Tentative Minutes of the FH Ad-hoc Group Meeting Held January 10 - 13, 1993 San Jose, CA

Joint FH and HSFH groups, Monday 10 Jan 94, 16:03
Everyone presiding.

Ed: How do you propose to shift gears?

------- confused discussion of the performance benefits of higher speed modes --------

Ed: Will high and low speeds exist on the same LAN? Will nodes listen to a default preamble and then change speed?

Wayne: Yes. 94/16 says multiple rate PHYs coexist. This is being voted on right now in the MAC group.

Peter: Simultaneously?

Wayne: is not sure.

‾ wants to know the performance gain at the application layer. reminds that DFW has time slots. favors file transfer time as a performance metric.

Kamilo: will address the issue in tonight's HSFH meeting.

Juan Grau: endorses performance simulation of multi-speed nets.

Juan & Ed: discuss the FDDI-type arrangement where the presence of even one high-speed-incompetent node forces all nodes to the low speed mode.

Ed: thinks two independent co-located nets at different speeds are more efficient than a single integrated, multi-rate one. Favors speed changes in the MAC rather than in the packet.

John: decoding is not necessary for avoidance.

Ed: agrees to submit a proposal.

Tim: speaks for the schedule-accelerating benefits of the FDDI-type solution.

Wayne: speaks for reserved bits.

Dave Leeson: thinks the mutual interference problem is perhaps being overstated. just treat them as separate PHY's.

Jim Renfro: too many PHYs work against the idea of standardization.

------- general discussion. there seem to be four possibilities. (1) MAC handles multiple rates at node registration time (2) rate changes occur in the packet with default-rate headers and signaling (3) the FDDI approach (4) write two separate PHYs and ignore coexistence issues ---

Wayne & Ed debate overhead inconclusively.

adjourn

Frequency-Hopping PHY subgroup, Tuesday morning 8:30, 11 January 1994. Chairman Chadwick presiding.

A discussion on methodology. Peter constructs the following list of things we've got to produce.

FH Subgroup Deliverables.

1   FH sequence choice and hop sync acquisition method
2   All RF parameter values (the RF template)
3   CCA and diversity management requirements/techniques
4   Power control specification
5   Packet Preamble(s)
6   Low level packet protocol, including delimiters, fragmentation, FEC, ARQ, channel coding and PHY signalling
7   Performance & Conformance evaluation methods, including a channel model
8   The "Bit Mask"

Peter Chadwick: Is ARQ implemented at the PHY level?

Ed Geiger: No. It requires information available only at the MAC

Peter: Then the PHY layer doesn't need CRC info?

Ed: Yes, it does because of CCA.

Tim Blaney: We, the standard rate FH group, need to start our own template document [template being PHY-group jargon for a list of parameter values]. Nathan can't attend both FH groups at once.

Peter: If the MAC group will take on the preamble, FH sequence and synchronization then we shall accomplish our deliverables by November easily. No problem.

Tim: Jerry Loraine was going to contribute on measurement and bit masks.

Ed Geiger presents 94/18.

Jerry Socci: Why is the checksum 16 bits?

Ed: I use this polynomial elsewhere. It's overkill here. 8 is probably enough.

----- discussion of the sufficiency of detection of errors in the packet length field, without correction ------- discussion on stuffing, dual scramblers and the necessity of transmitting all data -------

Peter: Ed, do you have IPR on what you presented?

Ed & Tim: don't know. Suspect not.

Roger Jellicoe: Do you imply a maximum packet length?

Ed: No, I just want error correction on 29 byte fragments independently.

----- break ------

Peter: let's see what consensus we can identify on CCA (generates following foil).

Clear Channel Assessment

I Information (which the assessment might be based on)
  A power on channel
  B decoding valid information
    1 detect transitions
    2 detect words
    3 calculations based on words, e.g., CRC
  C signal signatures (pilot tones, etc.)

II Implications
  A frequency reuse
  B C/I
  C system capacity in (bits/sec)/(Hz floor area)
  D coexistence with noninteroperating systems

III Timing

-------- Juan Grau & Ed discuss CCA and whether and how to defer to a packet already in progress when you awaken. We all assume no node need simultaneously transmit and receive ---------

Peter: thinks more than power detection will be required.

Wayne: we might defer (only) when we recognize a friendly net ID.

Ed: it's better to defer upon recognizing any information (presence of bits).

Dave Leeson: ovens don't obey LBT etiquettes or deference rules. The question is "why wouldn't you want to transmit?" You should defer only if that's the only way to avoid busting somebody's packet.

Someone (Dave?): the more you believe in the capture effect, the more you favor ALOHA.

Tim to Dave: How should we limit power?

Dave: advocates WINForum's rule; total power proportional to square root of occupied bandwidth

John to Dave: what do you like for CCA?

Dave: you might want to defer to power. It's too slow to decode. Also, there may be noninteroperable 802.11 modes. I liked WINForum's rule that lowering the threshold above which you defer to received power allows you to increase your own power in a dB-for-dB trade.

Jerry Socci: It sounds like everyone might go for the following. If your received power is below some threshold, you can go ahead and blast. If your received power is above the threshold, you can also blast but only if you can't detect a clock (no bits are present). That is, you defer iff power is above the threshold AND your clock recovery circuits indicate bit sync.

Tim to Jerry: How do we set the power threshold?

Jerry: make it ride the noise

------- uncaptured mulling and pondering -------

Juan: describes (to the consternation of many listeners) a multirate LAN Proxim has built. Considers it successful and not overly complex.

John: enjoys the moment.

Dave: advocates a simple standard, fixed upper packet length limit, announcement packets.

MOTION 1:　　We accept Jerry's proposal [above] as a baseline and call for submissions on CCA

Moved: T. Blaney, Seconded: E. Geiger

The chair ruled Motion 1 passed unanimously.

-------- break -------

Ed presents 94/19.

Tim: If we accept the CCA of Motion 1, how will different data rates coexist (since default devices can't decode high rate transmissions)?

Roger: make the higher bit rates multiples of the default rate

Peter: we could extend the flow chart and go for channel ID.

----- Peter vs. Ed on whether everyone has the same hop sequence. conclusion is that there is no problem in reality. general discussion of Francois Lemaut's definition of (hop sequence) orthogonality. conclusion is it's more than adequate --------

Ed: the worst way to slow the net is collisions.

Larry Zuckerman to Ed: in wired media collisions definitely hurt but not necessarily in wireless ones (implying Ed may be

underestimating the importance of the capture effect, which is the ability of discriminator-based receivers to tolerate low S/I ratios when 2FSK is used for signalling).

----- Dave vs. Ed on whether the protocol should support coexistence of separately administered and/or noninteroperable LANS --- ---

Jerry: It's too slow to depend on recognizing net IDs.

John: still, net ID's might be the basis of a second layer of defense. You might adjust your hop sequence or something, in order to escape having to time share [or, in English, share time] with the alien net.

Dean: is worried about the interaction of power saving techniques with changes in hop sequence [sleeping nodes might lose the net it it's done poorly].

------- more uncaptured discussion. Several agree to form a working group to draft language for CCA [see below] -------

Peter: let's move on to diversity management. RSSI? CRC?

Larry: maybe we can leave that out of the standard

Tim: but CCA needs doing on every channel

John (to uncomprehending colleagues): the optional RTS/CTS features of the DFW MAC might be useful as part of a diversity management regimen.

Peter: Should we use acks or nacks (for diversity management)?

Ed: that will be decided in the MAC group.

Ed: CCA should be the same for everyone or it may not be fair.

Tim: This standard should not force any particular diversity management scheme.

adjourn

**Frequency Hop PHY, 8:50 Wednesday, 12 January 1994
Chairman Chadwick presiding.**

Peter brandishes his list of deliverables; wants dates for each.

:r: shall we advise the MAC group they are to select the hop sequence and synchronization method?

Bill Huhn: send it to them with recommendations.

Peter: our list of sequence alternatives is (1) Francois Lemaut's or (2) Ed Geiger's. Did Francois consider the method for obtaining sync?

Dean Kawaguchi: 93/190 [the main DFW MAC exposition] has a lot of stuff on hop sync.

Peter: does it specify how to set hop times?

Dean: Yes.

Peter: writes as follows

Hopping Issues

1   Sequences
2   Timing
         hop now signal from MAC to PHY
3   Sync Acquisition

.n: 93/190 takes care of all that.

Peter: even acquisition?

Dean: that's in section 4.

Peter: in the MAC?

Dean: yes.

Peter: so it's a closed issue?

MOTION 1   The FH PHY group accepts IBM's proposed hopping sequences, in document 93/@ for 802.11-compatible FH WLANs.

Moved: J. McKown, Seconded: W. Moyers

VOTE ON MOTION 1: Yes=16, No=0, Abstain=2. Motion 1 passes.

Ed: this information would be part of our PMD.

--------- learned discussion on dwell time --------

Dean: dwell time should be settled by
     ulation.

------ learned discussion on the difficulties of simulation -------

Nathan: dwell time will be dictated by the MAC group.

Peter: the maximum dwell allowed by law is 400 ms

Various: it's a MAC problem.

Jerry Socci: they view it as a parameter they can change.

Bill Huhn: we decided before on a certain range.

John & Ed discuss the significance of 93/161, the FH PHY PMD (Physical Medium Dependent layer spec [?]).

Jerry: the individual values in the FH template, 93/83r2, were not all approved.

------- discussion on documents and their standing. documents 93/161 and 93/83/r2 will be redistributed --------

Ed: draws a document map

```
            802.11 PHY SPECS
.............................................|
| FH PHY SPEC |   IR PHY    |   DS PHY   |
|  (doc 93/172) |           |            |
|..............|.............|...........|
|FH PMD | HSFH |             |            |
|  (doc | PMD  |             |            |
|93/161)|      |             |            |
|_____|_____|_____|_____|
```

Peter: 93/161 is to be approved in September 1994. The CCA is to be approved by March.

------------ break ----------

Peter: is power control adaptive? We voted to allow several levels.

Dean: that's another MAC issue.

------ learned discussion on power control. consensus is that the MAC decides when to adjust power and which way -------

------ we start on Nathan's template, 83r2, working on the FH column to see what should go into 161. It quickly becomes apparent that we don't adequately remember which parameter values have been voted on and which have not. The following people accept assignments to promptly examine the minutes of one session and communicate all approved values to Tim Blaney, who is the editor of 93/161. Tim will

incorporate the relevant parts of Nathan's table into 161 and provide a column which specifies the approval status of each value ----------

John McKown	November 1993
Dean Kawaguchi	September 1993
Wayne Moyers	July 1993
Jerry Socci	May 1993
Tim Blaney	March 1993
Roger Jellicoe	January 1993

Peter: what does 83r2 mean specifying a maximum input level at the receiver? That the receiver should function properly at that value?

Larry Zuckerman: Yes. It's to set the minimum separation at which compliant units must work.

Wayne: we should take that to the full PHY group.

------- Chair rules Wayne is correct. learned discussion of other parameter values, often confused by whether or not they've been approved or merely proposed ---------

MOTION 1   We shall remove from 93/161 all reference to the subject matter of line 16 of 93/83r2 (fall back data rates below 1 Mbps).

Moved: J. McKown, Seconded: J. Renfro

VOTE ON MOTION 1: Yes=12, No=0, Abstain=5

MOTION 2 We shall remove from 93/161 all reference to the subject matter of line 17 of 93/83r2 (baseband bit clock jitter).

Moved: E. Geiger --- No second

Wayne: that was inserted by the full PHY committee and we shouldn't remove it.

----------- lunch break. we resume with few present. ------------

MOTION 3 We shall remove from 93/161 all reference to the subject matter of lines 17 and 17a of 93/83r2 (baseband bit jitter & clock accuracy).

Moved: J. McKown, Seconded: M. Traynor

VOTE ON MOTION 3: Yes=4, No=1, Abstain=2. Motion 3 passes.

Peter: Preamble length is to be closed July 94.

Ed (re line 19, maximum run length to be withstood by the synchronizer): Apple submitted a paper to the effect it's difficult to build a scrambler which will guarantee no runs longer than 7.

---Ed vs. Wayne on sync hardware vs. scrambler hardware.---

Juan: perhaps we should switch scramblers upon re transmission.

----- Ed vs. Juan on scramblers. -----

Wayne we're not ready for closure on run length (meaning let's move on).

Peter: deems line 19 an open issue; calls for submissions at the March plenary.

Tim: we should specify what the FH PMD can tolerate in the way of clock slop.

Peter: let's do it next time.

Tim: we're unclear what you want submitted.

Peter: say what you want and state your assumptions.

John: asks for and receives explicit confirmation from all present that the FH PHY must transmit all data and have no forbidden patterns.

Peter: let the minutes show that any pattern can be passed by the system.

Roger: is there a maximum packet length?

--------- secretary missed the answer --------

Peter: On to line 20; CCA response time.

John: I was supposed to do some calculations for time required for power detection but never got to it.

Tim: volunteers submission on CCA response time.

--- Peter moves on to in-band spurious emissions, line 20 of 83r2 ----

Tim: that too has to do with collocated operation.

Dave Leeson: calls for a measurement bandwidth to be specified.

Peter: advocates 1 MHz

Wayne: thinks line 21 is probably consistent with line 12.

Dave Leeson: also wants bandwidth for line 12.

-------learned discussion about images. Tim looked at 15.209 to see where the 500 micro volts per meter applies; he did document 93/223 on how the FCC wants us to perform the measurements. Juan & Roger endorse Tim's position. -------

Peter: the DS folks specified -55 dB for in-band spurs; I suggest we do the same.

Roger: Yes. We must compete with them.

Wayne: the DS guys should not be presumed to have thought this through well.

Peter: delivers detailed defense of -55 dB. Stuns the audience.

MOTION 4 In-band spurious emissions shall be -55 dBc.

Moved: P. Chadwick, seconded R. Jellicoe

VOTE ON MOTION 4: Yes=9, No=0, Abstain=5. Motion 4 passes.

------------- break ------------

--------- we ponder the possibilities for skirts. all recognize that line 12 and line 21 are now inconsistent and measurement bandwidths must be specified.--------------

adjourn

Frequency Hopping PHY group, Thursday, 13 January 1994, Chairman Chadwick presiding.

Peter: let's resume on the template.

Jerry: let's insert the preamble information upon which we've previously agreed; ramp, sync pattern, unique word.

Jerry & Ed discuss length field length and protection depth

Peter & Roger: let's do it next time.

Peter: adds a 37th line to his foil version of 83r2; "amplitude envelope window, closed Nov. 93." He then makes an editorial change

on line 22, changing the ETSI number to ETS 300-328. Next, he makes the following agenda for the next session:

March Meeting Agenda, FH Group

1. Preamble lengths, headers, etc.

2. Scrambling/bit stuffing

3. Clear channel assessment criteria & methods.

4. Template upgrading & standard draft editing (docs. 161, 172 & 83r2)

5. Tx/Rx switching times.

Peter: let's do line 23 (of 93/83r2); T/R turnaround time

Jerry: turnaround time needs a precise definition. Does it include the preamble? If so, the figure shown is too short.

------------ learned discussion -----------

Roger: it came out again yesterday in the joint session that R to T time is critical, as is knowing exactly when the transmission ends.

Various: T/R and R/T need to be symmetrical. can use the preamble to make up the difference [?]

Roger: shows a diagram; proposes T to R and R to T both include the ramps; so defined, Roger likes 24 microseconds.

Nathan: the quantity of most interest to the MAC group is the interval between the last data bit out and the first data bit in.

Dean: wonders what preamble has to do with carrier sense.

John: it looks like there will be a range of times required to calculate the channel is busy. If so, the MAC group need to come to grips with that.

Jerry: Yeah.

Everyone: Quite so, Jerry. You're absolutely right.

Ed: The MAC needs to process a while prior to ordering an ACK be sent. We can turn around in that interval.

ger: they're planning on being fast --- using hardware. We're proposing a length field. They're saying they won't put a length field in the MAC.

Jerry: doesn't care where the length calculations are done.

Larry: did a simpler system 8 years ago. It takes time to recognize that the signal is down.

Ed & Tim: think the length field should be in the PHY header.

Ed: at the end of the length field, the PHY could send the MAC a "packet receive interrupt."

----- Ed and others debate smart PHYs vs. dumb PHYs -----

Dean: the ramp down should not be included in the specified switching time. Instead, replace it with the minimum CCA time.

John: don't you mean the maximum CCA time?

Dean: no.

n: likes Dean's idea

Larry: wants MAC to give us an RTS

Someone: that won't do. the MAC wants continuous CCA information.

John: But that's exactly what we gave them in our presentation yesterday [see Ed's flow chart in the minutes of the full PHY]. We shouldn't have shown them a flow chart, which to most people suggests sequential processing and thus delay. We should have shown them a gate array whose input lines were labeled "output of continuously-running power meter" and "output of continuously running clock detector" or, perhaps, "clock present", and whose output was "channel clear"

Various: the flow chart was OK, they got confused by the wording.

-------- more learned discussion -------

Peter: repeats call for submissions on CCA.

------ adjourn -------