Tenative Minutes of the Frequency Hop Ad Hoc Group, May 1994

IEEE 802.11 COMMITTEE

The meeting opened at 0845, Tuesday May 10th, 1994.

Peter Chadwick announced his resignation from the position of Chairman of PHY-FH group because of a review of standardization activities within GEC Plessey Semiconductors. He called for nominations for the position.
Jim McDonald was proposed by John McKown, and seconded by Jerry Socci. There being no other candidates, the motion was put to the vote, and Jim was elected by acclaim: he then took the chair.

Peter Chadwick agreed to act as secretary for the remainder of the Oshawa meeting.

AGENDA

1. Produce recommendation on fragmentation length i.e. the MPDU length.
2. Plan activity through November
3. Receive submissions
4. Receive and approve minutes of the Vancouver meeting
5. Consider and resolve the CCA problem
6. Consider and review the draft standard

MAXIMUM MPDU SIZE

Discussion on this started with a discussion regarding immunity to microwave ovens. It was suggested that the packet length may be variable within a PHY. John McKown suggested that there should be two state machines in the PHY: one to determine CCA, and one to determine the MPDU size. Larry van der Jagt said that the PAR requires that 99.9% of the coverage be served 99.9% of the time with a 1 in 10e-9 undetected BER.

Peter Chadwick suggested that the upper bound for MPDU is 5 mS, and that the MPDU length could well be arbitrarily chosen around the 3.2 mS region.

John McKown proposed that:

It is the sincere opinion of the FH-PHY ad hoc group that the 2.4 GHz FH MPDU should be no longer than 3.2 mS (400 octets) for indoor applications involving pedestrian motion or interference from microwave ovens.

This was seconded by Larry van der Jagt.

Wayne Moyers proposed a friendly amendment that the 400 octets be struck. Seconded by Larry van der Jagt.

Larry Zuckerman asked why the microwave ovens were mentioned.

Larry Zuckerman moved that all after 3.2 mS be struck. Seconded Bill Huhn.

Voting commenced with 802.11 voting members only taking part: the Chair not voting, but having a casting vote in the event of a tie.

9 in favour, against 5, abstentions 4.

The amendment was carried.

Discussion on main motion:-

It was stated that the system needs to be adaptive, and that longer MPDUs are required. Jim Renfro suggested that the PHY indicate to the MAC the length of the MPDU, with a minimum of 3.2 mS. Various speakers recommended longer MPDUs so that throughput could be increased. It was pointed out that the time bounded services have a latency limitation, which limits maximum packet size. Dean Kawaguchi proposed that the 3.2 mS be the MPDU length, with the header, preamble etc. being additional to the 3.2 mS.

Dean moved to call the question: seconded by Wayne Moyers.

9 in favour: 4 against: 0 abstentions.

In favour of the amended motion:

7 in favour: 7 against: 0 abstentions.

AMENDED MOTION FAILS.

Further lengthy discussion followed.

Jim Renfro proposed:-

The PHY will provide an indication of the maximum packet length to the MAC. For the 1Mbit/s, 2.4 GHz FH PHY, this maximum length shall always be greater than or equal to 400 octets.

Seconded: Jerry Socci

Discussion on the motion:

Larry Zuckerman posed the question as to why an intelligent MAC cannot decide the max MPDU length based on a measurement of CCA?

Friendly amendment:

If a single length MPDU is demanded by the MAC group, the maximum MPDU length shall be 400 octets for the 1Mbit/s 2.4 GHz PHY.

Proposed: Jerry Socci Seconded: Dean Kawaguchi.

Question called by Ed Geiger. Seconded Dean Kawaguchi.

14 in favour, 1 against, 1 abstention.

Voting on the amended motion:

13 in favour, 3 against, 0 abstentions.

AMENDED MOTION PASSES

Proposed that the minutes of the Vancouver meeting of the PHY - FH ad hoc group as published in doc 94/88 be accepted.

Proposed: Peter Chadwick Seconded: Jerry Socci

Question called: John McKown. Seconded: Jerry Socci

14 in favour, 0 against, 1 abstention.

MINUTES ACCEPTED AS PUBLISHED

SUBMISSIONS

1) CRC AND BIT STUFFING

Dean Kawaguchi presented doc 94/104 entitled CRC Vulnerability and FH PHY Packet Formatting Update. In the following discussion, Dean suggested that the overhead of going to a 32 bit CRC was about 3%, while a 16 bit CRC would not

meet the requirements of the PAR. Discussion moved to the advantages and disadvantages of bit stuffing versus scrambling.

Dean proposed that:

The FH-PHY sub group adopts the FH packet formatting method presented in submission 94/069 with 32 bit block sizes and stuffing/inversion beginning with the first block following the PLCP header.

The motion was seconded by Jim McDonald.

A straw poll showed that 4 votes for 32 bit blocks, 6 for 16 bit blocks and 2 for not adopting the method.

Friendly amendment from Jerry Socci, seconded by Ed Geiger, to change 32 bit blocks to 16 bit blocks. This was not accepted by Jim McDonald.

After discussion, the motion was amended to read:

The FH-PHY sub group adopts the FH packet formatting method presented in submission 94/069 with 16,32 or 64 bit block sizes and stuffing/inversion beginning with the first block following the PLCP header. The block size is to be determined at a later meeting.

This amendment was accepted by the proposer and seconder.

At the vote:

8 in favour, 0 against, 0 abstentions.

MOTION PASSES

2. CCA

Jim McDonald presented doc 94/110 on a method of CCA. In discussion, the CCA philosophy of transmitting regardless if the signal received was not a like PHY signal was criticized because of the chances of causing collisions to other signals, and colliding with microwave ovens. This could lead to a loss of ACK at the receiver and thus a waste of battery power. A lengthy discussion followed. It was also suggested that if CCA defers at low signal levels, deferral may not be justified in terms of causing interference, and would in any case prevent maximal

use of the capture effect. It was claimed that a power field in the PHY header would be useful in maximizing frequency reuse.

It was proposed to run a straw poll on the various proposals.

Dean Kawaguchi's proposal relies on the signal exceeding a given power threshold and having a recoverable clock to cause deferral.

Jim McDonald's proposal looks for a very sensitive receiver and defers to preamble and unique word.

In favour of a straw poll: 7. Opposed: 6. Abstentions: 2.

The straw poll was called.

In favour of the Kawaguchi approach: 3
in favour of the McDonald approach: 1
abstentions: 4
want further proposals: 7

CHAIR CALLED FOR FURTHER CCA PAPERS AT THE JULY MEETING - ACTION: ALL.

The majority of members wish to have a hybrid CCA scheme, based on parameters such as receive power, like modulation methods, time etc.

Meeting adjourned at 1730.

The meeting reconvened at 0830 on Wednesday May 11.

The Chairman reviewed the progress made on MPDU size and the discussions on CCA, and then called for input papers on CCA to be presented at the July meeting. He stated that the July meeting will concentrate on CCA before all other technical business.

SUBMISSIONS - cont.

3) DIVERSITY

Ron Mahany presented doc 94/128 on Diversity. Discussion followed on the use of timestamps in the preamble: it was suggested that the 80 bit preamble is short for adequate diversity selection. The advantage of the approach is that it prevents antenna switching at a time which would lead to loss of data because the switching has occurred too close in time to the unique word.

PLANNING

Dean Kawaguchi produced a list of work items.

SETTLED ISSUES

Modulation Type and TX Mask
Preamble length and ramp (including synchronization and the unique word)*
Hop sequence and number of channels
Maximum MPDU length
Data Whitening/bit stuffing method.

* = possible change

OPEN ISSUES

CS/CCA Method, requirements, MAC parameters
Whitening Block Size
Change to preamble (if changed)
RX state machine - capture effect, collision recovery
Multiple rates - PHY and MAC/PHY
TX power control
PMD parameters
Text edit PLCP, LME, PMD (PHY Layer Convergence Procedures, Layer Management
Entity, Physical Management Dependencies)
MIB (Management Information Base)

Items to be closed have a cut off date for by the end of the July meeting.

TIMESCALES

At the end of the relevant meeting, the milestones are:-

May:

July: Resolve all open issues.
Cut off any new functionality

September: Complete Text edit.

November: Final text editing, voting, presentation to PHY, and 802.11 Plenary.

In order to facilitate the work of the committee, it was proposed by Dean Kawaguchi and seconded by Jim Renfro:-

That all open issues be closed by the end of the July 1994 meeting and priority of dealing with business in that meeting will be given to open issues.

Question called by Jim Renfro, seconded Dean Kawaguchi.

In favour: 11. Against: 0. Abstentions: 3.

On the vote for the motion

In favour: 10. Against: 3. Abstentions: 2.

MOTION PASSES

Meeting adjourned at 1200

Reconvened at 0930 12 May

Discussion of the draft text.

Motion: Editors can change section numbers, figure numbers, table numbers. The table of hop patterns will be in an appendix.

Proposed: Ed Geiger Seconded: Wayne Moyers

The question being called, it passed with 10 votes in favour, no abstentions or against.

Agreed that doc 103 PLCP layer changes be dealt with until 1030. Pointed out by Peter Chadwick that there appears to be a difference in the reported concept of CCA by the MAC group and the FH PHY group. Larry Zuckerman is producing a paper, which will be circulated prior to the next meeting.

The chair requested that input on docs 94/78 and 94/111 be circulated via e mail, prior to the next meeting.

Dean Kawaguchi presented paper IEEE P802.11 - 94/103, with a description of the various layers. He drew the attention of the group to the fact that some re-numbering had occurred. Dean stated that the Header Error Check Field had not been approved by the group, and explained the working of it. Some discussion on the 16 bit CRC followed: some queries were raised about the accuracy, and Dean Kawaguchi and Ed Geiger will investigate, and report back.
Wayne Moyers queried the mechanism whereby items get included, such as the rate shifting: Dean and Ed said that they were waiting for formal submissions.
The presentation moved on to the transmit and receive state machines, receive timings etc. This was adjourned at 1115.

It was AGREED that discussion would resume at the July meeting.

Brief discussion of matters considered by the Chair to be controversial in 94/111 followed. The proposal was that an EIRP of 333 mW be adopted for the USA market. Discussion followed. Larry Van der Jagt pointed out that a maximum radiated power of 600 mW applied if it was possible to get within 1 inch of the radiator. A number of speakers opposed the suggestion of limiting the transmitter power level to 200 mW output: this is to be discussed at the July meeting.

Jim McDonald presented his summary of the committee work during the week.

Meeting closed at 1130.