Tentative Minutes of the IEEE P802.11 MAC Working Group

Interim meeting
Dayton, Ohio
September 14 -- 17, 1992

Monday, PM, MAC Working Group

The meeting was called to order by chairman Dave Bagby, Sun, at 1:45 pm, Monday, Sept 14th, 1992. The minutes were kept by Jim Schuessler, NSC.

We have basically four subjects. Happy to see Time-bounded papers. Continue work on MAC/PHY interface. Thirdly, let's take a rough cut at DS. Lastly, we have a paper on management issues (Steve Chen, Toshiba). We will focus on our issues log this time, break into smaller groups to write arguments pro and con, and each day, come back together and compare notes. Disadvantage is that you may be interested in more than one group, but so be it.. Comments?

Chuck: What are the subgroups?

Dave: Time bounded, MAC/PHY interface, DS, SMT.

Richard LaMaire, IBM: What about the choice of a particular MAC protocol?

Dave: We tend not to get anywhere when we've tried this in the past. Too broad and divisive.

Richard: How about just Random Access verses Frame Based?

Dave: Wants to cover four listed issues first.

: what results do you want?

Dave: Goal is to flesh out issues with alternatives, and arguments pro and con. The more resolution the better. We should take votes on these things to move forward. This builds hysteresis in the process and moves things forward. OK, hearing no objections, lets present the papers first.

François: Process looks good, but reservations because one person may be interested in more than one group. We may have a tendency to rehash when we get back together.

Dave: Yes, this is true, but lets try it and see how it works.

Time Bounded Services

Jim presents 92/107. Simon Black takes over on minutes.

Taking over notes:

107: Addresses particular issue numbers on time bounded services. Input from HP, National Semi, IBM. Major issue addressed was 15.1. Proposal given for what time bounded means. What are the bounds ?

more complex but much information available on present systems - PSTN, DECT, GSM, _ Paper looks at maximum delay (less so at 'jitter'). Attempted to draw some initial boundary conditions for delay - 20-30 ms. Another requirement may be real time monitoring systems. Paper also considers medical telemetry application. This is an area that needs some more thought maybe. In an effort to make some progress some motions proposed - for example what is time bounded. Leave motions until after discussions in sub-

groups. Identify issues that require more information. Identify protocols above MAC - but not necessarily propose to do this work in IEEE 802.11.

Concerned about interchange between time bounded Vs isochronous - be careful with terminology. In FDDI what we are calling time bounded is synchronous. Isochronous is like FDDI II modes. We need to be careful with terminology generally - a glossary ?

Have we adopted time bounded as a term in IEEE 802.11. We should focus on applications as these give the nature of the services. Applications were considered back in the market requirements document - refer back. Document is 92-1 then there are comments that have not been built in. Going back to 15.3 and the 8 kHz framing - would like to avoid one LLC for both packet and isochronous services. Need to re-address model. If there is to be framing - then there is not much choice other than 8 kHz.

Then there is ATM. It would be nice to hide 8 kHz. Some issues will interact with others. Applications - issue of delay is crucial parameter - if we go to the applications only a few press the boundaries - and they really do ! Very soon actual number is a compromise. Current systems are not always reasonable in delay. Also depends upon what systems that you wish to inter-work to - if communication is purely local then delay may be a private matter (when interconnecting to the PSTN it may not be). Issue for voice is echo suppression requirement. Should approach problem and think about it as a whole - don't want to see applications. We inherit all properties of other 802.11 networks - when we are inter-working with those networks. Table in document is a good working reference - need to identify real world requirements for isochronous services. Some concern about why we need to carry time bounded services on a LAN - why to we have to restrict ourselves to a single protocol - could for example split the spectrum. Why do we have to do this - real question is whether you are going to have multiple radio infrastructures to provide a range of services. Must make every effort to reach goal of universal solution. ISDN and conference services are easy compared to some of the other applications compressed video at 384 kbit/s for example. This is the first group that is writing a new MAC after multi-media requirements. Again should look at ATM. What is at top of MAC - separate time bounded and asynchronous interfaces - two upper layer 2 protocols ? We already have to interface to 802.2 LLC.

(ed. Jim takes over notes from Simon.)

Dave: Let's stop discussion on this topic and present 108. After a break, and this paper, we will break into smaller groups. **3:00 pm Break**.

Richard LaMaire, IBM, presents his paper, **Performance of a Reservation Multiple Access Protocol.** Paper relates to performance of the proposed IBM reservation protocol proposed by K. S. Natarajan. Group keys in on method of determining the parameter "p", which is the length of the smallest division of a frame. All other fields are made up of some number of "p" length slots. Richard says you need to get "p" only approx. correct, or close to optimal. You do this by a course estimation of the load on the network. Comments:

Chan: Even in packet mode what is the worst case delay, not the average? The average is not meaningful.

Richard: In random access protocols, the worst case is important since there is a non-zero probability that you incur quite a long delay to get access.

Michael: Have you considered a specific PHY which goes better with this protocol? FH or DS?

Wim: Suggests that FH is better since you have multiple channels.

Richard:/Nat: Scales to different mediums and higher speeds (up to 20 Mbit/s/s)

Richard: Segmentation in the A and B sections was done for error control, and this applies to other physical layers/media.

Dave: Talked about changing "p" under changing load. I'm trying to get an idea of what range the choice of "p" is good for.

Richard: See graph on Baseline Closed-Loop Client-Server Example: Throughput. It is not too critical.

Richard provides copies of his conference paper. (Everyone rushes to table to get their copy..!)

Dave: How many people are interested in a discussion of the Distribution Services (DS) Dave and Simon are the only ones to respond. Wim is interested, but not highest priority. We will get to paper 106 tomorrow. Since it is about 4:30 pm, lets break into groups François is interested in DS topic. Tomorrow we will discuss MAC/PHY interface, DS and Time-bounded services. No objections. Everyone look at issues log, write alternatives and then try and write pro and con arguments for each alternative. Please try and get both sides. Also be on the lookout for related issues.

Meeting **broke up into small groups at approx. 4:30 pm**

Tuesday, PM, MAC Working Group

The meeting was called to order by chairman Dave Bagby, Sun, at 4:35 pm, Tuesday, Sept 15th, 1992. The minutes were kept by Jim Schuessler, NSC.

Yesterday we had two groups: Time bounded and DS. I think we should continue this morning's discussion on 15.9 - three classes.

Jim: Summarizes yesterday. Got consensus on issue 15.1 for certain applications. Can we close this issue?

Dave; This is a full 802.11 process. We can take a straw poll here and submit the vote to the full committee. I'm hoping this gets "rubber stamped" in the full group.

Wim: SO is it in the form of a motion to the full group?

Dave: yes, but don't spend time wording this.

Jim: read conclusion. Charged to provide exact words to François for issue page.

Conclusion: We propose to close issue 15.1 by accepting the definition stated in answer to Question 1 (What does time bounded mean?) in document 92/107, and by accepting an upper bound of 30 ms as the definition of a working limit placed on MAC to MAC Time-bounded MSDU delivery as shown in figure 1 as "B". This conclusion is based on only the applications listed in Table 2.

Dave: Takes this issue as an example of the process. Writes ALTERNATIVE and asks for pro and con.

Jim: We opened another issue which was: What is the MAC to Portal delay?

Simon: Has two issues. Association of time bounded with human factors. Seems def. should be wider than human machine interface. Also issue with "end user" should be "user" only.

Group launches into rewording the alternatives to Question 1 in issue 15.1.

Dave uses computer overhead display to work with issue wording.

Adjourn for the day at 6:15 pm

Wednesday, AM, MAC Working Group

The meeting was called to order by chairman Dave Bagby, Sun, at 8:55 am, Wednesday, Sept 16th, 1992. The minutes were kept by Jim Schuessler.

After lunch we will be back as a joint group to draft FCC comments on NPRM.

A couple people (Chan, Simon) brought proposed working for definitions of time bounded. See screen from Dave's computer...

Chan: Likes 2. (his) We should only deal with 802.11 bounds in the definition and not try to specify a global Time-bounded definition.

Paul, Chuck: Like 3.

Richard, IBM: Likes 3, if remove delay variance. Thinks specifying delay variance is difficult and other 802 and ANSI standards supporting ISO. services do not do this.

--People propose slight modifications to wording...

Chan: Problem is not average, but worst case delay. At a certain delay the data has no value. Change "absolute" to "worst case" and I would support number 3.

Tim, Apple: Illustrates cases of where only absolute delay is important (image browsing), only delay variance is important (one way video), and where both are important (two way video conferencing.)

John Eng, DEC: new definition.

Chan: Shows foil illustrating components of delay in a Time-bounded service. First delay is quantizing delay (time to accumulate number of samples; 48 bytes take 6 ms at 125υΣ/byte), second is buffering delay (picked 3 ms of delay variance), the sum is the transfer delay, or 9 ms in his example.

Dave: May want to table this issue for a time.

Chuck: OK, but lets commit to a resolution by next meeting.

Paul: OK, but can't work on other Time-bounded issues

Dave: yes, for some I agree.

Rick (Richard, IBM): We may be trying to define too much. In FDDI there is synchronous and isochronous

Tim: Agrees with Rick. We are trying to get one definition for three classes of service. May want to turn to defining different classes of service.

Chan: Speaks to Rick. Fundamental difference with wired/fiber networks you described and WLAN. This does not work for a packet medium in which there is no concept of a slot.

Tim: sorry for confusion over applications. Describes/explains different classes of Time-bounded services.

John and Chuck discuss difference between gross bandwidth and reserved bandwidth. John makes point that even with lots of bw, if you don't have guaranteed delivery, Time-bounded services won't work.

Chan: Trying to get solution dependent definitions.

New Issue: (Tim)

What are the classes of service 802.11 will provide?

Alternative:

Class 1. Best effort delivery, Connectionless. (e.g. file transfer or email)

Class 2. Time based reservation class. Connection Oriented (e.g. video conferencing.)

Class 3. Non-Time based reservation class. Connection Oriented (e.g.: image browsing)

Reference doc. 92/109, 110

Back from Break at 10:40 am

Dave opens discussion on issue 15.2, What does coexist with Basic Service Set mean for both types of services? One alternative is that it does not mean anything.

Chan: Comes from a worry that Time-bounded support will add cost.

Wim: Maybe related to 15.8.

Dave: Straw poll: That it should "go away" Yes: 7, No: 0, Abstain: 1

We are open to any meaningful explanation here and will open a new issue if warranted.

Cover the new issue (stated above) now numbered 15.1.2 and reworded as in new issues doc.

Cover issue 1.4: Will the standard have options.

Dave: Yes, but as a last resort.

Jim: Agrees Yes, the standard will have options. However, adding an

option should be viewed as a last resort, the result of a failed compromise. I think each person should view options as a necessary evil and try their hardest to eliminate them through compromise lest we create a shopping list instead of a standard!

Simon: Yes, but any option adds complexity to conformance testing. Options should be minimal

François: Yes, we will have options, but should be avoided when possible.

Straw Poll: yes: 0, no: 0, yes-minimal: 10

Issue 15.8: Do all STA and infrastructures support Time-bounded services.

François: PAR says Asynch. will be supported and we have decided this is the default. Therefore Time-bounded need not be supported.

Jim: Disagrees. See doc. 107, page 9.

Chan: Yes, Perception that Time-bounded adds cost, but don't believe this since it should be one MAC and one MAC chip.

Paul: Avoid a situation like FDDI. We should have one single MAC that supports Time-bounded services.

Tim: Agrees with Jim and Chan. Asks why people believe cost is an issue.

Dave: DS may be different and more costly if Time-bounded was supported all the way through. We are talking pennies, and that is important to some.

Sorry: Large part of the discussion not recorded since I was participating in much of it.. Perhaps, if members desire more detailed minutes, we should find a more unbiased person to take them.

Chan: Presents model showing Hybrid Mux above the 802.11 MAC. (dated March 8th. 1991)

Consensus that we need to decide if the H-MUX resides above the MAC or between MAC and PHY like FDDI.

Jim: Perhaps Chan's model is correct for 802.11. FDDI was constrained by FDDI-I when designing FDDI-II.

Question is whether 802.11 should define this stuff above the MAC.

See issues list with Arguments as captured by Dave.

MAC/PHY interface and DS are two other topics we said we were going to discuss at this meeting. What will we do tomorrow? Try to flesh out issues list on them. Deal with sec. 5, DS and DSS first.

Break for Lunch: 1200

Think about afternoon's subject: Do we want to channelize the 20 MHz or not? (ref. to NPRM comments.)

Thursday, AM, MAC Working Group

The meeting was called to order by chairman Dave Bagby, Sun, at 9 am, Thursday, Sept 17th, 1992. The minutes were kept by Jim Schuessler, NSC.

The topic of the morning is Distribution System (DS) and Distribution System Services (DSS). Dave presents. He shows "electronic foils" on the overhead from his computer. Definitions are not changed from Requirements doc.

Assume all of the stations within a BSS consist in a common address space. The DS connects BSS into a larger entity. The Access Point (AP) provide the connections from BSS to the DS. The DSS are the means used to gain, control and remove access to the DS. Also contends there is some consistent address space within an ESS (i.e. between and including BSS) No assumption made about what the DS in the middle is. You need this common address space if you are going to control transfer of information between a STA in BSS1 to another STA in BSS2.

Since we need to implement the actual DS with what wired systems we already have, what we need to define this the DSS and its interface to the DS.

Answer to 5.1 is that only need to specify the services, not the implementation of the DS.

Jim: So you contend you can define a common DSS and inter-network over all of today's existing networks.

Dave: (yes, exact words lost..)

Simon: For each physical network, there may be an inter-working layer to translate.

François: Agrees with Simon. The subnetwork with provide common capability.

Dave: Test DSS by asking could I build this out of type a, b or c network?

Chan: Worthwhile to define interface (DSS to DS) Are we saying services out of station for purpose of distribution are the same as those provided to user interface? Impossible for same services for DS and single users.

Dave: Not sure I understand.

Dave: Next question is: When I introduce another different kind of LAN, how would I get our ESS 802.11 LAN connected? The 802.11 LAN has address space "A", and other LAN has address space "B". Many cases they are the same, but this is the easy case. How do you handle two different. address spaces? Introduce the term "portal". Looks like AP, actions that may occur could be different. There is a line through the AP and a similar line through the Portal, each having their own services. This should define the set of DSS.

Wim: If assume ESS can be made from any 802. LAN. What is the difference between Portal and AP. Are they not the same? ..... OK, so Portal may be different due to address space differences..?

Dave: This assumption they are different must be made now so we don't limit ourselves. It may indeed turn out the functions are the same.

François: if 802.x, where x is different than DS -- 802.11 should not care. If x is the same as the DS, then the Portal becomes an AP.?

Dave: Is this other LAN then an ESS?...

Nathan Silberman: How can DS be an 802.3 LAN with your addressing scheme.?

Dave: Don't understand. You can make DS out of any LAN. Look at services that can be invoked. Don't need to specify internals of DS.

Simon: Provided you can address STA. and STA4 (in different. BSS) by the DS, it does not matter what that DS is.

Michael: Afraid that 802.x should use already defined address space for 802 LANs. Also, how can you make a chain of Portal connected LAN and 802.11 LANs? Also, is it possible to have loops in network, is it possible to have redundancy?

Dave: re. address space -- don't care. This is just a way of conceptualizing a problem. Now, interoperability with existing networks is VERY important. If chaining, look at existing upper layers -- explains today's network.

Michael: Contends this Portal is a router. Your charter is to design a network in first 1 and one half layers.

Dave: Your point is that perhaps we need functions outside the scope of 802.11..

Michael: If you need routing, you need more than a flat address space. You need additional addresses, like subnet or network address.

Dave: This is separate from our discussion here.

Michael: I am afraid we are reinventing the wheel. The AP can only do store and forward. The Portal can do store, forward and filter.

Dave: No. You don't have to specify a new DS. I really don't care what the DS is!

Michael: OK, so why call it portal and not 802.1 bridge.

Dave: Because this is insufficient.

Don: Thinks 802 will require us to define the DS specifically.

Dave: Don't try to map it into a particular implementation now. These are seeds, conceptually with which to think of the problem more clearly. ----- OK, Here is a Bridge. A bridge goes between different address spaces, like a portal, BUT does not support our roaming capability. So bridges are not AP or Portals.

Wim: Could be a subset of DSS are really identical to Bridge services?

Dave: Don't know.

Paul: Limited benefit to Bridge, but does not provide all function you want. You can roam within one subnet.

Dave: Yes.

-------- draws picture

Computer connected to network is computer and network card, Bridge is two NIC connected with CPU (software) Software distinguishes differences between these devices. In fact the hardware may be the same. Don't let this limit your thinking.

(see past minutes on subject)

Michael: Simple solution is to put Bridges everywhere - where behavior is that of 802.1. Don't we already have, perhaps imperfect, solutions to this problem already?

Dave: Key in what you said is the "imperfect" part. We need perfection on mobility of these stations. In a future bridge, you may find these functions we need to define here, but not today and this is outside the scope of 802.11

Don: Yes, bridges don't support roaming.

Dave: Yes, today's addressing schemes break if you want to do this.

Michael: Is there any paper on this? This is a very interesting topic.

Dave: Not yet. Our definition of a ESS... Meeting in San Diego was where this first came up. Addresses issue 5.1 and 5.3 Ask yourself what kind of functions you need on this line in an AP and Portal between these networks. These are the DSS. Summary:

- BSS has a consistent address space
- ESS has a consistent address space
- The DS provides services (DSS) within an 802.11 ESS (via APs)
- The DS provides integration services between different address spaces (via portals)
- The set of services required for an AP plus the set of services required for a Portal equals the set of DS services which 802.11 needs to define (e.g. the DSS)
- **It is possible and desirable, to specify the DSS without specifying the internal implementation details of the DS.**

Wim: Do we need to specify the interfaces on the Portal.

Dave: Don't know.

Chan: Hope we adopt this, especially the last point. Without this we can't write the standards document.

Dave: I believe this since it is correct technically and second, I don't think we can successfully do this (define a new unique DS) within 802.11

Michael: Could you suggest some milestones for this project.?

Dave: Yes, but not now. This is a set of ideas for people to start thinking about. Next time, sorry... ------ In the past, when people have presented a MAC protocol they have tried to support roaming etc. in it. Some of those properties are in the DSS. If we separate these functions, we may in fact be able to evaluate the MACs more clearly.

Michael: Think about does this make sense in a layered model? Think about mixed architecture with 802 LANs. I agree with you we should think of these services in an abstract nature. Will you present this to the full committee?

Dave: Not intention to do so. This is mostly in my original paper. (802.11 Concepts and Definitions by Bagby)

Simon: Take a straw poll on the last point. It addresses issue 15.1

Dave: Well, I don't think people have thought this through.

Simon: Withdrawn. New issue: Is there continuity of Time-bounded services across an ESS? When you move from one BSS to another do you have continuity of time bounded services.?

Dave: Thinks that question is already answered in the affirmative. More next meeting.

BREAK at 10 am back at 10:45

Chairman Dave wants to capture issues. Refer to issues list on screen. Brainstorm on 5.3 What are the DS functions?

- Forwarding of MSDU between APs.
- DS must "know/be able to fine out" STA to AP association

Chan: Should be a little more generic - higher level. Is this above or below the MAC?

Simon: If you are forwarding MSDUs, by definition. it is above the MAC.

Dave: Not necessarily (draws arrow out the side of a box) Implication is that if it is above the MAC people with argue it is outside the scope of 802.11

Thinks you should say: The DSS must include the ability to deliver 802.11 MSDU between BSSs. Another one: DSS must pass through information needed for things like authentication, registration etc. from

Chan: The DS must have a data base. Addressing facts, asleep or awake, etc.

Dave: What are the services?

Paul Congdon: The DSS provides the STA to AP association within an ESS.

François: Two functions may have to provide. Segmentation of MSDUs.

Dave: disagrees. DS could be a wire. What are the functions at the interface?

Wim: How about a filtering function. Are the DSS the only thing that distinguishes an AP from a STA? There should be some filtering function.

François: Seems like every time we define something that should be done at interface, we say it should be done on the other side...

Simon: That first single service is very important and has many implication associated with it. Roaming for instance. Time-bounded implies much as well if maintaining the Time-bounded service is to be done. If we can only achieve this through virtual connection...

As captured by Dave on screen: If Time-bounded services imply a connection, then the DSS must be able to provide and maintain the connections between the STAs.

Simon: Can a single DS support two separate 802.11 LANs? (ed. Like Michael was saying?)

Dave: You should have no way of knowing. Don't know or care if it gives the right service to you.

Paul: talked about delivery between two BSS, but what about delivery between portals as well.

Dave adds: DSS must include the ability to deliver 802.11 MSDUs between BSSs and (via Portals) to non-802.1 LANs.

Dave: Is it necessary for DS to be managed in any way?? All APs are STA and STA are managed.

Paul: This is almost a new issue that should be raised. Dave types: Is a DS a managed object or only the APs and/or Portals or none or what? ------ Can DS services be extended across non-802.11 LANs?

Dave: Like Michael was saying. Answer is I don't know. Can't guarantee since it is outside our scope.

Paul: Asking how extensible is the DSS. Are they available outside the scope of 802.11 LAN?

Simon: A lot behind the first two services. You need to do a lot to accomplish these.

Dave: Probably some data base work here, but this should not make a difference. to us.

Paul: No, but .... providing information to us. AP and Portal query DB to find our levels above.

Dave: Assuming AP has some intelligence.. Suppose our DS is a wire?

Jim: You are assuming the DB is in the DS. I believe it is in the DSS.

Dave: I could argue both ways. draws picture on foil of a simple DS - a wire. Describes a dumb bridge where all gets forwarded...

Chan: That same principle can be extended to multiple areas. So this is non-intelligent operation. The number of BSS is not important.

Dave: Maybe we want to say that we need a way to filter traffic intelligently so that I don't broadcast every MSDU to every BSS.

Chan: Correct.

Dave adds to screen: The DSS must provide some filter algorithm to avoid flooding all BSSs with all traffic or an SP must shout only MSDUs for STA that are associated with it?

Chan: "negative and positive filtering"

Paul: Don't need to specify the algorithm

Dave: An AP should only forward MSDU that are intended for it???

Simon: Problem I have is we say we can't go above the MAC. If true, the DS in general is irrelevant to us. However, if we want to make a WLAN there is more functionality we need.

Dave: draws picture of protocol stack showing MSDU down through LLC and up through another STA.

Simon: Saying part of AP is a normal STA. Defines how gain access to media. The DS is above it and provides me with a WLAN, and therefore is the DS anything to do with 802.11? Are we just defining what is in a STA?

Dave: Understand what you are saying. The group feels that without DS we don't get a useful WLAN.

Simon: Agrees. Maybe this mean functionality above the MAC

Michael: Pity in brainstorming ideas the mobility idea does not appear. By using the DS, the DSS is a function that provide the ability for one STA to go to another BSS.

Dave: Yes, the PAR states we must do this.

Michael: OK.., Other thing is way of getting around problem of going to layers outside our mandate. It is possible to create and adaptation layer UNDER the PHY layer. This is the way 802.3 is conveyed throughout some SONET link.. All this functionality of bridging and routing of the DS may be included under the PHY layer. It would be an Adaptation layer.

Dave: Don't understand how this is possible.

Michael: It only confuses you if you want to be very orthodox in your ideas. This is the way ATM folks specify Ethernet conveyance over ATM.. It is an Adaptation Layer. This is kind of semantics, but may help overcome bureaucratic problems. Take seven layer model, break the PHY link. Insert the Adapt. between them. "New" layer between them called Adaptation Layer. Contains the functions of the DS. So to connect two STA through AP, you need this.

Dave: If you tickle the PHY you tickle the media (assumption you can't do this..)

Draws more pictures... Current thought is put DSS between LLC and MAC. Claims don't know where def. of MAC boundary should be drawn.

Simon: Many of the functions of DSS live at LAYER 3 of an OSI protocol stack.

Dave: If I'm thinking implementations, the DSS is above.

Simon: Then is every STA functions of AP?

Dave: no, difference. is that STA does not include DSS and AP does.

Simon: Thinks AP has far more functions reaching higher in the OSI stack.

Dave: Agrees.

Paul: Doesn't like placing DSS box in an architecture like that. If the DSS is a service then it has a SAP, then where is it located?

Simon: Answer question how bits of data are delivered in ESS, so where then does DSS fit? If we want WLAN standard and not just CAI Common Air Interface, we must define DSS. Specific functions needed for WLAN outside functions needed for a STA. There is an open issue along these lines.

Dave: Well, we have a lot to do...

Paul: As information. gets passed up may be additional information. that implies ownership

Simon: Key issue is def. of addressing function.

Dave: Want to spend remaining time on (short) conversation of planning for our **next meeting**.

Michael: Have a def. of MAC and Data Link Layer and not sure DS has this function. Our aim for DS is not to deliver packet to upper layer but to provide mobility. So function to do this is different from MAC function. Important to call this DS a different thing, but we may draw it under (the PHY..)

Dave: Like to invite papers on this subject. This and Time-bounded services. Between now and then we can think of more issues. Think of how they effect each other.

Michael: Step further may be to get guidance from 802.1

Dave: Political issue - understand your point. Is there any other subject we should address at next issue.

Paul: MAC/PHY interface.

Dave: We got no contrib. this time. Read FieldBus spec. Happy to put on agenda and allocate time depending on contributions.

Simon: Problem with MAC/PHY interface discussion is that it is system design far too down in detail to discuss at this point.

Paul: Agrees, but there is some independence. You can work on the interface without knowing everything.

Dave: Noticed we had a question of where the H-MUX resides. Above or below the MAC. The model from before needs to be refined for Time-bounded.

Chan: Plan to do that for AP and STA. Not understood that if packets used, they can traverse the same infrastructure as all other packets - as long as delay issue is met.

Dave: Will extract issues from minutes and put on reflector. Straw poll: Should we attempt to define the internals of a DS?

Jim: As close to suicide as you can get for the committee.

Wim: Understand, but there is more complexity than we understand in this yet.

Dave: So, we would like NOT to do this, but not sure it is possible yet.

Michael: Problem of interoperability. Should define how an AP from producer to an AP from another producer through a DS....???...is a must.

Dave: Our current interoperability. goal is between AP and STA and STA to STA. Happy to take off line.

François: For next time could some time be spent on closing other issues not related to these discussions?

Dave: This process seems to go well if you capture in real time - after the fact is hard. Try to pick up this procedure, then this will happen naturally.

François: Some can be closed very easily, and they are not on the agenda for next time.

Michael: Open an issue: How two APs from ...

Dave: You are saying what are the conformance criteria. This is already an issue.

Michael: Not sure. One DS from one manufacturer may not interoperate with another.

Dave: On the wireless side we are dealing with this. You are asking about the other side of the AP (agrees).

Chan: Question: Should we define interoperability between DS? Can't do this yet.

Simon: If choose an 802 LAN for DS, will DSS interoperate over it?

Wim: So how do you define conformance testing for this?

Simon: Use MAC Bridge example with different networks between - have the same problem here.

Wim: Not really. You can verify conformance at both ends.

Simon: disagrees. it is the same problem

----------Dave writes Issues as: What interoperability / conformance requirements do we desire for APs related to inter-AP connection through the same DS.?

Adjourn for Lunch at 12:05 pm