

**IEEE 802.11  
Wireless Access Method and Physical Specification**

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Title: **Minutes of the PHY Sub-Group Meeting, May 1996  
Waltham, Massachusetts**

Date: May 9, 1996

Recorded by: Mike Trompower  
Formatted by Dean Kawaguchi

**Minutes of FULL-PHY (6 May 1996)  
Waltham, Massachusetts**

Full PHY meeting convened at 1:15 PM by Chairman Dean Kawaguchi (Symbol Technologies).

Mike Trompower (Aironet) will be secretary and assume the editorial changes resulting from this meeting.

Agenda for this meeting set:

- approval of past minutes
- IR PHY HEC
- Multirate issues
- comments resolution
- Japanese Callsign
- FCC wish list
- conformance testing
- reports

the above agenda approved by consensus.

minutes of March meeting approved - Jan Boer/Mac Sullivan 8-0-1

IR HEC discussion

this topic is a result from a comment from Michael Fisher to check the IR PHY header check, that the transmit bit order is reversed from other PHYs and tradition. The affected text is in clause 16.2.4.6.

**Motion 1** : Jan Boer / Stuart Kerry

To bring clause 16.2.4.6 into alignment with the other PHYs and to specify that the CRC-16 header check field be transmitted MSB to LSB.

discussion -

either implementation will function, because the PLCP has a defined length and a known starting point (SFD) there is no reason to force a change in the particular implementation.

**4-0-5 motion passes**

this motion will be brought forward to the full working group for approval

Multirate issues

Jan clarifies that there is a motion in the full PHY group to bring the Length field interpretation of all phys the same.

The FH and DS PHYs currently have the PLCP LENGTH field specified in bytes

The FH and DS PHYs are uniform in the way that they handle the rate change. The PLCP is always sent at the 1 Mbps rate and the rate change is started with the MPDU.

Comments Resolution

The file which recorded the comment resolutions from the full PHY of March meeting (believed to have been submitted) was viewed. There are no outstanding comments for the full PHY to address.

Japanese Call sign

There are several companies that have approved product in Japan which do not transmit the callsign on each packet. There is at least one company whose product is approved which transmits the callsign with each packet.

A suggestion to take the least prohibitive approach to performance. A suggestion that each company seeks approval through the MKK (as opposed to the MPT) which seems to not require the call sign on each packet.

How to handle:

- 1) remove all references to operation in Japan until the situation is fully understood
- 2) treat the call sign requirement as beyond the scope of the standard
- 3) determine the requirements and add text to the draft specification

the overwhelming affect of putting the callsign on every packet is the performance hit, the possibility of the SFD appearing in the callsign pattern,

This topic is a PHY issue accept that there is required a path for the call sign to be provided to the PHY.

the RCR specification is not explicit in the sense of describing the requirement. There is only a requirement that the call sign be capable of reception from a 'like quality' receiver.

In the e-mail response from the MPT, comment A3, states that Japan will 'never' make 802.11 the required standard ....

STRAW POLL for discussion:

- 1 - leave as is
- 2 - add call sign in every packet
- 3 - remove all references to Japan in the whole standard

4-3-2 consecutively for each option

Motion to adjourn until Wednesday morning full phy meeting  
the remaining agenda items will be discussed then

**Minutes of FULL-PHY (8 May 1996)  
Waltham, Massachusetts**

Full PHY meeting convened at 10:30 AM by Dean Kawaguchi (Symbol).

Mike Trompower (Aironet) will be secretary.

Agenda:

recap from Monday meeting

Approve motions today so that editing can be accomplished before closing plenary tomorrow.

DS motions

**Motion 2:** (Jan Boer / Mike Trompower)

Move that the full PHY approve the section 15 text additions relating to multirate as described in document 96/65 r1 and the minutes of the DS PHY group. The change is the interpretation of the DS PHY PLCP to be in microseconds. The interface to the MAC is still in bytes.

(8-0-2) **Motion passes**

**Motion 3:** (Jan Boer / Mike Trompower)

Move that the full PHY approve the section 15 text additions relating to conformance testing as described in document 96/65 r1, documents 96/66 and 96/67 r1 and the minutes of the DS PHY group. Text changes are the addition of two 'optional' PLME primitive commands to facilitate conformance testing.

(11-0-1) **Motion passes**

FH motions

**Motion 4:** (Dean Kawaguchi / Stuart Kerry)

Move that the full PHY approve the hop patterns for France and Spain as described in document 96/68.

To the best of FH PHY knowledge, these hop patterns abide by the local regulations and adhere to the smaller operating bandwidth restrictions.

(10-0-1) **Motion passes**

**Motion 5:** (Dean Kawaguchi / Stuart Kerry)

Move that the full PHY approve the following: "IF the receive procedure encountered an unsupported rate error, the PLCP shall keep the CS/CCA state at BUSY for the duration of the frame by either: detecting higher rate signals with equivalent performance to the which is specified in 14.6.15.3 or setting the countdown timer to the value corresponding

to the TIME REMAINING adjusted by the actual value receive interpreted at the highest known rate. RXSTART.indicate(rate out of range) will be reported.

(5-1-5) **Motion passes**

**Motion 6:** (Dean Kawaguchi / Naftali Chayat)

Move that the full PHY approve the expansion of the RATE field from 1 bit to 2.

00=1Mbps, 01=2Mbps, 10=reserved, 11=reserved

the negotiation of the data rates assigned to the reserved rates is outside the scope of the standard.

(10-0-2) **Motion passes**

**Motion 7:** (Dean Kawaguchi / Naftali Chayat)

Move that the full PHY approve the changes made to paragraphs 14.3.3.2.1 and 14.6.15.3 to resolve a probability of detection conflict.

(9-0-2) **Motion passes**

Motion 8 (Naftali/Art Lashbrook)

ammend the agenda to allow the reporting of the high speed FH group at this point

(7-0-3) motion passes

#### high speed FH report

possible use of modulation other than 8-GFSK was discussed

there was no support at the meeting to include text into the draft at this time

no motions were passed at this meeting

question about sensitivity penalty of 6dB with respect to 2 Mbps

more susceptible to multipath and requires better linearity

#### FCC wish list

document 96/58 contains the wish list

Symbol requests wider channels - NPRM request was denied by FCC.

at the March meeting there were two motions approved which directed that 802.11

address the FCC on the issue. These motions were never brought to the full PHY at that meeting.

Should this option be considered as part of this standard since the ETSI spec calls for a minimum of 20 hops, and in countries like France and Isreal, this bandwidth would not allow for this minimum to be met? A rebuttal - it is believed that Mexico requirements specify a 500 Khz maximum bandwidth, so the current spec will not allow operation in Mexico.

**Motion 9** (Naftali / Art Lashbrook)

Move to accept the recommendations as outlined in document 96/58 by the FH group to bring to the full WG a request to provide an official 802.11 position on the NPRM 96-8.

Naftali volunteers to provide the text for submission to the FCC.

discussion - overall capacity of the FH system will be reduced due to the wider channel spacing as a result of this operation at the sacrifice of additional bandwidth for a operation of single link bandwidth.

call the question (7-2-2)

(6-2-3) **motion passes**

adjourn until next scheduled PHY session

**Minutes of FULL-PHY (9 May 1996)  
Waltham, Massachusetts**

Full PHY meeting convened at 11:15 PM by Chairman Dean Kawaguchi (Symbol Technologies).

Mike Trompower (Aironet) will be secretary.

agenda set as follows:

Japanese call sign

reports

conformance testing

Japanese call sign

**Motion 10** (Jan Boer / John Fakatselis)

Move that a subcommittee of the full PHY be formed to address the Japanese Call Sign issue.

(7-0-0) **motion passes**

This subcommittee will be chaired by ? and the roles of the 802.11 executive committee as liason to the MPT are recognized.

reports

DS report -

all motions were ratified by both the full PHY and the full plenary at the WED full working group. Nothing additional to report.

agenda for next meeting -

resolving letter ballot comments and conformance testing

FH report -

there were three motions made (see FH PHY minutes for complete text and votes of the motions):

1) the PLCP rate field was expanded to three bits to indicate rates from 1.0 to 4.5 Mbps in 0.5 Mbps steps

2) the text was modified to reflect changes in the CCA detection algorithm and the addition of the capability of holding CCA BUSY for the calculated duration of an unsupported rate.

3) the text was modify the receive procedure to pass the byte count and data rate of an unrecognized rate to the CCA procedure.

**Motion 11** by (Dean K / Art Lashbrook)

Move to accept all above motions and corresponding text changes on behalf of the FH PHY.

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

conformance testing

presentation of document 96/96 by Carl Andren (Harris)  
simulations of the FSK signal show that the 1-0 header produces spikes at the +/- 500 Khz frequencies. This could be problem for 500 byte packets and the passing of the FCC spectral mask of having a the spectrum down by 20 dB. A recommendation to move the filtering out will allow about an additional 3 dB of margin.

This topic is ruled to be outside the scope of the 802.11 and no action will be taken as a result.

Vote to continue for informational purposes only

(5-0-1)

discussion that the FCC testing should be done with long packets (1-2Kbytes in length) in order to reduce the problems caused by the 1-0 header.

agenda for July meeting will be:

process letter ballot comments  
Japanese call sign and regulatory issues  
conformance testing

Adjournment for the full plenary.

**Boston, May 6-9**

Secretary- Mike Trompower

Agenda

Approval of minutes

IR PHY HEC - Motion #1

Multirate issues

Comments resolution

Japanese call sign

Straw poll:

1 Leave as is

2 Add call sign in every packet

3 Remove all references to Japan in whole standard

4, 3, 2

Subcommittee to address Japanese call sign issue

DS Motions  
FH Motions  
HS FH Study group of Full PHY  
FCC wish list - Motion #2  
Reports  
Conformance testing - Carl Andren  
Agenda for July  
    Process comments  
    Japanese call sign  
    Conformance testing

**Motion 1: To bring clause 16.2.4.6 into alignment with the other PHYs and to specify that the CRC-16 header check field be transmitted MSB to LSB.**

Moved by: Jan Boer, 2nd: Stuart Kerry

PHY vote: 4-0-5 Motion passes  
Plenary vote: 19-0-4 **Motion passes**

**Motion 2: Move to accept the recommendations as outlined in document 96/58 by the FH group to bring to the full WG a request to provide an official 802.11 position on the NPRM 96-8.**

Recommendations in 96/58:

1. The 802.11 should reply to the FCC NPRM 96-8 strongly supporting wider channels for FHSS systems.
2. Include language to support a minimum of 20 non-overlapping channels, provided that the total occupied bandwidth including all channels be at least 75 Mhz. with the same transmit power levels presently specified by FCC Part 15.247.
3. Include language asserting that wider channels will allow fair access and perhaps even less interference to other users of the band such as DS and less peak interference levels to narrowband systems.
4. Include language that this will provide harmonization with European CEPT regulatory requirements, worldwide interoperability of products and facilitating US industry worldwide competitiveness

PHY vote: 6-2-3 Motion passes  
Plenary vote: 9-6-8 **Motion passes** (procedural)

**Report of the IEEE802.11 FH-PHY Group Meeting  
Boston, May 6-9**

Secretary - George Fishel

Approval of Minutes

Agenda

Comments resolution - Motion #2

France/Spain hop patterns - Motion #1

France/Spain references

Other draft issues

Multirate (CCA in multirate) - Motion #3 and #4

3 Mbps

Readdress CCA motion - Motion #5

Agenda for next time

Process comments

Japanese regulatory

**Motion 1: Accept the hop patterns for France/Spain in 96/68.**

Moved by: Dean Kawaguchi (Stuart Kerry acting chair), 2nd:

FH PHY vote: 5-0-0 Motion passes

PHY vote: 10-0-1 Motion passes

Plenary vote: 27-0-1 **Motion passes**

**Motion 2: Accept the following text changes to the FH section.**

Changes made to paragraph 14.3.3.2.1 by changing the time to 22 usec. from 20 usec. and adding the words "synchronous" and "asynchronous" to the text. Additionally, add the sentence to paragraph 14.6.15.3 " that starts synchronously with respect to slot times as specified in subclause 14.3.3.2.1" and "In the presence of any 802.11 compliant 1 Mb/s FH PHY signal above -85 dBm that starts asynchronous with respect to slot times as specified in subclause 14.3.3.2.1, the PHY shall signal busy with 70% probability of detection during the preamble within the CCA assessment window."

Moved by: Art Lashbrook, 2nd: Naftali Chayat.

FH PHY vote: 3-0-2 Motion passes

PHY vote: 9-0-2 Motion passes

Plenary vote: 21-0-7 **Motion passes**

**Motion 3: expand the rate field from one bit to two**

**Four combinations**

**00 = 1Mb/s**

01 = 2Mb/s  
10 = reserved -> undefined higher rate A  
11 = reserved -> undefined higher rate B

Add statement: Compliant FH PHY devices shall not transmit codes 10 or 11.

Moved by: Naftali Chayat, 2nd: Art Lashbrook.  
FH PHY vote: 3-1-0 Motion passes  
PHY vote: 10-0-2 Motion passes  
Plenary vote: 21-3-7 **Motion passes**

**Motion 4: Accept the following text changes to the FH section.**

**“If the receive procedure encountered an unsupported rate error, the PLCP shall keep the CS/CCA state at BUSY for the duration of the frame by either:**

- 1) **detecting higher rate signals with equivalent performance to that which is specified in 14.6.15.3 or**
- 2) **setting the countdown timer to the value corresponding to the TIME REMAINING adjusted by the actual data rate or by the highest known data rate if the rate is beyond the set of known rates.”**

Also, delete the “monitor packet” block from Figure 77 and in the Receive State Machine paragraph 14.3.3.3.1 will be modified to read “If the PLCP header was decoded without a CRC error but encountered an unsupported rate , then the PLCP shall immediately complete the receive procedure with a *PHY\_EXEND.indicate (EXERROR=unsupported\_rate)* to the MAC, and return the CS/CCA procedure with TIME REMAINING set to the byte/bit count remaining and the DATA RATE set the value in the PLCP header.

Moved by: Art Lashbrook, 2nd: Stuart Kerry  
FH PHY vote: 3-0-1 Motion passes  
PHY vote: 5-1-5 Motion passes  
Motion sent back by WG to the PHY

There were three motions passed in the FH PHY meeting. Presented as one motion in the PHY by instruction of the FH group.

**Motion 5: Accept the following changes for multi-rate support and CCA:**

- 1) the PLCP rate field was expanded to three bits to indicate rates from 1.0 to 4.5 Mbps in 0.5 Mbps steps
- 2) the text was modified to reflect changes in the CCA detection algorithm and the addition of the capability of holding CCA BUSY for the calculated duration of an unsupported rate.
- 3) the text was modified in the receive procedure to pass the byte count and data rate of an unrecognized rate to the CCA procedure.

PHY vote: 6-0-0 Motion passes

Plenary vote (PHY group, Johnny Z.): 15-0-3 Motion passes

Text changes:

Bit	Parameter Name	Parameter Values	Description
0	Reserved	Default = 0	Reserved
1	Reserved	Default = 0	Reserved
2	Reserved	Default = 0	Reserved
1:3	PLCP_PDU_BITRATE	000=1.0Mbps, 001=1.5Mbps, 010=2.0, 011=2.5, 100=3.0, 101=3.5, 110=4.0, 111=4.5Mbps	This field indicates the bit rate of the PLCP_PDU from 1 Mbps to 4.5 Mbps in 0.5 Mbps increments

Added paragraph in CS/CCA:

If the receive procedure encountered an unsupported rate error, the PLCP shall keep the CS/CCA state at BUSY for the duration of the frame by setting the countdown timer to the value corresponding to the calculated time based on the information in the PLCP header and the 33/32 expansion factor.

Changed paragraphs in receive:

If the PLCP header was decoded without a CRC error but encountered an unsupported rate, then the PLCP shall immediately complete the receive procedure with a *PHY\_RXEND.indicate(RXERROR=unsupported\_rate)* to the MAC, and return to the CS/CCA procedure with the byte/bit count remaining and the data rate value contained in the PLCP header.

If an error was detected during the reception of the packet PLCP\_PDU, the PLCP shall immediately complete the receive procedure with a *PHY\_RXEND.indicate(RXERROR=carrier\_lost)* to the MAC, and return to the CS/CCA procedure with the byte/bit count remaining and the data rate value contained in the PLCP header.

**Report of the IEEE802.11 DS-PHY Group Meeting  
Boston, May 6-9**

Agenda:

- Minutes (accepted)
- Multi-rate issues
- Conformance testing (resulting in update of document 96/66A)

Passes two motions in Wednesday plenary:

**Motion 2:** (Jan Boer / Mike Trompower)

Move that the full PHY approve the section 15 text additions relating to multirate as described in document 96/65 r1 and the minutes of the DS PHY group. The change is the interpretation of the DS PHY PLCP to be in microseconds. The interface to the MAC is still in bytes.

PHY vote: 8-0-2 **Motion passes**

Plenary vote: 14-0-8 Motion passes

**Motion 3:** (Jan Boer / Mike Trompower)

Move that the full PHY approve the section 15 text additions relating to conformance testing as described in document 96/65 r1, documents 96/66 and 96/67 r1 and the minutes of the DS PHY group. Text changes are the addition of two 'optional' PLME primitive commands to facilitate conformance testing.

PHY vote: 11-0-1 **Motion passes**

Plenary vote: 12-1-10 Motion passes

Agenda for July:

- Letter ballot comment processing
- Conformance testing

See you in the Netherlands!

**Report of the IEEE802.11 IR-PHY Group Meeting  
Boston, May 6-9**

No active IR group members present at this meeting. One change made to IR section in the full PHY meeting (see motion #1).

