18. **Any other business** The chair thanked IBM for the excellent facilities provided and showed his appreciation with the traditional package of flower bulbs for François Simon.

19. **Closure** The session was adjourned around 4 PM.

Appendix 1
Attendance list

Mr. RICHARD C. ALLEN	Apple Computer Inc	+1 408 974 2880
Mr. DAVE BAGBY	Sun Microsystems labs Inc	+1 415 336 1631
Dr. DAVID BANTZ	IBM Corporation	+1 914 784 6808
Mr. T. CHRIS BAUCOM	IBM	+1 919 254 4974
Mr. KEN BIBA	Xircom	+1 818 878 7600
Mr. SIMON BLACK	Symbionics	+44 223 421025
Mr. DALE BUCHHOLZ	Motorola Inc.	+1 708 632 5146
Mr. MIKE CHEPONIS	EO Computer	+1 415 694 7337
Mr. BURCHALL COOPER	LXE	+1 404 4474224
Mr. ROBERT S. CROWDER	Ship Star Associates Inc	+1 302 738 7782
Mr. WIM DIEPSTRATEN	NCR Systems Engineering B.V.	+31 3402 76482
Mr. JOHN W. ENG	Digital	+1 508 486 7734
Mr. ROBERT GAUTHIER	Rockwell International	+1 714 833 4189
Mr. RANDY HAAGENS	Hewlett Packard M/S R3NF	+1 916 785 4578
Mr. VICTOR HAYES	NCR Systems Engineering B.V	+31 3402 76528
Mr. JAMES HEALY	O'Neill Communications Inc	+1 609 497 6800
Ms. CAROLYN L. HEIDE	Spectrix Corp	+1 708 491 4543
Mr. DONALD E. HEINS	IBM	+1 919 848 5254
Mr. DEWAYNE HENDRICKS	Tetherless Access Ltd	+1 510 657 5616
Mr. GREGORY T. HOPKINS	WINDATA	+1 508 393 3330
Mr. LARRY van der JAGT	Knowledge Implementations Inc	+1 914 986 3492
Mr. W.S. -WALT- JOHNSON	Photonics Corp	+1 408 370 3172
Mr. YOSHIHISA KAWAMURA	Digital Equipment Corporation Japan	
Mr. KENNETH KENNEDY	Cabletron Systems	+1 603 332 9400
Mr. BENN KOBB	New Signals Research	+1 703 715 6165
Mr. RAJEEV KRISHNAMOORTHY	NCR	+1 303 223 5100
Mr. MIKE S. LECLERE	Hewlett Packard	+1 916 785 4289
Mr. RICHARD LEE	Spectrix Corporation	+1 708 251 5378
Mr. DANIEL E. LEWIS	Telxon	+1 216 867 3700
Mr. JIM LOVETTE	Apple Computer Inc	+1 408 974 1418
Dr. AKIRA MIURA	Panasonic	+1 415 858 1000
Mr. ROY MIYANO	ALPS Electric (USA) Inc.	+1 408 432 6458
Mr. FRANK MOORE	National Semiconductor	+1 408 721 7187
Dr. K.S. NATARAJAN	IBM T.J. Watson Research Center	+1 914 784 7844
Mr. FRANK O'NEILL	LXE Inc	+1 404 447 4224
Mr. ROBERT H. ROSENBAUM	WINDATA	+1 508 393 3330
Mr. CHANDOS RYPINSKI	LACE Inc.	+1 707 765 9627
Mr. JAMES E. SCHUESSLER	National Semiconductor	+1 408 721 6802

Appendix 1
Attendance list (continuation)

Mr. MICHAEL SERRONE	Diablo Research Corp	+1 408 730 9555
Dr. R.ANTHONY SHOBER	AT&T Bell Laboratories	+1 908 949 7991
Mr. FRANçOIS Y. SIMON	IBM	+1 919 254 4584
Mr. DUANE SMITH	Rockwell International	+1 714 833 6453
Mr. MARVIN SOJKA	Norand corporation	+1 319 369 3564
Mr. WILLIAM M. STEVENS	Apple Computer Inc	+1 408 974 6307
Mr. OREST L. STOROSHCHUK	General Motors of Canada	+1 416 644 6994
Mr. R.E. -DICK- WEADON	S/W'ern Bell Techn Reas Inc	+1 314 529 7517

Appendix 2
Document list

91-129	Report of Joint CCIR-CCITT meeting on FPLMTS
91-130	Communications requirements of Multimedia applications: A preliminary study (Timothy Kwok, Apple Computer)
91-131	Tentative minutes of the November 1991 meeting
91-132	Remarks of Victor Hayes to FCC en banc hearing (Excom input version)
91-133	PHY ad-hoc group report
91-134	Tentative agenda for the January 1992 meeting
91-135	Void
91-136	Remarks of Victor Hayes to FCC en banc hearing (As filed)
91-137	Summary of requirements for Multimedia applications: a preliminary study
91-138	MAC ad-hoc group report
92/1	Requirements document, Draft January 1992
92/2	Slotted ALOHA Demand Assignment Multiple Access MAC Layer Description (Jonathon Y. C. Cheah, HNS)
92/3	Comment on Requirements Document (91-108) (G.A. Kellett, Scientific_Generics)
92/4	Explanation of the PHY Layer Template Document (Larry van der Jagt, Knowledge Implementations, Inc.)
92/5	Void 802.4L Data (Larry van der Jagt, Knowledge Implementations, Inc.)
92/6	Liaison - ETSI STC RES-10 (Simon Black, Symbionics)
92/7	Proposal for Wireless Architecture (Bob Rosenbaum, WINDATA)
92/8	Comments on 802.11 WLAN Requirements Document 91-108 (Alan Flatman, ICL)
92/9	Comments on requirements document (802.11/91-108 (Simon, Symbionics)
92/10	Proposal For Physical Layer Specifications of A Diffuse Infrared Medium (David Waskevich, Spectrix Corp)
92/11	Efficiency Factors in Design of Access Method (Chandos A. Rypinski, LACE)
92/12	Description of Management Functions (Chandos A. Rypinski, LACE)

Appendix 2
Document list (continuation)

92/13	Wireless LAN Access Protocol Development, Simulation and Demonstration (Chandos A. Rypinski, LACE)
92/14	An Update to the Hybrid Wireless MAC Protocol Supporting Asynchronous and Synchronous MSDU Delivery Services (Ken Biba, Xircom)
92/15	Additional requirements for Appendix G in the IEEE Requirements Document IEEE P802.11-92/01 (Wim Diepstraten, NCR/AT&T)
92/16	An Overview of the Hybrid Wireless MAC Protocol (Ken Biba, Xircom)
92/17	Void.. (Overheads for Jonathon's has already been distributed as 91-51)
92/18	Attendance list [will expand into Tentative Minutes of the January 1992 meeting (Chapel Hill)]
92/19 bis	IEEE Requirements document comment on doc 92/01 (Wim Diepstraten, NCR)