Minutes of the Higher Speed Working Group

Meeting was opened at 8:35am on Tuesday 7/8/97

Agenda
        5GHz PAR corrections
        2.4GHz PAR
                ■   technical presentations
                ■   PAR wording
        IR
                ■   technical presentations
                ■   PAR decision/wording
        5GHz PAR
                ■   PAR corrections
                ■   BRAN
PAR decision/wording

Richard Paine was assigned as secretary

Discussion on presentations for 2.4GHz PAR. Vic mentioned that we had to work on the 5 criteria for presenting a new PAR.

John Cafarella from Micrilor

1st generation technology of 2.4GHz
Robust 10Mbps modulation
MSK: low current
Need for TRANSEC
DS
        16CHIPS/SYMBOL
        12dB processing gain
Retransmission protocol also controls
        FEC
        Antenna Diversity
        Adaptive P-CSMA
PN Codes optimized for multipath
MAC - level retransmissions
Rapid acquisition
        Small preamble
        High data throughput
Strongly supported by the Army
DSSS Privacy at >7.5Mbps throughput
Clarion has some commercial products
It is 802.3
Conforms to 802.11 MAC
Relationship between 2 and 10Mbps standards
        Dual mode wireless NIC
Chose not to use the RTS/CTS because it is optional in the spec

Modulations with DSSS

Processing gain is chip rate divided by symbol rate; no penalty

Biorthogonal modulation adds another bit

    For coherent signaling

        Send one of M Waveforms

        Sign conveys additional bit

    For noncoherent signaling

        Send one of M Waveforms

        DPSK between symbols conveys extra bit

    16-ary bi-orthogonal yields 5bit/symbol

Orthogonal modulations with DSSS

    Walsh function orthogonal signaling is most natural for DSSS

Optional Coding

    Used to combat "irreducible error rate

    High rate R/S code

        minimal reduction of data rate (8.67Mbps)

        Approximately 2db coding gain

    Short, single-error correcting block code

        Non iterative decoding

        Very low latency

    Simple hardware implementation

The retransmission is transparent to the MAC and to the user

    Physical layer and managed by the MAC layer transparently

16 Walsh function symbol correlations at <half the power of 16 independent correlators

Summary

    10Mbps modulation

        robust in multipath and interference

        12-db processing gain

        7DB E/N

        Natural match to DSSS

    Optional FEC+Good PN Codes (multipath)

    Efficient implementation

The retransmission protocol allows to put the retransmissions between the pulses of a microwave oven.

Three important things about this implementation approach

    Modulation

    Security

    Chip level modulation

FEC is done on a nibble, so it's a much more robust system (would be good for problem solving)

The symbols are all in slots and that fact is put in the preamble

It is synchronous to the symbol

The speed is picked up by a very fast, few number of functions, processor just before/after transmission

Only transmit diversity

Harris Position on Modulation

Maintains interoperability with 1 and 2Mbps 802.11 DSSS vs the Micrilor solution

802.11 DSSS BPSK, 802.11 DSSS QPSK, 5.5Mbps BMBOK, and 11Mbps QMBOK

The Harris 10Mbps degrades to the 1 and 2Mbps 802.11 systems when the 10Mbps cannot be maintained

The range loss at 11Mbps is not that much (like 200ft vs 300ft for the 1Mbps).

Does not do the FEC that the Micrilor does.

They are before the FCC currently and expecting to pass and have chips out pretty soon.

Carl is using CTS/RTS in the mode of the existing 802.11.

Morning Break

Discussion on document 59; PAR Proposal for High Speed extension in 2.4GHz Band

Johnny wanted to add the distinction about the PLCP header rather than the possible MAC header.

Dave Bagby made the statement that he objected to the distinction that the previous standard had to be a precondition of the PAR. He also stated that we should decide on one extension rather than multiples

Johnny and Jan want to include the use of the previous headers a prerogative. Dean said that such headers may not make sense and should not be in the statement of the PAR. Others agreed with Dean. Keith said that we should not give the impression that we are going to do another PHY for 2.4 on the same level as DSSS and FH. Peter Ecclesine stated that in 802.3, the extensions to the original were put into the criteria and not into the scope of the PAR. Bob Bagby made a proposed scope without the restrictions. John Chafarella said that if we make the restrictions, we will throw the baby out with the bathwater. Jeff Abramowitz proposed to keep it simple.

A straw poll was taken on the header level specification in the scope and the people to take it out were three to one. Seven were con and 22 were pro. The statement come out.

Bob O'Hara made the proposal to delete the second sentence. The vote was 25 for, 4 against, and 2 abstain. There was no discussion.   The second sentence will be deleted.

Dave Bagby proposed some more wording changes to remove the (in approval) in 5b and the deletion of the full use (5-year life cycle). In 7, the first sentence was modified by deleting "without the need to replace the existing equipment."

Mack Sullivan: The date in 5d is to put a date in a year earlier. Peter Ecclesine said that five plenaries are required to put anything through the balloting and through the executive committee. They decided not to change the date.

Base stations were changed to access points in paragraph 7.

Several companies stated that they are pursuing patents on these 2.4GHz technologies. Harris, Micrilor, and Symbol said that they are pursuing patents, but they will live by the IEEE rules.

The other places in the PAR were changed to be compatible with the first statements and votes in the document.

Dave Bagby made a motion to insert "a" before higher and change "extensions" to extension. His intent is to change the scope of the project to make it smaller. Win seconded. The discussion was by Naftali to not restrict the project to one PHY. Dave called the question, and Peter seconded. The vote was 27, 3, 0 to call the question. 25,5,5 was the vote to support the motion to do just one PHY.

Break for Lunch

The first question after lunch was on how to choose the PHY. There was no resolution and then we moved on to the criteria. The first criteria is the broad market potential and Dave Bagby proposed a little change. The other four criteria were also reviewed and commented on.   The criteria were all modified to accommodate the earlier worked scope. A statement was also added about a version of the modulation method was approved by the FCC.

The key change was in the statements about implementing a single PHY rather than multiples. Dave moved to accept the PAR as modified and John seconded. 25, 2, 4; the motion carries

Infrared

The LTEL corporation presented at the previous plenary. They offered a 10Mbps IR wireless LAN. They are back after being asked to address compatibility with the existing 802.11 MAC.

The Differential Mark Inversion (DMI) is the modulation method. The DMI modem has an error rate of less than 10^{-10}. 30 meters is the distance of the service area.

The packets are encapsulated 802.3 packets. Encapsulated ethernet which is not 802.11.

Why would you want to do this when hundreds of companies have already committed to IRDA?

Naftali laid out the options for a new PHY. We would have to create a new PAR.

Simon Black proposes not to generate a PAR based on the one company presentation on the IR LAN proposal.

Most of the discussion was negative, especially in light of the diffuse IR standard already created that caused a problem for the new standard.

Naftali stated that we should do a straw vote on whether what was presented we want to turn into a PAR. The straw poll result is that this study group does not want to generate a PAR for IR.

Jan Boer from Lucent on the BRAN

Project create in March 1997
Merges ETSI's HIPERLAN expertise and fixed access expertise
Leverages ACTS R&D programs
Future oriented
Broadband Radio Fixed Access
25Mbps to 155Mbps
From 50m to 15km range
User data rates from 16K to 16M
Core network independent
    POTS, ethernet, etc
No known manufacturers are producing a HIPERLAN I product - Jan added that the problem is with the requirement to equalize the connection which is technically difficult
Working Group I - Requirements and architectures
Working Group II - Spectrum and Regulatory Matters
Working Group III - Access Network Specifications
Working Group IV - Interworking specifications
Liaisons with ATMForum, IEEE, ITU-R

Technical Reports
    Requirement and Architectures
    Inventory
Working group 3 has not made the choice for the modulation technique
Quite a bit of discussion about the where ATM fits.]

Some of the PHY proposals are

OFDM (Magic Wand)
Single Carrier (NEC)
Ramp (Thompson)

Both ETSI-BRAN are investigating the network access
Convergence is important
    ETSI is standard development for Europe
    All 5Mhz wireless will use the ETSI protocols in Europe
Proposal - define common radio PHY, based on same physical characteristics, suitable for adoption by standardization bodies
    Could eliminate differences in certification requirements
    provide benefits such as scale

Break for Coffee

The discussion moved to the letter from 802.11 to BRAN for liaison

There were several comments about modifying the letter to be more gentle in its tone. One of the comments had to do with the suggested requirement to recognize 802.11 devices as HIPERLAN devices and the other had to do with requiring recognition of the 802.11 as an official body. Jan will bring it up tomorrow (7/9) in the 802.11 plenary.

Presentation by BreezeCom on 5.2GHz Modulation Possibilities

Naftali is recommending the use of GMSK/OQPSK with parameters similar to HIPERLAN; to define a higher level based on OQAM at double data rate; and to reconsider preamble and error correction issues relatively to decisions taken in HIPERLAN.

Wim make the comment that HIPERLAN does not like the approach they picked for HIPERLAN I. Naftali is hoping that our correlation with HIPERLAN will enable us to combine efforts and make something more advanced than the either project separately.   Lots of discussion about the whole range of modulation and how we could implement all the available bandwidth of the UNII frequencies.

The meeting adjourned at 4:34 and reconvene tomorrow at 8:30am.

Wed 7/9/97
Masahara from NTT in Japan
Evaluation Items for the PHY

NTT is purporting that OFDM in combination with QPSK is the best modulation scheme for the new PHY
There is no FEC in their proposal
Four 25MHz bands have skirts on the signal that can cause problems with the FCC unless there is a guard band

Naftali

Naftali apologized to the group for the strong wording on the 3Mbps emphasis on the 2.4GHz PAR

Vic Hayes

There was quite a bit of delay while Vic presented the wording changes for the new PAR to go to the executive committee and corrected typos. Vic moved that document 63 (the PAR) be submitted to executive committee and Keith seconded. Approved the new version with 33,0,0. Vic also moved that the new 5 criteria be presented to the 802.11 committee (97/31) and a new document 97/65 (it is a supplement to what we just approved), Dean seconded. Dean called the question. 27,0,4, the motion carried.

Dean moved to replace 59 version 1 with version 2. Seconded by Neal. 36,0,1, the motion carried. .

MSK Chip Modulation
John Cafarella from Micrilor
9:37am

John hadn't completed his presentation yesterday and is finishing. He explained the waveform yesterday, and today he wanted to present more. They are moving their radio to a PCMCIA form factor and he presented the problems they ran into by moving to the PCMCIA card. They used MSK because they can put a hard limit on receive and be more efficient in power conservation.

Offset-QPSK or O-QPSK must be converted to MSK and to do that, you must convert the rectangular signal to a sine curve which is MSK-like. Clarion calls this the 110. The data modulation has not changed.

Military JTIDS, ?, and ? use MSK for modulation. Has more power conservation than other modulation techniques.

Presentation doc.: IEEE 802.11-97/52 by John Cafarella, MICRILOR, Inc. , on a modulation technique for 2.4GHz. He proposed an MSK coding technique that would allow lower power consumption than QPSK. This would be critical for PCMCIA applications.

John Cafarella also presented doc.: IEEE 802.11-97/53 a method of providing security for wireless LAN applications. The presentation proposed Transmission Security (TRANSEC) coding method that could be used to code wireless data. He compared TRANSEC method to Data Encryption method and gave an overview of the coding technique. Debate followed on security issues and should the next generation product provide the option of more that one security technique.

Break at 10:20

New Issues

After a break the meeting continued with a discussion of issues lead by Naftali Chayat. Some of the issues discussed were channelization

Naftali Chayat surrendered the chair of the study group to Dean Kawaguchi. Naftali made a proposal that the PAR that was agreed on yesterday limited the FH PHY and proposed that separate PHY PARS be presented

Dean brought up addressing the ATM interface

Richard Paine brought up the use of all the 300MHz and Naftali thought that the first 200MHz was going to be used in the PAR anyway by channelization.

Naftali handed the chair over to Dean Kawaguchi and proposed that we allow more PARs. "To prepare separate PARs for DS and FH extensions in the 2.4 GHz band." Phil Belanger proposed that we do the

same thing with maintenance PARs. Vic gave an explanation about what has happened with the executive committee and the subject of a maintenance PAR. They don't want one. George brought up the history of 802.3 and the number of PARs that they have implemented. Simon Black objected to the benefit of the 3Mbps and then Dave Bagby objected to the lack of benefit in creating a market. Keith Amundsen made an argument to not do this. Chris Zegelin made the comment that it was going to confuse the customers. Dean made the comment about the fact that the 3 was shot down because we were trying to get the standard done. Keith supported Dean's position. Miri supported Naftali. Jeff supported Naftali. Dave brought up that there was a motion on the floor. Miri was a second on the motion. Mack called the question. Tim seconded. 15,11,13, the motion passes.

There wasn't anything left to do this afternoon and Vic brought up that we would have to meet with the study group to reword the now 3Mbps PAR. We then started to work the wording on the 3Mbps PAR. Document 68 is the document for "PAR for 3Mbps extension of 2.4GHz Band" and a motion was made to accept it. Chris made the he discussion was that this PAR puts a constraint on the marketplace. Naftali made a motion to extend the meeting,, it loses 7,14,9. The study group reconvenes tomorrow morning at 8:30am.

Study Group Reconvenes at 3pm on 7/9/97

Main 2.4GHz PAR was approved. The other proposal that was approved is "prepare separate PARs for DS and FH extensions in the 2.4 GHz band" (15,11,13).

Naftali turned over the chair to Carl. Naftali proposed a motion to the following: "to interpret the above motion to be the 59R2 PAR and to have an FH extension PAR." Keith seconded the motion. Dean called the question. 8,5,15 the motion carries. Phil noted that it was stupid to confuse the customer. Harris noted that they abstained because of the confusion to IEEE about the multiplicity of proposals. Dean stated that he went to a negative because of confusing the customer. Keith made the comment that the 3Mbps could be done on a fast track, anything else could not. Naftali moved to accept the PAR on the 97/68, a PAR for a 3Mbps FH to 802.11. Move to forward document 97-68 (a PAR for 3Mbps FH) for submission to the 802.11 for submission to the executive committee. Comments were generally negative. 5,11,14 was the vote. The motion failed. There was some follow up discussion about what would have changed the votes from positive to negative or vice versa.

We still have a motion to submit a PAR, but no acceptable paper.

We are back to issues. Carl yielded the chair back to Naftali.

We worked the ETSI BRAN working paper. Changes were made to the statement "IEEE 802.11 requests that the ETSI BRAN project makes a strong effort to make the 5GHz band accessible in Europe for equipment that does comply to future 5GHz 802.11 standard. There was also a modification of the document with its reference to WINFORUM. We changed it to regulatory agencies. We also deleted a sentence that was confusing. Motion by Paine to nominate Jan Boer as our liaison to the ETSI BRAN project. Victoria Poncini seconded. 24,0,3, the motion carries. Paine makes the motion to move the 97/67, as modified, to the 802.11 plenary. Peter Ecclesine seconded. 26,0,0.

The meeting was adjourned at 4:27 and the comment was made that a skit had to be readied.

No meeting tomorrow morning.