Tentative MAC Minutes
Monday, January 8, 1996

The meeting was called to order by chairman Dave Bagby at 1:30 PM. Carolyn Heide secretary.

Goals

- Complete D2 draft editing
- create/review pics proforma
- complete letter ballot comments
- papers: 96/1 (doesn't exist yet), 96/3 (missed section 8 comments)

Administration

Matters arising from minutes: none

Motion #1: **To approve the Nov. 1995 MAC minutes in Doc. 95/235**

Moved by: Tom Baumgartner
Seconded by: Simon Black

Motion 1 Discussion: none

Approved: no nays ***Motion #1 passes***

Work plan, break into small groups

Simon Black: leads work on Pics Proforma
Dave Bagby: leads rest of comments remaining

Break to small groups 1:50 PM, reconvene at 5:15 PM

A long discussion took place about what to do with the state machines: Should they stay where they are, or be in an informative annex, or be removed until they are correct? Even as an informative annex, is it bad to have them present if they are wrong? Are they helpful to users if they are included with a rider that says they are not quite correct? Is it better to have them there but ensure that they are correct, though not necessarily complete? If they are in an informative annex, is the rule 'use at your own risk', with the pics proforma as the final arbitrator? Although the state machines don't mandate the implementation, they do tend to guide it, and there is fear of guiding implementers into a broken implementation.

There is an opinion that the state machines should be the definition, and the prose should be informative.

Motion #2: **That Clause 6.7 be moved to an informative annex and that the MAC group continue to work according to the agenda to improve that annex.**

Moved by: Tom Baumgartner
Seconded by: Johnny Zweig

Motion 2 Discussion:
Looking at 802.1D may provide guidance - it contains actual C code for spanning tree included as informative. There is precedence for having the text as the definitive rules, and the more strict format representation as informative.

Motion #3: **To amend motion 2 to replace "moved to an informative annex" with "deleted", and replace "that annex" with "the state machines".**

Moved by: Bob O'Hara
Seconded by: Carolyn Heide

Motion 3 Discussion:
Why work on them if they have no formal home? To eliminate incorrectness from the standard until it can be replaced with something correct. Leaving the incorrect information there allows the possibility of the work being not done and the bad information remaining. Removing them serves to force the work to be done to produce correct information.
There is concern about the amount of time it would take to replace them with no specification of what will replace them. However, perhaps the amount of time it would take to fix them is exactly why they should be removed - at some point it is more economical to replace than to repair - the current work would not be lost, it will certainly be the basis of the replacement.
Is it possible to create perfect state machines? Probably not, so is there any value to having imperfect ones? More good than harm to have them in a clearly labeled informative annex - will probably generate more yes votes. However it is offensive to have known incorrect information remaining.
The normal way to improve on what you have is to leave in the incorrect information while it is fixed, not just remove it. It may be worth while to lessen the amount of detail in the state machines and have them less complete but more correct. The act of trying to fix them will bring to light problems more so than just replacing them.

Motion #4: **To amend motion 3 by replacing the last 2 words ("state machines") with "quality of the draft by adding, in an informative annex, formal definitions of the functioning of the MAC protocol".**

Moved by: Johnny Zweig
Seconded by: Bob O'Hara

Motion 4 Discussion:
Call the question by Johnny Zweig, second Tom Baumgartner (no nays)

Approved: 6 Opposed: 7 Abstain: 1 ***Motion #4 fails***

Motion 3 discussion (cont)
Call the question by Greg Ennis, second Tom Baumgartner (no nays)

Approved: 3 Opposed: 8 Abstain: 2 ***Motion #3 fails***

Motion 2 discussion (cont)
Call the question by Johnny Zweig, second Tom Baumgartner (no nays)

Approved: 11 Opposed: 1 Abstain: 0 ***Motion #2 passes***

Carolyn Heide will do the editing to move clause 6.7 to an informative annex.

Meeting adjourned: 5:50 PM

Tuesday PM, January 9, 1996

The meeting was called to order by chairman Dave Bagby at 1:15 PM. Carolyn Heide secretary.

Motion #5: **To take motion #33 from the Nov. 1995 meeting from the table.**

Moved by: Tom Baumgartner
Seconded by: Wim Diepstraten

Motion 5 Discussion: none

Opposed: none ***Motion #5 passes***

Motion 33(Nov95) Discussion:
There are clearly real life situations (e.g. Windows for Workgroups) where the reliability of broadcast/multicast is very important.
There is opposition to requiring implementations to do things (i.e. use the CFP for broadcast).
Problem is that a random occurrence has become non-randomized by buffering broadcasts until after DTIMs.
An opinion is expressed that it is the low value of the contention window causes a high collision rate which cannot be recovered in the case of broadcast/multicast.
The contention free period is perfect for sending broadcasts/multicasts. Using a PIFs or SIFs before broadcasts also works.
Accepting the motion says it is not a problem we want to solve.
Call the question by Johnny Zweig, Chris Zegelin (no nays)

Approved: 0 Opposed: 11 Abstain: 2 ***Motion #33(Nov95) fails***

Discussion of Clause 6 Comment #198

The More Data bit is still there in the Control Field, its use could be expanded. Broadcasts/multicast could be separated by a SIFs or PIFs, and use the More Data bit until all of them have been sent.
A related problem is power save stations - don't know when the broadcast period is over.

Motion #6: **That we take 1/2 hour as a committee of the whole.**

Moved by: Johnny Zweig
Seconded by: Anil Sanwalka

Motion 6 Discussion: none

Approved: (no nays) ***Motion #6 passes***

Possibilities:
- PIFS only (between each broadcast)
- More Data bit only
- PIFS and More Data bit
- Use contention free period
- SID but 0 excludes other SID bits
- use RTS before broadcast
- reduce collision probability by lengthening the contention window
- PIFS before all broadcast including beacon, restrict from tx at TBTT

There is a lot of support for the PIFS and More Data bit scenario for the infrastructure BSSs. Then again, maybe the More Data bit is useless because if you loose any of the frames in the sequence it doesn't tell you anything. The More Data bit use is redundant. Sending them PIFs apart, the appearance of a DIFS indicates that the broadcasts are finished. The More Data bit hurts nothing, it can only help.

If you are going to send them PIFS apart you might as well use the contention free period because you just created one (except you don't have to do a CF-End). Just using PIFS is creating a weird exception, while just using a contention free period is using what we have. The implementer can use contention free period without us making rules that it must or must not be used. No ... the proposers say this is not a contention free period. In each PIFS the medium is sensed and the broadcast burst will pause until the medium is free.
About there being more collisions because CW is too small - there is opposition to the lengthening the contention window because we have rejected this before (a number of times).
Some feel that the IBSS case is not broken, broadcasts are as reliable as other data, no change is required.
The Beacon itself is a broadcast and is also inherently unreliable. The beacon sender has no idea whether or not the beacon got through, so the reliability of at least the first broadcast data is low. Only using the contention free period increases the reliability at all (maybe).

Motion #7: **That the reliability of broadcast should be improved.**

Moved by: Johnny Zweig
Seconded by: Matt Fischer

Motion 7 Discussion:
Call the question by Tom Baumgartner, second Johnny Zweig (no nays)

Approved: 8 Opposed: 2 Abstain: 2 ***Motion #7 passes***

Motion #8:
as amended by motion #9:
To improve the reliability of broadcast we ask an ad-hoc group to work out the details of an approach based upon a mechanism of "PIFS before all broadcast including beacons, restrict from new transmissions at TBTT, ~~and~~ with or without a More Broadcast bit", and bring a detailed proposal back to the MAC group for action.

Moved by: Sarosh Vesuna
Seconded by: Greg Ennis

Motion 8 Discussion:
Call the question by Tom Baumgartner, second Sarosh Vesuna (7,5,1) fails
If this motion fails several people will make the same motion without the More bit.

Motion #9: **To amend to replace "and" with "with or without"**

Moved by: Tom Baumgartner
Seconded by: Carolyn Heide

Motion 9 Discussion: none

Approved: (one nay) ***Motion #9 passes***

Motion 8 Discussion (cont):
Against: special mechanism not needed. There are basic mechanisms available to implementers which can be used. Also this is not applicable to IBSS.
In favour: this is not an expensive special mechanism to add.

Motion #10: **To amend t remove the words "with or".**

Moved by: Tom Tsoulogiannis
Seconded by: no second

Motion 8 Discussion (cont):
The more bit is present and used for power save stations. So this is just extending its use and creating a special case.
Call the question by Bob O'Hara, second Tom Baumgartner (no nays)

Approved: 9 Opposed: 2 Abstain: 1 ***Motion #8 passes***

Propose that they come back to the MAC group with suggestion Wed. afternoon.

Meeting adjourned to small group: 4 PM

Wednesday AM, January 10, 1996

The meeting was called to order by chairman Dave Bagby at 8:40 PM. Carolyn Heide secretary.

Visit from the FH PHY Group, by Dean Kawaguchi

After the hop, if STAs have deferred because there wasn't enough time left, there will be contention at the end of the hop. The PHY group thinks the best solution is that STAs pick a new random backoff number after a hop. I.E. When a STA decides it is able to tx for every reason except that its frame will not fit before the hop, it should do nothing until the hop is complete, then start a new random backoff.

The actual recommendations reads: that after a hop had taken place there would be a new backoff number chosen.

Discussion:
Against:
There is some objection to adding special cases upon special cases to handle the FH PHY.
This is a problem without quantification (again). Since we don't know how big a problem it is, leave it alone, make no special case, and just see what happens. (Then again, lack of information has never stopped us from making decisions before!)
One MAC for all PHYs. This is a situation where the PHY is busy and should be treated like any other PHY busy.
Already the MAC is very complicated.
There is a bias towards small frames at the end of a dwell. That would be removed if the dwell was just ignored, letting frames fail when they fail.

In favour:
Since this is the way the FH PHY operates and we have the situation to deal with, there is a feeling that this is a not terribly difficult way to handle it. The backoff method exists, this is just a slightly different way to use it.
Small frames will get out before the hop, so it is a crush of big frames that pile up waiting to go after the hop. If the RTS threshold is set right, the RTSs will collide and things will straighten out fairly well, fairly quickly. But RTS use is optional, so the collision of large frames could get ugly. So backoff seems like a reasonable solution to get over the congestion. Randomizing after hop will recover much faster than allowing the collisions and resolving that way.
Situations that encourage congestion and cause collisions have a serious effect on throughput, steps should be taken to avoid them. All timer control of hopping comes from the MAC, so it is consistent that this be controlled by the MAC.

Other Solutions Discussed:
- PHY indicates busy when hopping. Then MAC will see busy while deferring due to not able to fit tx before hop, and the natural method of handling busy will take over.
- Variable length fragments could be re-instated. That would maximize utilization of bandwidth and minimize congestion after the hop.
- When STA decides tx will not fit in this dwell, set NAV to busy until after dwell, and handle it the same as any other NAV busy situation.
- Do nothing, let the collisions of RTSs sort it out after the hop. Let STA go ahead and start a tx that will fail. This will naturally cause all other STAs to defer due to busy, and only cause the loss of one frame.
- add having the PHY indicate busy during hop to what has been proposed.
- where does a STA decide that there is not time to tx in the dwell? If the sequence was calculate the random backoff, then add that the tx and ACK length and decide it won't fit. If at that time you decide to pretend busy until after the hop, the backoff already selected will take affect then.
- mandating (or recommending) that following a hop transmissions use an RTS will allow the RTSs to naturally resolve the collisions.

Motion #11: **To reject the recommendation made by the FH PHY group.**

Moved by: Bob O'Hara
Seconded by: Carolyn Heide

Motion 11 Discussion:
Call the question by Dean Kawaguchi, second Jim Renfro

Approved: 4 Opposed: 14 Abstain: 1 ***Motion #11 failed***

Motion #12:
as amended by motion 12:
That the MAC group create a small group, which will meet in the evening, to consider this PHY group recommendation and prepare a response.

Moved by: Tom Baumgartner
Seconded by: Wayne Moyers

Motion 12 Discussion:

Motion #13: **To amend to add that the subgroup meet in the evening.**

Moved by: Dean Kawaguchi
Seconded by: Greg Ennis

Motion 13 Discussion: none

Approved: (no nays) ***Motion #13 passes***

Motion 12 discussion (cont): none

Approved: 16 Opposed: 1 Abstain: 2 ***Motion #12 passes***

That small group will meet at 5:45 PM.

Break into small groups until 4 PM, Reconvene, 4:15 PM

Motion #14: **Decline letter ballot comments 300, 301, 302, 304, 305, 306, 307 because the plenary declined to alter the D2.1 multirate mechanisms.**

Moved by: Johnny Zweig
Seconded by: Chris Zegelin

Motion 14 Discussion: none

Approved: 7 Opposed: 1 Abstain: 6 ***Motion #14 passes***

Motion #15: **To adopt the CIF changes recommended by Greg Ennis.**

Moved by: Wim Diepstraten
Seconded by: Sarosh Vesuna

Motion 15 Discussion: none

Approved: 10 Opposed: 0 Abstain: 2 ***Motion #15 passes***

Motion #16: **To accept comment resolutions for 227G.**

Moved by: Tom Baumgartner
Seconded by: Bob O'Hara

Motion 16 Discussion: none

Approved: 10 Opposed: 0 Abstain: 3 ***Motion #16 passes***

Motion #17: **To accept recommended resolution for comments in 96/3**

Moved by: Bob O'Hara
Seconded by: Tom Baumgartner

Motion 17 Discussion: none

Approved: 12 Opposed: 0 Abstain: 0 ***Motion #17 passes***

Report from the 'how to improve broadcast' group, by Matt Fischer

Objection: Why does increasing the priority of broadcast increase its reliability? Started out trying to make broadcast more reliable and have changed the dynamics of the system by raising the priority of broadcast. Fundamentally changes the access method by giving broadcast more priority. So what if it gets priority - it gets media access priority, but its transmission is faster and more reliable. Alternatively a collision may be caused with the guy from whom we are removing priority.

Beneficial side affect: if beacons going on PIFS, there is less likelihood of beacon delay, gets sent closer to TBTT. For power saving stations that is an advantage - its most power consuming task is looking for beacons.

Against: Decreases reliability of broadcast in overlap BSSs because it creates a period similar to a PCF without the protections built into the PCF to help in the overlap situation. This is not as good a solution as using a PCF for broadcast. Some feel that this is very similar to PCF.

Motion #18: **To use PIFS before all multicast including beacons with a restriction against new TX at TBTT by non-AP, with more bit, by adopting the change presented (Doc 95/15).**

Moved by: Matt Fischer
Seconded by: Johnny Zweig

Motion 18 Discussion:
In favour: Simple and straight forward, does what it is supposed to do. Leery of interactions, but none are obvious. Adopting may be going out on a limb, but let's do it.
Against: Not proven that this fixes the problem. This is a complex scheme that may have second and third level interactions. This introduces a lot of new functionality a late date.

Motion #19: **To postpone motion 18 until tomorrow AM.**

Moved by: Simon Black
Seconded by: Wim Diepstraten

Motion 19 Discussion:
Most people think its a good idea to sleep on it. An opinion is expressed that quick discussions after presentation of complex items has been detrimental a few times recently - not everyone agrees with that.
Call the question by Tom Baumgartner, second Carolyn Heide (one nay)

Approved: 9 Opposed: 3 Abstain: 3 ***Motion #19 passes***

Motion #18 postponed

Motion #20: **To recess until tomorrow at 8:30 AM.**

Moved by: Simon Black
Seconded by: Wim Diepstraten

Motion 20 Discussion: none

Approved: 7 Opposed: 5 Abstain: 1 ***Motion #20 passes***

Meeting adjourned: 6:15 PM

Thursday AM, January 11, 1996

The meeting was called to order by chairman Dave Bagby at 8:30 AM. Carolyn Heide secretary.

General

Motion #21: **To adopt the MAC pics proforma work done this week.**

Moved by: Bob O'Hara
Seconded by: Tom Baumgartner

Motion 21 Discussion: none

Approved: 7 Opposed: 0 Abstain: 2 ***Motion #21 passes***

Return to Motion Postponed yesterday

Motion 18 Discussion:
There are already sufficient mechanisms in the protocol to increase the reliability of broadcasts which implementers may use if they think they have a problem. This is enough, without making a special case. This may result in different implementations performing differently under some circumstances, but this can be a good thing.
Others feel that standardization is about making all implementations the same.
It is pointed out that a previous motion this week passed saying that the reliability of broadcast should be improved.
There is not agreement that this change damages the overlap case as discussed yesterday.
There has been some suggestion that using a normal PCF, broadcast only, would be one way to use the existing mechanism to accomplish better reliability and that this is a good idea, but PCF support is optional - there is a feeling that it ought to be mandatory if it is the preferred solution to broadcast reliability. Others feel that implementers can decide to implement PCF if they are worried about the reliability of broadcast.
An opinion is expressed that this idea is being rejected simply because it is new, and people are afraid of change at this late date.
Call the question by Tom Baumgartner, second Anil Sanwalka (no nays)

Approved: 7 Opposed: 4 Abstain: 4 ***Motion #18 passes***

Document P802.11-96/16, by Matt Fischer

Motion #22: **That the MAC committee adopt the text changes described within this presentation to change the multicast transmission mechanism in the ad-hoc case in order to effect more reliable delivery of multicast frames.**

Moved by: Matt Fischer
Seconded by: Anil Sanwalka

Motion 22 Discussion:
This proposal damages the ATIM mechanism because fewer ATIMs will get through in an ATIM window in which broadcasts get sent. There is some discussion as to whether this is a problem or not.
There is some question as to whether this works - maybe it reduces the reliability of broadcast. Currently an STA sends a broadcast ATIM in the ATIM window, that may get trashed due to collision, in which case the STAs may go to sleep and miss the broadcast frame. Any STAs that stayed awake anyways will get the broadcast. There is a probability of collision on the broadcast frame itself when it gets sent also. So the sum probability of failure is the sum of the ATIM failure and the broadcast frame failure probability. In the proposal, the probability is simply the probability that the ATIM fails, which is higher than the existing method. There is some discussion of the actual formula to calculate this.
Call the question by Simon Black, second Bob O'Hara (8,5,1) fails
The ATIM that announces broadcast has a probability of collision, but if it has a collision it is with another ATIM, the overlap should be finished before the broadcast itself goes immediately after a PIFS, the broadcast will not be damaged by the collision of the ATIMs. All STAs are awake because it is the ATIM window, so the broadcast has in fact a higher success probability. The only problem will be if the ATIMs which collided were both broadcast ATIMs.
This proposal saves power because STAs are not required to stay awake the entire beacon interval if there is a broadcast ATIM currently. With this the STAs can go back to sleep after the broadcasts go in the ATIM window.

It is noted that the problems with broadcast all seem to result because of the power management scheme. If the power management scheme is causing the transmission of broadcasts to be unreliable, then the power management scheme should be fixed.
The requirement for the ad hoc power management was that it be simple and robust - it is now. It is this proposal that breaks power management, not the other way around.
Volume of broadcast traffic is directly proportional to the number of users. In an ad hoc network that is likely to be low. Usually used for advertising and query. Those can survive loss.

Approved: 3 Opposed: 7 Abstain: 5 ***Motion #22 fails***

Clause 7

Motion #23: **To adopt the clause 7 improvements from Tom Siep.**

Moved by: Bob O'Hara
Seconded by: Carolyn Heide

Motion 23 Discussion: none

Approved: 7 Opposed: 0 Abstain: 0 ***Motion #23 passes***

TSF Timer Accuracy Specification Problem

Subclause 8.1.2.3 says TSF Timer must be accurate to +/- 25 parts per million (.0025%). Implementations will want to shut off their high frequency oscillators when sleeping. When switching to the lower frequency oscillator for sleeping you will loose more accuracy than this (as much as 30 some microseconds). Would like to reduce the accuracy required.

Motion #24: **To change in 8.1.2.3 the number "0.0025" to "0.0035".**

Moved by: Bob O'Hara
Seconded by: Carolyn Heide

Motion 24 Discussion:
Hop timing, dwell timing, beacon timing are all affected by this. For instance, STAs will hop at times different by this inacurracy.
Against: possibly degrading performance to save implementation complexity and cost. More thought required as to what is the real affect. You may even go to sleep and wake up several times between hops, so if your accuracy is affected each time you could wind up with a higher accumulated error.
In favour: this is such a large slop that you couldn't make a STA that violated it.
Undecided: The beacon interval field is so large you could beacon once a minute, that allows an inaccuracy of a number of milliseconds. Maybe if you want to build a system that stupid, so be it. Maybe there should also be a recommendation as to how often you have to resynchronize. There is no reason to assume there will be a beacon every hop to get you synchronized before the next hop.
In 6.2.1 the change adopted previously introduced the TBTT one slot time virtual carrier sense - with this change you might need to make that bigger.
Maybe the scope of this question needs to be further considered. It really only may matters in the ad hoc case, maybe it is related to what PHY you are using, and how is it measurable.

Approved: 5 Opposed: 4 Abstain: 3 ***Motion #24 passes***

(The original vote was 4,4,3. The chairman voted approve to bring to resolution.)

Document P802.11-96/17

Motion #25: **To adopt the changes proposed in Doc P802.11-96/17.**

Moved by: Tom Baumgartner
Seconded by: Carolyn Heide

Motion 25 Discussion: none

Approved: 11 Opposed: 0 Abstain: 2 ***Motion #25 passes***

Other Problem Identification

Miscellaneous Subjects, Document P802.11-96/19, by Wim Diepstraten

Wim reviewed some items that he has identified that he thinks people might want to consider for letter ballot comments.

CFP Predication start problem, by Tom Tsoulogiannis

CF parameter set defined CFP rate, but you cannot tell when the beginning of the CFP is coming. Receive beacon, so you know the period, but you don't know when the next one starts. You know when the next DTIM is coming, but not all DTIMs start CFPs. So add two single byte fields - CFP count and period in each beacon so you know when the next one is coming.

Two things, by Dave Bagby

Comment 218 lost a "shall" - the group thinks its editorial.

Comment 110 - adopting the text from 207 did not address the issue of the 0 based values in the this sections. It is not clear what the details of this issue are, Dave will do further research.

One thing, by Johnny Zweig

Motion #26: **That the text from subclause 4.4 be moved to as a new subclause in clause 6.**

Moved by: Johnny Zweig
Seconded by: Chris Zegelin

Motion 26 Discussion:
There seems to be agreement that this is a good idea, although we had to discuss it for 15 minutes.
Call the question by Johnny Zweig, seconded Bob O'Hara (no nays)

Approved: 8 Opposed: 1 Abstain: 3 ***Motion #26 passes***

Quick preview of report to plenary, including ...

Motion #27: **That 802.11 create Draft D3 from Draft D2.1 and adopt changes from this week and send D3 out for (regular, not confirmation) Letter Ballot per schedule passed out by Vic.**

Moved by: Johnny Zweig
Seconded by: Tom Siep

Motion 27 Discussion: none

Approved: 11 Opposed: 0 Abstain: 1 ***Motion #27 passes***

Motion #28: **To change the CF parameter set cfp_rate variable as per text submitted by Tom Tsoulogiannis.**

Moved by: Tom Tsoulogiannis
Seconded by: Johnny Zweig

Motion 28 Discussion:
There is a discussion of whether or not this affects any other sections. Yes, there is at least one change identified in subclause 6.3.2.2.

Approved: 8 Opposed: 0 Abstain: 5 ***Motion #28 passes***

Motion #29: **To adjourn.**

Moved by: Tom Baumgartner
Seconded by: Carolyn Heide

Motion 29 Discussion: none

Approved: (no nays) ***Motion #29***

Meeting adjourned: 12:20 PM