Tentative Minutes of Phy Subgroup Meetings
Held during the Week of 9/13/93
Taken By Larry Zuckerman and Rob Benton
Pasted into required format by
Larry Van Der Jagt

1:00 PM Call to Order by Larry Van Der Jagt, Chairman

Larry Zuckerman agreed to take minutes for this meeting.

Chairman announced that everyone in attendance is permitted to vote, and that, from time to time, straw polls may be taken from official voting members only.

Draft Agenda for this was reviewed and accepted

Motion to form an official Higher Speed Ad Hoc Group

Wayne Moyer, seconded by Kamilo Feher

Discussion:

Feher reviewed meetings that already took place in Denver and Cupertino, referring to minutes [P802.11-93/156]

Vote: 16 for, 0 against, 10 abstained

Motion Passed

Discussion of when to hold Higher Speed Ad Hoc Group Meeting: Should not conflict with Infra Red Ad Hoc Group Meeting; Higher Speed already has five papers ready;

IR group already has meeting scheduled for 6 PM today; Resolved to meet at 5:15 PM today and figure out then will continue, possibly 7:15 PM Tuesday.

Announcements:

Author of 93/143 will distribute this paper but not read it at a meeting.

93/137 will be read at both this meeting and the Higher Speed Ad Hoc Group.

Resolved that this afternoon, we shall hear 93/148, 93/150, 93/138, 93/137, and 93/149 if time permits.

A minimum of 15 minutes will be allowed for each paper.

It is now 1:39 PM. Break will be at 3:00.

1:42 PM First Paper, P802.11-93/150, Francois Le Maut

"Preamble for Frequency Hopping PHY"

Delivery; Proposed Preamble and Postamble delimiters

Discussion

Questions by Moyers, Zuckerman, Chayat', Feher,

Strusaker, and others

Is 1 Mb/sec raw signaling rate? Yes.
Reasons for using SDLC 7E flags: Compatibility w/SDLC;
Van Der Jagt pointed out that 7E alone does not meet Hamming distance requirement, but that combined with unique word preceding it, may serve the purpose
Some question about taking advantage of MAC timing: No.

Second Paper: IEEE P802.11-93/137, Shuzo Kato et. al.
"Implementation Architecture, Suggested Preambles and Study, VLSI Components for Standard 1 Mbit/s GFSK and for Higher Bit Rate FQPSK, Offset QPSK WLAN"
Delivery
Discussion/Questions
Power Consumption
Sampling resolution, (8/bit period)
Analog to Digital Converters are external
Carrier & Clock Recovery accomplished in 16 symbol periods
If ideas in this paper become the standard, NTT grants uses of its applicable patents free of charge to all--also includes carrier recovery facility

Third Paper: IEEE P802.11-93/138, Kamilo Feher
"1 Mb/s and Higher Data Rate PHY/MAC: GFSK and FQPSK"
Delivery
Discussion

Break 3:11PM to 3:35PM

Fourth Paper: IEEE P802.11-93/148, Jerry Socci & Ken Ju
"Preamble and MAC Header to Support Hop Acquisition for a Frequency Hopped PHY
Delivery by Socci
Discussion
Etiquette Issues
Complications of Roaming
Not addressed by this paper

Any evaluation done for BER of E(-3) or worse?

Not done, but should be done

Why did you use a 010101 bit pattern instead of 11111?

To facilitate [carrier and] clock recovery

Issue of 010101 versus a longer sequence

Former better when no correlator being used

Latter better when correlator being used

Administrative Announcement:

Infrared Ad Hoc Group consents to change its meeting time to 6:30PM tonight, in order to avoid conflict w/Higher Speed Ad Hoc Group meeting to be held at 5:15.

Discussion of Preamble Items as a Group:

Socci's proposal has no end delimiters, but Le Maut's plan does (in the form of SDLC 7E flag)

Solid delimiter eliminate the need for a Length field

Nature of needed delimiter

Ending delimiter is most difficult

Larry V.--Is anyone strongly opposed to header being 104 symbols (to make it even number of octets)?

Make sure header is long enough for everyone's needs, as determined by a majority vote

Even though Standard will be determined with the help of discussions explaining the uses of the various bit pattern fields, the standard itself will specify only the exact bit pattern itself, not their uses. The equipment designers will make use of these fields in any ways they see fit to permit desired operation of their products.

Read paper #143 overnight to be able to vote intelligently tomorrow

Ramping Issues--lowest cost amplifiers have greatest spectrum spread during turn on & turn off

Announcement:

Reconvene 8:30AM tomorrow

4:57PM Move & resolution to Adjourn

End of Minutes--respectfully submitted

Lawrence H. Zuckerman

Tuesday AM meeting

Minutes by R. Benton

LVJ Q: is there anything to allow us to have DSSS and FH cooperate in terms of not jamming each other?

Paul: listen before talk, an appropriate threshold level must be chosen at which interference is unbearable. BW of DSSS is 10X BW of FH. What about preamble: We must detect body of packet w/o any special signal. DSSS must detect hopper w/o special signal. Also we must detect each other any time we are in same band. This is harder for DSSS.

LVJ: perhaps a common area can be found so that hopper can understand DSS xmtr:

Rob B. : Maybe before the DSS starts phase mod, they can simulate the hop at one freq:

(Much multiple access conversation at high data rate between various PHY members)

LVJ : a media access protocol is a MAC:

Paul: what is form to recognize that a hopper is present for dss, or vice versa?

Tom T: use simple energy detection for inform MAC/PHY interface of presence on channel occupancy.

LVJ: Systems can only coexist if the ettiqutte is followed.

Rob: This does not sound interoperable.

LVJ: Interoperability is not the goal. The two wireless schemes only have to be able to co-existence. Let's move on to the main task at hand. Do we want to finalize the size of the preamble.

John Mckown: Are we sure that we want all 100 bits to be preamble.

LVJ: When people have a hop per packet, they insert pad bits so others can set hop timer. Is phy header only at the beginning, or scattered in the packet.

(Paul& kamilo have conversation on uses of this pre.)

Craig Mckenna: Speed shift might be internal to MAC. Is speed shift internal to MAC:?

LVJ: any speed shift should be internal to PHY. There is no reason MAC should be involved in speed shift.

John: There is zero bits in preamble devoted to speed shift.

LVJ: A low speed unique word with speed shift encoded in it could be used. In modems the speed switch was in phy. (more discussion) What does phy have to add to preamble to enable speed synchronization and hop synch?

Francois: The phy must worry about the capability to go at a higher speed. Let the MAC worry about interference management and the phy about speed.

John: A: B: this topic is not for this committee, and it needs thought, so someone needs to make a proposal. Best way is to define a placeholder.

(much more discussion)

Nathan: We could have a fixed preamble to recognize, so that systems can synch, and those that want a longer preamble can put it in front of the fixed part of the preamble.

Francois: you reduce the length of preamble if going to higher speed.

LVJ: the guy who xmits must use least common denom. If there is a minimum preamble, then all must be able to understand it.

Kam: If you want low cost rcvr, it must be able to have short preamble.

LVJ: does anyone know what the bits should be used for? (more multiple conversations)

Kamilo: For ramp up, it is nice to have sequence of 11111..., carrier based encoder might have advantage over 101010 ie. carrier synch.

LVJ: If it was low speed mode first, then a period of unmodulated high speed carrier, do we believe this would be sufficient for the higher speed rcvr to acquire.

Bob: some targets were set at 100 bits, if we look at it nd say this if fine for 1MBps, then if we have a fall back sys of half speed, then is it still ok for the slo sys to come up on line.

Kato: 16 symbols is enough, so if

LVJ: if GFSK is coming at h=.4, then youwant to rcv different speed , is there enuf to shift gears at diff speed, or do we need bits after speed shift triger. If coherent, it seems difficult to re acquire the signal once you demodulated.

LVJ: every frame will start with same modulation and preamble, and then if it wants it can seitch to speed

John: if we are going to support diff speeds, then you should declare how often: eg is it donein MAC or higher-what happens: why should we support packet by packet switching. It should be node by node. Every packet starts out w ??SK.

LVJ:

John: I see the meet me channel as TDMA, so every so often, the net drops down and ynchs new comers

LVJ: there is no access point necessarily.

John: I can give some proposals, eg: I move that the PHY group views gearshift as infrequent occurence, so headers should be indep. of mod type. Of course if you go go from binary to quatern, then there is a change in header.

LVJ: interpreting john: Assumptions for operations,1) Speed shifting accomplished by a higher function than the phy.

If we are going to support the phy hiding the speeed change from the MAC, then it has to be done in phy.

John: motion 2) we assume that Data rate selection happens at association time.

Bob: I view shift as being more important than selection of the disc. of speed shift.

LVJ: We can hide things from the MAC, but can't you hide things above it. We can pass things above MAC to enable Data Shift if req'd. Can we take a position with the MAC group that we support data rate below 1MBps. As a fall back. We know the MAC group does not want to support a slower speed .

Francois: It seems we chose a basic data rate too high to begin with if we need to tell MAC group to handle a speed slower than 1MB. If we change, then we must also worry about the link up problem that will occur if a rcvr can't follow a access pt.

LVJ: lets get back to queue.

John: we don't won't to stir up people without reason. I move that we don't add anythning about data rate under 1MB. We will forward list to MAC group with the 2 items only.. I move we send as is.

Kamilo: I second.

LVJ: Now floor is open for discussion. Nathan?

Nathan: John,will this list support downshifting.

John: It will, but not explicitly. Are you telling the MAC it is its job to support gearshifting ,. My tendancy is to not say someting unless we are more certain.

Nathan: After you associate, and you need to shift gears, then you need to tell the MAC to do so.

LVJ: maybe change the part 2 to say"initial data rat...., and ends We assume the capability based on propagation conditions will be inmplemented.

LarryZ: we need to give this more thought: If you expect someone to rcv a higher speed packet then you need to

John: you can use a table to tell what data rate and modulation is used when conversin with someone.

Larry: But you still need a spectrum to acquire a modulation

John: when you sign in you can tell me what you need.

Larry: what I am hearing is that every thning will come in at same higher speed.

LVJ: gear shift is more import in shift to lower speed, but we don't want to alarm the MAC group. Sooner or later we must tell MAC group.

Kam: I think we don't have to gear shift in every packet, I stongly support adding bits to gear shift to preamble. We need a few bits in pream, and it does not seem to be a big hit out of 12000bit in packet.

To talk about gear shift because of conditions should not be prob, since we might want to go faster too. Ocass we shuld check the BER to determine if a gear shift if needed. I think we should add 10 bits TBD in case some new prob

comes up. 1e-5 is theory and thru put could easily nose dive, so it is necessary to inform MAC group of need to be concerned of this. We should amend part 2) to say ..capability to change data rate infrequently thereafter.. I think we shoild tell MAC group that we may need to go below 1MBPS

John: I am not sure that a need for a low data rate is there.

LVJ: Do we think there is a a chance of working at 1e-3 then we need to do someting now.

Francois : Implication is that a need for topology list in MAC

LVJ: I agree

Craig Mck: Open system viewpt is that you start with fixed mod at association time. This whole set of motions is based on simplistic view of operations, and MAC is better qualified to determine this

Tim: I think the MAC group will laugh at this move . Could we clarify the move.

John: Can you sensibly commun at diff. rates between nodes. You have to keep a table of antennas already. There is a way used in internet of bringing nodes into timing, so I think this is doable.

LVJ: We were a media where everyone could understand all messages, so this shoots down RTC=-CTS

Dean: There is no comm between rcvr to select antennaes.

John: There will be a table, and its a question of how often you update it.

Break

LVJ: Let's get on with deciding what to do with the move

Vote taken, motion fails: For 6:against 8 :abs=7

Issue 24-11 should we decide to set 104usec log preamble

Lets decide on length 1st, then cut it up into what each section is for.

Kamilo: lets call it 104 bits, 104usec long, then decide on content.

LVJ: This is a straw man, so idea is for people to go back and decide if its reasonable. It is premature to make it final. Can I have a motion?

Kamilo: I move we adopt a preamble of 104 bits with understanding of the content and purpose of each bit, and the time length of it is to be further negotiated.

WM. 2nd

John: I move to question the motion.

Vote: 4 against, 6 opposed, 13 abstain. motion fails

LVJ : During Ramp on -ramp off process, do you want modulation?

Discuss 1st 8bits of preamble

Kamilo: no, xmit 00000 because CW carrier reduces splatter

Conversation concerning spectrum splatter during turn on of xmtr.

Larry: some efficient implementation may be limited by this so they may not be able to turn as fast as 8bits

LVJ : next set of bits

John: bit sync, carrier recovery, ie center frequency recovery . We are being imprisoned by our terminolgy here. Lets free ourselves of this. The function of this is to say "this is a packet" not noise. We can use this to determine carrier offset and elim dc offset, but it needs to be clearly not a noise signal.

LVJ: what about antenna selection:

John: what about if you have 4 antennas, then you need 5 repetitions of the sequence.

Discussion about antenna selection and preamble between various members of group

Kato: One does not do sync at same time as ant select, but can use signal strength instead.

John: I agree

WM: We have a long time to demod . Lets allow a system to use a demod signal to help select antenna

Bob: You need bit sync inorder to do RSSI in DSS. I argue that we should keep it 4X as long as sync

Kamilo: there is a problem with RSSI. If there is multipath, then the weaker signal may be better, because its overall BER will be better

John: I think RSSI is not a problem in Altair which has 167ns pquaternary bit

LVJ: Lets make a list of needs of these fields:

1) Ramp on

2) Bit sync

3) word sync

4) Offset correction

5) Power measurement for antenna selection

6) unique word

7) Phy signalling field

Jerry Socci: what is diff between 3 and 6?

Kamilo: they are the same, eliminate 3. add ramp off

LVJ: lets prioritize these items

John: Packet detection, power measure, :

Nathan: what is unique word for?

Kamilo: I don't know.

Bob: Lets resolve issue of RSSI and also plan for future higher data rate: we may or may not need longer field for antenna selection

John: I think what Bob is worried a bout is another header:

Jerry Z: I think you can combine all the items in one bit pattern. An idea is 1100 as a repeating pattern that is useful for all functions listed

LVJ: A bit pattern is offered for items bit syn, offset correction, and RSSI(antenna measurement)

Kamilo: I have no problem with sequence: offset correction could be for carrier recovery, and bit sync should follow it.

Sequence is as follows:Ramp on,antenna select,offset correct,bit sync,word sync,phy signaling field,ramp off,reserved bits.

Comment from Jim D?: It seems we are trying to decide this on an adhoc basis. Why are we doing this without more study?

LVJ: We found that we got motion when we made some decisions earlier.

Wayne: it seems we are ignoring some of proposals already made.

LVJ:fine, but the proposal should have been made to us.

Paul: the PROPOSAL WE MADE IS FOR DSS, but feel free to use it.

Jerry: I think NSC and IBM proposal addressed items 2-6. I don't know what backup results are needed . The only thing not covered was higher data rate and PSF

LVJ: We voted to take it for further study, so we are doing the best we can. What is stopping anyone from coming up with a strawman proposal? Lets get a strawman and let people take it home with them

Rapid discussion

LVJ: can we ask the two previous proposal authors to get togather with whoever else is interested.

John: I move we break for lunch.

LVJ: I second.

S. Iand say this isband tematwerto: 16 symbols is enough for synch with GFSK different speed , is there enoughbits in preamble gerent, it seems difficult to re (conversation relating to need for having to change speed twice for every packet exchange between access point and multiple STA.) Eto it can swdifferent .John: Ierent. I ? Lets examine here.W(more conversation)see the meet me channel as TDMA.Es to the hop rate. (mentions Altair)Taendent lationary (referring to Altair again)(J and writing on view graph)support the phy hiding the speeusage of the word ""ription (discussion related to STA with higher BER perhaps using a lower speed)MAC to enable Data Shift if requireat we support data rate below 1Mb a(in the PAR) bpsl occur if a rcvr can't follow the access point.(trying to quiet the disorderly conversation) Lets get back to the queue.AC group with the 2 items only.h"""consider low power apps. It might take longer for them to gear shift.g.t I am hearing is that every thand rble sa lemcionallyo think we shoubps.? If so, then hof STA's in the ..From an ooint,yomust a ulation.icateerent? -Note that we considering and the implication is that this the S- protocol.unicationPHY and MAC for What is the function of the ?S.

(personally, I wonder if this matters as there is really no true interest in interoperability between DSSS and FH radios)T.

(more discussion).

(much more discussion)proposal we made is for DSSS,..

Adjorn for various ad hoc groups.

Thursday AM

Sub group reports:

Tom Baum..: IR group made no progress this time. Questionaire not answered. No convergence. How did GMSK convergence occur? I thnk we will be able to add an IR column next time to the doc. We need to open an issue at next meeting on what parameters are appropriate to spec.

Larry: We are going to open an issue on this: what are parameters for the IR PHY?

lets vote: 24 for, 0 against, 0 abstain

Tom: we will schedule a meeting for morning. Does that conflict with you Wayne?

WM: We thought you weren't going to meet. We will meet that same morning.

Tom: (debate over date of meeting) we will meet one of those nights.

Jan : TUes pm and Wed am meetings were held. Goal was to close as many as possible of specs. We had 3 presentations by Paul, Kamilo, and S. Kato. We closed several specs. We settled on OQPSK as modulation scheme.

Larry: you chose OQPSK? I'm surprised.

Jan: so am I. We need to pick a preamble, and turn around time, and a few other sub-issues.

Jan and Larry: discussion on time req'd for DSSS meetings.

Larry: We will come up with a template 1 SDLC flag, and two bytes of ones.. for the next mailing we'l try to get as fars as we can towards the final document of 93/20. Each time we close an issue, we need to include text in the document.

Nathan: Higher data rate. Went over Aug 23 meeting. Presentations by Feher, Kato, Naftali. In Cupertino meeting the minimum data rate of 1.5Mbps. We need to settle n a nominal data rate. Alos a problem came up with being backward compatible with 1Mbps GFSK. This means we need to provide for a gear shift mechanism in the MAC. We will make some proposals to the MAC group. We discussed 90% power spectrum. We feel it would be necessary to go to FCC with the request for wider channels for higher data rate. Kamilo is supposed to do a study for the next meeting. Was there a concensuss to go with only 20 channels. We would drop to 100 mW to go with the world wide standard for power per unit bandwidth. We will meet Mon morning in the plenar, and one more night.

Larry: there might be a policy that they don't allow meetings in parallel with the plenary. We might not be able to get rooms for the afternoon if you want a session.

Nathan: (more discussion) We will discuss modulation method at the next meeting.

Larry: We need to work a way of talking to FCC. I am concerned about the MAC. If we have two access point which are talking to each other and controlling access to the media, is it part 15.245 acceptable.

Nathan: I think it is ok as long as its thru it over the air.

Larrry: We have a standing commitee time. Questionaire not answered. No convergence for interfacing with the FCC. We have not gone to the FCC as engineers with the IEEE and asked for a law change.

Is it permissable for the 802.11 group to go to FCC.

Ron: there is a simple coresspon method to talk to FCC. A group here can ask thenm for a read on an issue, as long as it isnot too complicated.

Larry: the problem with as a group going to FCC is we would need to ask executive commitee.

wayne:i think we could get John Reed to come address us.

Larry: Should we go to the executive comm. and ask if we could have FCC come in. I think we should have Vic address the executive comm. In the session this afternoon, I we should bring up the idea of having an informal address from the FCC come in. This would allow Vic to go thru the politics of getting approval of the IEEE, whom we are the representatives of.

Plan for the next meeting: * close FH headers *preamble * acquisitive issue

Nathan: We haven't decided on a post-amble either

Larry: I think of the header as both before and after amble

The issue of the header should be closeable at next meeting, because people have had a lot of time to look at this issue. Should the preamble for DSS and FH have some commonality? I haven't seen any proposals.

Wayne: how can we close the issue of ettiquette?

Larry: No one has NCR doesn't believe ? The start and end delimiters are stripped off before passage to MAC

John: coexistence if a MAC matter. They took the power and listened in the band The freq hopper mac could maybe deduce the presense of a dss by noticing loss of a number of frequencies. Part of the winforum soln is a rule saying everyone is allowed power / root hertz. This is not a soln, but if you give a DSS equal power as FH, then it should go as power for square root of transmit bandwidth.

Larry. * Continue work on MAC/PHY issues

*Look at constraints on DS and FH PHY in the 2.4 band that concern coexistence.

* Close on DSSS issue 24.12 parameterization template

* Continue work on IR mod issues

* complete work on text for FH mod description

* continue work on higher data rate studies

* some work on something about measure at antenna or in the air?

John : paper by Bill Rumler of ATT

Discussion on FH template. Look at some other text such as 802.6 for example.

Larry: meetings - Monday am: HS and IR ad hoc group. Tues am meet as PHY group, work on coexistence, and possibly preamble, MAC/PHY issue. HS ill meet mon nite, IR will meet Tue nite..(several meetings:see schedule.) In the 802 meeting you can see full committee meeting.

Are there any submissions for next time planned? (J.S., F.C., J.B., S.K., LVJ, J.B.)

John: Discussion on synchronizer: Have a link between header words, and the error problems. Goal is to try to reduce false alarm probability.

John: post work to usenet news group at comp.std.wireless

Rob Benton

Addendum. Submitted by Jerry Socci

Results of the Sept 802.11 Tu. eve meeting about the FH Preamble.

Results of the Sept 802.11 Tu. eve meeting about the FH Preamble. The discuusion from that evening is summarized below. The meeting was attended by Tim Blaney, Burchall Cooper, Kamilo Feher, Roger Jellicoe, Shuzo Kato, Francois Lemaut and myself.

Preamble Structure resulting from Tu evening mtg

Preamble Length approx 104 bits (104 us at 1 Mbps)

Preamble content:

A) Ramp On Time: Approximately 4 bits. Modulation on or off ? Submissions should address length and modulation on/off

B) Antenna select, Bit Sync, Offset correction, Carrier Recovery: Approximately

80 bits. Manufacturer to use as needed. Currenlty have 3 proposals which are:

a) 1010...

b) 11010....

c) 1001....

C) Unique word: Have 2 proposals:

16 bits and 24 bits. Contributions should address length and contents.

D) PHY Signaling Field: Discussed and would invite papers that address use and

feasability to joint group. There are concerns some of which are:

- o if shift occured how would lower data rate radio recognize there is data on the channel
- o MAC issues

E) Packet Start/Length Field: There are two proposals which are to a) use a length field protected by a checksum or b) use start and end delimiters. Submissions should address this issue.