

## Tentative Minutes of the PHY Subgroup Meeting held 7-10 March, 1994 in Vancouver, B. C.

**Tuesday morning PHY Group, 8 March 1994.** Chairman Larry Van Der Jagt Presiding. John McKown acting as secretary [by the time these tentative minutes are published they will have been reviewed and corrected by the chair and perhaps other major participants]. It is the intention of the secretary that speakers will be identified only by their given names except at first reference or when ambiguities arise.

Submissions 94/nn are allocated to groups as follows.

PHY	48, 49, 53, 59, 79
FH	68, 69, 70, 72, 73, 78
IR	55, 56, 62, 63, 64, 65, 66
DS	50
HSFH	51, 54, 71, 74
M/P	61

PHY Submissions constitute one item on the agenda; the other is satisfying the guidance received from the plenary session just concluded. A straw poll on the disposition of 94/52; 15 against a presentation, 1 for; it is treated as "information only."

Larry: let's try to do 5 papers before the break. The authors of 49 and 79 are the only ones present.

Wayne Moyers: 94/70 is irrelevant to the PHY group.

Larry: I'll present Chandos' paper, then on to CCA. After break we'll have a strategy session on how to heed the sentiments expressed in the plenary.

Ed Geiger: There exist tabled motions relevant to that; they may be reintroduced.

Larry: during our half afternoon Wednesday, we'll hear reports from the ad hoc groups and address any issues arising from them; we'll plan for the standard and plan for the next meeting. Anything else?

Ed: The FH group needs to review its draft standard.

Larry: that's for the FH group session. You have your scheduled time and any night sessions you care to embrace.

Ed moves & Wayne 2nds agenda adoption; passes by acclaim.

Larry presents 94/48; advises we read & consider it.

Peter Chadwick: rejects /48's intermodulation argument. The magnitude of the effect is negligible and the argument applies equally to DS. LBT works against simultaneous emissions.

Paul Strusaker: Yes. Successful DS designs have been in the field for 25 years. Well-designed FH and DS systems will work fine.

Several Others: agree

The group decides not to execute the motion within 94/48, preferring to give Chandos the option of pressing his case in person.

Dean Kawaguchi presents 94/70.

Tim Blaney: questions appropriateness of Dean's sync assumption (that packet time is random with respect to antenna switch time).

General discussion on the precision of synchrony at wake-up time.

Wim Diepstraten attempts to present 94/59 but is ultimately defeated by technical difficulties.

Jim McDonald presents 94/78 on CCA (recommends packet detection).

Ed: CCA takes about 100 microseconds.

Larry: we haven't yet discussed provision of direction to the ad hoc groups regarding events in the plenary. Does the group want to accept a modified agenda to address that after lunch?

Acclaim: yes.

----- break for lunch -----

Larry: we must act on the direction we almost received from the plenary to report a single modulation type and data rate.

Kamilo Feher and Larry investigate the HS group's status. They agree the FH group is writing a standard and the HSFH group is executing a study.

Wayne: multiple data rates, if they happen, will have to be supported by consensus.

Ed: last night in the HSFH group a modulation scheme was moved and tabled. wants modulation schemes to be voted on in joint FH/HSFH meetings.

Kamilo: The HSFH group has status equal to the FH group.

Larry: not quite. The other ad hoc groups are chartered by the plenary to draft standards, not studies.

\*  
Kamilo: there is no need to replay the deliberations of the HSFH group in other groups.

Michael Rothenberg: there is no time to repeat deliberations. blocking minorities exist. seeks direction from the PHY.

MOTION 1: the PHY group will vote on the motion tabled in last night's HSFH group concerning FQPSK. Moved: J. McDonald. Seconded: E. Geiger.

Peter: speaks for motion 1. It presents greater unity as viewed from above. Rate changing requires coordination between FH & HSFH.

Someone calls for a straw poll: "how many are enthusiastic about multiple data rates?" 21 are, 16 are not, 8 lack opinions.

Rob Carl: wonders how many feel qualified to accurately represent their companies' opinions in an immediate vote

Kamilo: Mr. Chairman, may a committee vote on an issue which is in violation of the direction of a previous committee decision? [?]

Larry: The PHY has chartered the ad hoc groups and is responsible for monitoring the progress and output of the ad hocs. Our present purpose is to get the PHY as a whole to help rationalize the situation(s) in the ad hoc groups based on feedback we have received from the plenary.

Wayne: given another hour, we might have gotten a vote in the HSFH group.

Tim moves to call the question, Ed seconds. for call=32, against=0, abstentions=22. The question is called.

VOTE ON MOTION 1: for=23, against=19, abstentions=15. The chair rules the question is procedural and the motion passes.

Paul: feels this is a FH issue and will abstain.

Jerry Loraine: reads the motion as expressed last night in the HSFH group:

MOTION 2: "I propose FQPSK be adopted as the higher rate scheme." Moved: J. McDonald. Seconded: K. Feher.

Larry rules Motion 2 cannot be amended [secretary's comment: surely we should have phrased motion 2 this way: "The PHY group adopts FQPSK as the only higher rate FH scheme"]

Michael Ruthenberg: asks for straw poll on how many feel unqualified to judge at this time. 9 out of 57 feel unqualified.

Kamilo: wants 10 minutes. Larry would be unfair not to give it to him.

General discussion on whether technical presentations are appropriate and in order. The general direction of the discussion is that most feel they have seen enough detail to decide. Larry says we will proceed without technical discussion at this time.

John moves to call the question. Peter seconds. for call=30, against=3, abstentions=22. The question is called.

VOTE ON MOTION 2: for=5, against=26, abstentions=27. Chair rules the question is technical and the motion fails.

Someone calls for a straw poll: "in principle, if it were found in the HSFH ad hoc group that 2 Mb/sec was feasible, how many would be opposed to that as a second, higher data rate for the FH PHY?" 11 are opposed.

General discussion is terminated by

MOTION 3: We will pick in this forum one of the three modulation schemes proposed last night at the HSFH meeting. Moved: E. Geiger. Seconded: D. Kawaguchi.

Wayne: Doesn't like this precedent.

Jim moves to call the question. Peter seconds. for call=35, against=0, abstentions=19. The question is called.

VOTE ON MOTION 3: for=24, against=12, abstentions=18. The chair rules the question is procedural and the motion passes.

Wayne: There are 3 candidates: FQPSK, pi/4 QPSK and 4GFSK. Kamilo has thoroughly responded to 93/210a on behalf of FQPSK. pi/4 QPSK is treated in 93/34 and 4GFSK in 94/8, 94/42 and other documents.

Peter: doesn't our previous motion remove FQPSK from the list?

Larry: no.

Michael: supports Wayne's reluctance to take decisions outside the HSFH group but recognizes the plenary's sense of urgency. Wants a simple majority to decide the issue if 75% is not obtainable.

Larry: It's a technical question. 75% is required. Does the group wish to extend the agenda and continue on this issue after the break?

Acclaim: yes.

----- break -----

Larry: Ed will have the floor. Our purpose is to provide direction to the ad hoc groups on how best to serve the PHY as a whole and proceed with the standard.

Larry: There is a procedure for dealing with perceived improprieties of the chair within "Roberts Rules of Order;" they should be appealed immediately.

Any problems should be brought out in this session rather than later in the halls.

MOTION 4: We adopt the following procedure to select a single HSFH modulation scheme. First, by a simple majority vote, eliminate 1 of these 3 candidates: (1) 1.4, 2.8 and 4.2 Mb/sec FQPSK; (2) 1.5 Mb/sec pi/4 DQPSK, (3) 2 Mb/sec 4GFSK. Second, eliminate one of the remaining two candidates by simple majority. Third, take a vote to approve the selected scheme by 75% majority. If a 75% majority is not obtained, then the HSFH PMD will not be included with the 1.0 Mb/sec FH draft standard.

Moved: E. Geiger, Seconded: D. Kawaguchi.

MOTION 5: Amend motion 4 such that after step 1 the 2 remaining schemes may be supported technically for 10 minutes each.

Moved: M. Rothenberg. Seconded: K. Feher.

Peter moves to call the question. Colin MacNab seconds. for call=39, against=0, abstentions=5. The question is called.

VOTE ON MOTION 5: for=21, against=17, abstentions=10. The chair rules the question is procedural and motion 5 passes; motion 4 is amended.

Tim: Why not instead only discuss prior to the final vote?

Michael: wants to refresh memories.

Dean: is for the motion and for speed.

MOTION 6: Amend Motion 4 such that the last sentence reads "If a 75% majority is not obtained and the HSFH group cannot arrive at a resolution by the last PHY meeting of this session, then the HSFH PMD will not be included with the initial 1.0 Mb/sec FH draft standard to be released in November 1994."

Moved: M. Rothenberg. Seconded: J. Grau.

Dean moves to call the question; Jim Renfro seconds. For call=34, against=4 abstentions=8. The question is called.

VOTE ON MOTION 6: for=20, against=19, abstentions=11. The chair rules the question is procedural and the motion passes.

Tim moves to call the question; Peter seconds. for call=36, against=24, abstentions=[smudge]. The question is called.

VOTE ON MOTION 4 AS AMENDED BY MOTIONS 5 AND 6: for=44, against=0, abstentions=10. The chair rules the question is procedural and the motion passes.

The chair counts 62 persons in the room. We begin the elimination process (the first step of motion 4).

Voting to eliminate FQPSK: 26.  
Voting to eliminate pi/4 DQPSK: 14.  
Voting to eliminate 4GFSK: 1.

The 20 minute advocacy period begins with Jerry Loraine defending pi/4 DQPSK. It's antipodal, which is 10 dB better than orthogonal FSK against AWGN.

Naftali Chayat and Juan defend 4FSK, stressing its hardware compatibility with 2FSK.

Voting to eliminate pi/4 DQPSK: 25.  
Voting to eliminate 4GFSK: 15.

Someone calls for a roll call vote on the final contender, 4GFSK. Larry conducts a straw poll. For a roll call vote=11, against=24. Nevertheless, we endure

MOTION 7: We will conduct a roll call vote to satisfy the third step of motion 4 (as amended). Moved: B. Messinger. Seconded: W. Moyers.

Dean moves to call the question. Jim Renfro seconds. for call, against=0, abstentions=1. The question is called.

VOTE ON MOTION 7: for=13, against=28, abstentions=11. The chair rules the question is procedural and the motion fails.

Voting to approve 4GFSK as the HSFH modulation scheme: 26  
Voting not to approve it: 18.

The chair rules less than 75% approve.

Kamilo: The DSSS group only has 2 modulation schemes before it, not 3. The 1 Mb/sec scheme is BPSK. DQPSK and OQPSK are essentially the same modulation technique.

Tim: reads a motion about the March deadline.

Larry: rules Tim's motion out of order.

Jim Renfro: understands Kamilo's point but is worried about interoperability. There cannot be two ways to demodulate.

Kamilo: what is your problem?

Jim Renfro: there is no reason to support both techniques.

?: it is even difficult to get standards with two nearly equal functions through the balloting groups.

Kamilo: Oh, O.K., I am prepared to gamble. Let us vote.

Jim McDonald: please describe the two methods you are discussing.

Paul: DOQPSK has a half chip offset to improve modulus. It requires coherent techniques but allows pure class C. I don't think class C is really necessary.

Jan Boer: Offset QPSK has multipath problems and the requirement for coherence is burdensome. The performance claimed with perfect coherence will be degraded in practice.

I have not seen OQPSK products or realistic simulations.

MOTION 8: The PHY group accepts DQPSK for DSSS. Moved: J. Boer. Seconded: P. Strusaker.

MOTION 9: Postpone consideration of motion 8 until the third day of the May meeting. Moved: K. Feher. Seconded: M. Golanbari.

John moves to call the question. Peter seconds. for call=39, against=0, abstentions=3. The question is called.

VOTE ON MOTION 9: for=7, against=26, abstentions=13. the chair rules the question is procedural and the motion fails.

Kamilo: We have spent 4.5 hours with few technical discussions. This is unsound.

Larry: We are here to generate guidance for the ad hoc groups. We have seen many technical discussions over the past months and have had ample time to consider them. We have been alerted to the plenary's discontent with the output of our ad hoc groups.

Kamilo: You were not so advised. What is our topic here? This proceeding is improper.

Larry: The topic according to the adopted agenda is to provide guidance to the ad hoc groups.

John moves to call the question. Peter seconds. for call=32, against=1, abstentions=13. The question is called.

VOTE ON MOTION 8: for=21, against=13, abstentions=19. The chair rules the question is technical and the motion fails.

MOTION 10: The PHY group accepts OQPSK for DSSS. Moved: K. Feher. Seconded: H. Mehdi.

John: proposes voting members only.

Larry: rules that out of order based on input from Kamilo that this would be changing the rules in mid-stream.

Jan moves to call the question. Paul seconds. for call=39, against=1, abstentions=2. The question is called.

VOTE ON MOTION 10: for=7, against=20, abstentions=18. The chair rules the motion is technical and the motion fails.

Paul (chair of the DS ad hoc group): I don't feel the DS group has received sufficiently clear direction from the PHY at this point.

John: I think we can fix that. Calls for straw poll of voting members only. For DQPSK=22, for offset PSK=3.

Several: that seems clear enough.

MOTION 11: Let us adjourn. Moved: J. McKown. Seconded: J. Renfro

VOTE ON MOTION 11: for=30, against=12, abstentions=2. Chair rules the question is procedural and the motion passes.

We adjourn.

**Wednesday Afternoon PHY Group, 9 March 1994.** Chairman Larry Van Der Jagt presiding.

Larry: the agenda will be

- 1 reports from subgroups
- 2 issues arising from reports
- 3 plan next meeting
- 4 other business

We will adjourn at 17:30. During this meeting only "voting members" may vote.

Rob Carl: calls for a time limit on speeches.

Larry: 2 minutes.

Wayne: Why voting members only this time?

Larry: chairman's preference. it gives the best picture of events in the plenary.

Michael Rothenberg: wants a vote on who votes.

Larry: you must appeal the chair's ruling.

Michael: I do.

Vic: that requires a second, is decided by a simple majority and is undebatable [Vic later discovered this should have been debatable].

Mac Sullivan: I second.

For chair=25, against chair=13, abstentions=7. The chair is sustained.

Paul Strusaker reports events in the DS ad hoc group. The group unanimously chose DBPSK and DQPSK, exclusively, as their low (1 Mb/sec) and high (2 Mb/sec) rate modulation schemes. They will next consider CCA and the MAC/PHY interface. They expect to finish at the next session.

MOTION 1: The PHY subgroup accepts, as the DSSS modulation schemes, DBPSK for 1 Mb/sec and DQPSK for 2 Mb/sec. Moved: P. Strusaker. Seconded: J. Boer.

Peter Chadwick moves to call the question, Jan seconds. The question is called by acclaim.

VOTE ON MOTION 1: for=25, against=1, abstentions=2. the chair rules the question is technical and the motion passes.

Wayne Moyers reports for the HSFH ad hoc group. Thanks Tim Blaney for his contributions. The group made much progress, addressed all issues and finished their template. Gearshifting has been proven feasible and accomplished. Displays a marked-up copy of 93/210a. See the HSFH minutes.

Juan Grau displays and discusses masks and the spectra of 2- and 4GFSK signals. Gear shifting may be executed as follows.

- (1) all control, broadcast and multicast packets are transmitted at the slow rate (2GFSK)
- (2) the switch to the high rate (4GFSK), when selected prior to a transmission, is handled in the physical layer and is invisible to the MAC.
- (3) the PHY header and end delimiter or length word shall be transmitted at the low rate; the MAC MPDU shall be transmitted at the selected rate.
- (4) the data rate for the MAC MPDU is identified by a field in the PSF of minimum length 2 bits.
- (5) there is no need for timing-critical resources in the MAC.
- (6) the MAC functionality required for multiple rates is the same for different PHY types.
- (7) the rate switch can be considered instantaneous at the field boundary.

Paul: and base-rate clock detectors will work well when driven by the high-rate signal.

Juan: our scheme supports all the CCA (i.e., clear channel assessment) techniques listed by Jim McDonald. Shows chart on throughput. Capacity doubles using the high rate if packet duration is held constant; improvement is somewhat less if bytes/packet is held constant. The overall improvement can be expected to fall between 50 and 100%.

Wayne: so we consider ourselves essentially finished. We have unanimous HS group approval for every line to update 93/210a. We're committed to resolve any other problems as they arise.

MOTION 2: The PHY group accepts 4GFSK for optional FH service at 2 Mb/sec. Moved: W. Moyers. Seconded: M. Rothenberg.

Bob Egan moves to call the question, Dean Kawaguchi seconds. The question is called by acclaim.

VOTE ON MOTION 2: for=23, against=2, abstentions=4. The chair rules the question is technical and the motion passes.

Peter Chadwick reports on the FH group. They were unable to reach consensus on a packet length. They accepted 94/68. They will edit by simple majority. Changes require formal motions.

General discussion on documents and document management.

MOTION 3: The HSFH ad hoc group shall make text submissions to the FH group, containing descriptions of the optional services, for inclusion in 94/68. Moved: Tim Blaney. Seconded: R. Carl.

Wayne moves to call the question, someone seconds. The question is called by acclaim.

VOTE ON MOTION 3: for=15, against=0, abstentions=6. The chair rules the question is procedural and the motion passes.

Larry: at the next meeting, all groups will be editing text.

John McKown: calls for straw poll: how many think CCA should be PHY-specific, i.e., different PHYs require different CCA techniques? 23 think CCA is PHY-specific, 1 thinks not.

General discussion on where CCA work should be done. A straw poll indicates a majority feels it should be done in the ad hoc groups.

Larry: then we will resolve CCA at the ad hoc level.

Larry maps out the schedule for the next meeting. General discussion on procedure, speed, and the unwieldiness of editing at the plenary level.

MOTION 4: The PHY subgroup will ask the plenary to direct the subgroups to keep their working drafts within the subgroups until the November meeting when they will be combined. Moved: P. Strusaker. Seconded: W. Moyers.

John moves to call the question, Tim seconds, the question is called by acclaim.

VOTE ON MOTION 4: for=26, against=0, abstentions=1. The chair rules the question is procedural and the motion passes unanimously.

Peter: what about NTIA's attempt to reallocate 17 MHz within the 2.4 GHz ISM band?

Consensus: remand the issue to plenary.

----- adjourn -----

