IEEE P802.11
Wireless LANs

Minutes of the MAC Enhancment Study Group

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1. Meetings at the 802.11 November 1999 Plenary

1.1. Tuesday AM

1.1.1. Appointment of Secretary

    1.1.1.1.   Tim Godfrey

1.1.2. Call to Order

1.1.3. Agenda for the week

    1.1.3.1.   Policies Overview
    1.1.3.2.   Study / Schedule Overview
    1.1.3.3.   Call for Papers
    1.1.3.4.   Presentation of Papers
    1.1.3.5.   PAR Draft
    1.1.3.6.   New Business
    1.1.3.7.   Presentation to WG Plenary

1.1.4. Agenda Approved without objection

1.1.5. Policies Overview

    1.1.5.1.   Approximately 10 first time participants
    1.1.5.2.   Overview of voting rights – in SG everybody has the right to participate in debates, make motions, and vote. Key Motions of Robert's rules: Point of Order, Point of Information, Parliamentary Inquiry.

1.1.6. SG Authorization and Charter

1.1.7. SG Schedule to completion

    1.1.7.1.1.   Sept 99 – list of candidate enhancements
    1.1.7.1.2.   Nov 99 – Initial PAR
    1.1.7.1.3.   Jan 00 – Finalize project list, Update PAR draft
    1.1.7.1.4.   Mar 03 – Finalize PAR, Submit PAR
    1.1.7.2.   If we have a mature PAR by Thursday, we may accelerate the schedule.
    1.1.7.3.   No Questions or Comments

1.1.8. Call for Papers

    1.1.8.1.   Load Balancing PAR Criteria (NWN) 99/252
    1.1.8.2.   Frame Customization (NWN) 99/253
    1.1.8.3.   DFS/TPC (Lucent) 99/254
    1.1.8.4.   Introduction to QoS (Lucent) 99/255
    1.1.8.5.   802.11 enhancements for QOS (AT&T) 99/251

1.1.8.6.   *Reed Solomon Coding for IEEE 802.11b (Alantro) 99/250*

1.1.8.7.   *Evaluation of Protocol Efficiency (Breezecom) 99/256*

1.1.8.8.   *Streaming Enhancements to 802.11b (Sharewave)*

1.1.8.9.   *Scheduling Overlay for 802.11b MAC (Sharewave)*

1.1.9. Order and Scheduling of Papers

1.1.9.1.   *NWN Papers – 20 min for both*

1.1.9.2.   *Lucent Papers – 40 minutes*

1.1.9.3.   *AT&T Paper – 20 minutes*

1.1.9.4.   *Alantro Paper – 15 minutes*

1.1.10.   Presentation of Papers

1.1.10.1.   *Load Balancing PAR Criteria (Maarten Hoeben, NWN) 99/252*

1.1.10.2.   *Frame Customization (Maarten Hoeben, NWN) 99/253*

1.1.10.3.   *Questions*

1.1.10.3.1.   *Q- How does the presentation map onto the motion that initiated the study group? A- If we are to enhance the MAC and add things that should have been there, why not do it. Q – I have a problem with adding proprietary things to a standard.*

1.1.10.4.   *Later discussion will occur on the subject of what is in and outside the scope of the standard and the SG charter.*

1.1.11.   Review of Candidate Projects from September Meeting

1.1.11.1.   *QoS, VoIP, Multimedia*

1.1.11.2.   *Enhanced Privacy*

1.1.11.3.   *IAPP*

1.1.11.4.   *Load Balancing*

1.1.11.5.   *Extensions for proprietary vendor information*

1.1.11.6.   *Enhanced authentication*

1.1.12.   Review of PAR Five Criteria

1.1.12.1.   *Broad Market Potential*

1.1.12.2.   *Compatibility with IEEE 802*

1.1.12.3.   *Distinct Identity*

1.1.12.4.   *Technical Feasibility*

1.1.12.5.   *Economic Feasibility*

1.1.13.   Presentation of Papers, Cont.

1.1.13.1.   *DFS/TPC (Lucent) 99/254*

1.1.13.1.1.   Dynamic Frequency Selection. Transmitter Power Control.

1.1.13.1.2.   802.11a should be conformant to European regulations in order to be accepted as a HiperLan standard.

1.1.13.1.3.   MAC enhancements are needed to implement DFS and TPC in 802.11a.

1.1.13.2.   Introduction to QoS (Jan Boer, Lucent) 99/255

1.1.13.2.1.   Distributed access procedures for real time traffic (Blackburst)

1.1.13.2.2.   Questions:

1.1.13.2.2.1.   Q – have you looked at the reduction of throughput due to the BlackBurst on the air. A – Comparable to CSMA/CA backoff in DCF.

1.1.13.2.2.2.   Q – Doesn't this assume no hidden nodes? This wouldn't have backward compatibility. In a busy medium, non-RT stations would delay RT stations. A –

1.1.13.2.2.3.   Q – have your simulations been implemented? A – yes, we have systems running.

1.1.13.2.2.4.   Q – blackburst is replacing the backoff? A – no, blackburst is only used by RT stations at PIFS.

1.1.13.2.2.5.   Q – have you looked at scalability in an enterprise? A – the nice thing is that it is fully distributed as in DCF. Q – CSMA has no guarantees, with a lot of stations black bursting, there could be a problem. A – One thing to address is how hard is the QoS guarantee to be? Q – would PCF work with Blackburst? A – No, this is not compatible with PCF. PCF is an option.

1.1.13.3.   802.11-Based Wireless Technology to Enhance Premises Voice and Data Services (Harry Worstel, AT&T) 99/251

1.1.13.3.1.   AT&T intends to provide broadband access to the home through Cable TV acquisitions.

1.1.13.3.2.   Questions

1.1.13.3.2.1.   Q – what do you mean by client network point coordination function. A – we are providing a service oriented system to provide telephones over a cable system. The 802.11 network is a client to the overall network.

1.1.13.3.2.2.   Q1 – is the 802.11 network just an access network? A – 802.11 is just a function of the overall network. Q2 – is AT&T looking at providing services in the 5Ghz band? A – Yes, absolutely.

1.1.14.   Poll

1.1.14.1.   How many people plan to be active in the area of QoS (strong recommendations or proposals) Approximately 4 companies, 8 people.

1.1.14.2.   We should have an ad-hoc session to start to look at the baseline to address issues of compatibility and feasibility. Longer term objective – when we start the TG, we start the discussion at this point with consolidated proposals, and understand the thinking of other proposals so we can converge rapidly.

1.1.15.   Presentation of Papers, Cont.

1.1.15.1.   Reed Solomon Coding for IEEE 802.11 (Chris Heegard, Alantro) 99/250

1.1.15.1.1.   Questions

1.1.15.1.1.1.   Q – if a packet fails, does it get through the LLC? A – we are not suggesting the mechanism of how the system is implemented, just the advantages of FEC

1.1.16.   Review of Candidate Project list

1.1.16.1.   Current List

1.1.16.1.1.   QoS, Multimedia over Wireless, VoIP.

1.1.16.1.2.   Enhanced Privacy

1.1.16.1.3.   Inter Access Point Protocol

1.1.16.1.4.   Load Balancing

1.1.16.1.5.   Proprietary vendor information

1.1.16.1.6.   Enhanced authentication

1.1.16.1.7.   Dynamic Frequency allocation

1.1.16.1.8.   Power Control

1.1.16.2.   Discussion

1.1.16.2.1.   We cannot address this big of a list with one PAR.

1.1.16.2.2.   We need to consolidate all of these into one PAR. Some may need to be removed.

1.1.16.2.3.   We need a better definition of what belongs in the 802.11 MAC, and what belongs above it.

1.1.16.2.4.   The IETF is defining Intserve and Diffserve, which are layer 3 functions that require layer 2 hooks to operate.

1.1.16.2.5.   Is there something in the QoS scope statement that is outside of our charter?

1.1.16.2.6.   The problem is that you are not stating what you want to accomplish. The PAR must be specific. What are the metrics of QoS? What is VoIP? Go back to the original motion, and remove those subjects that don't map.

1.1.16.2.7.   For the QoS service question, what do we need to implement?

1.1.16.2.8.   There are certain requirements for the applications that need QoS.

1.1.16.2.9.   Objectives – maximize available bandwidth, minimize latency, support as many services as possible.

1.1.16.2.10.   Comparison of the 802.11a PAR. It was not extremely specific.

1.1.16.3.   Is the statement of work acceptable? "Enhance the 802.11 MAC to support streaming over wireless".

1.1.16.4.   Discussion

1.1.16.4.1.   There should be several PARs. Let each subject stand alone.

1.1.16.4.2.   Enhanced Privacy: "Enhance the 802.11 MAC to implement stronger privacy protection". How much security is required? Specific applications, specific required security against specific threats.

1.1.16.4.3.   Do we need to quantify exactly what is to be done at this point, and perhaps limit what could be possible in a proposal? Do we discuss all the technical details and market issues before the PAR is issued, or get the PAR and then make the decisions? Prefers the latter.

1.1.16.4.4.   What is appropriate diligence for a PAR, and what is appropriate for the TG? As of September, we took the approach that we will not have quantitative requirements for the PAR.

1.1.16.4.5.   What do we have to do? Will ExCom deny the PAR approval?

1.1.16.5.   Chair – will present existing text to ExCom to get opinion on what is required to create a satisfactory PAR?

1.1.17.   Adjourn Session

1.2.   Wednesday AM

1.2.1. Call to Order

1.2.2. Call for Papers

1.2.2.1.   Security issues with IEEE 802.11 (99/257)

1.2.3. Discussion of PAR scope and requirements

1.2.3.1.   Concern whether PAR is acceptable to ExCom. Chair has approached ExCom.

1.2.3.2.   Howard Frazier from ExCom and RevCom to present his opinion and views.

1.2.4. Howard Frazier

1.2.4.1.   Title is Pro-Forma for supplements

1.2.4.2.   Scope is one or two sentences regarding what the group is doing.

1.2.4.3.   Purpose is 3 or 4 sentences on why you are doing this.

1.2.4.4.   Too much detail can tie your hands. You learn things through the process, that might require a PAR change later.

1.2.4.5.　　　　　Questions

1.2.4.5.1.　　　Q – there are a lot of different areas we are looking at. Should we consider splitting this work into multiple PARs?

1.2.4.5.2.　　　A – multiple PARs sound good, but remember a PAR authorizes you to conduct a task group and run a sponsor ballot. The real reason for multiple PARs is if you expect parts of the work to proceed at different rates, and would require separate sponsor ballots. If you believe all the enhancements will be developed at one time and balloted together, you should keep them together. Also if they affect a related area of the existing standard, they should remain together.

1.2.4.5.3.　　　Q – regarding 802.11b. We recognize a need to fix the standard. What is the minimum time to go from a PAR to approval.

1.2.4.5.4.　　　A – 802.11b was recently approved. Additions to the MIB which are necessary for the MIB could be included in the MAC enhancements SG.

1.2.4.5.5.　　　Chair – let's restrict this discussion to the work of the SG

1.2.4.5.6.　　　Q – As one who was urging for more specificity. EG – supporting "streaming". What is the definition of streaming? Otherwise the parties involved have different expectations, and work at cross purposes. Please speak to the tradeoff there.

1.2.4.5.7.　　　A – there are other vehicles to accomplish that. The group needs to understand what they are doing. The PAR is not the place to do that. Another list of internal objectives is appropriate. Some groups create a few pages of requirements documents. A PAR is not the right vehicle for that.

1.2.4.5.8.　　　Q – do other groups do the objectives before or after the PAR.

1.2.4.5.9.　　　A – there is no rule. Whatever works for the group. The objective document is under control of the group, so it can be internally modified. The PAR has to go to the Standards Board to be changed.

1.2.4.6.　　　Example from work so far:

1.2.4.6.1.　　　Candidate Project and Scope.

1.2.4.6.2.　　　Chair – ask for comments on the scope statement on QoS.

1.2.4.6.3.　　　Howard – this level of detail is probably already too verbose.

1.2.4.6.4.　　　Chair – we need consolidation, not expansion.

1.2.4.6.5.　　　Jim Carlo, Chair 802 & NesCom. The PAR defines your "sandbox" and what you are doing. You want to make it big enough to hold the final document, even if it shifts a little bit.

1.2.4.7.　　　Questions

1.2.4.7.1. *Q – comment on the 5 criteria*

1.2.4.7.2. *A – this is an 802-specific analysis tool. Each criteria has several bullet points that need to be addressed.*

1.2.5. Presentation of Papers

1.2.5.1. *Evaluation of Protocol Efficiency (Breezecom) 99/256*

1.2.5.1.1. *Additions to statements of work*

1.2.5.1.1.1. DCF Acknowledgement scheme and frame aggregation.

1.2.5.2. *Streaming Enhancements to 802.11b (Rajugopal Gubbi, Sharewave) 99/259*

1.2.5.2.1. *Questions*

1.2.5.2.1.1. Q – regarding ECC, would that apply to the MAC payload?

1.2.5.2.1.2. A – the header needs to be protected also, but it needs to be compatible.

1.2.5.2.1.3. Q – Please clarify technique of avoiding collisions.

1.2.5.2.1.4. A – Using the existing CFP in 802.11, with additional enhancements to improve throughput.

1.2.5.3. *Scheduling Overlay for 802.11b MAC (Rajugopal Gubbi, Sharewave) 99/260*

1.2.5.3.1. *Questions*

1.2.5.3.1.1. Q – Do you have any simulation data regarding feasibility

1.2.5.3.1.2. A – much of this presentation is obvious. More data will be coming in later meetings.

1.2.5.3.1.3. Q – If you go back 5 years ago, there were papers on the same subject. In the real environment, it just stopped working. You should review the papers from back then. Nobody then could figure out how to make scheduling work. You always have contention from devices not under your control. We don't own the band.

1.2.5.3.1.4. A – There will be interference, not necessarily contention.

1.2.5.4. *Security issues with IEEE 802.11 (Bob Beach, Symbol Technologies) 99/257*

1.2.5.4.1. *Questions*

1.2.5.4.1.1. Q – You have lumped together a number of issues at various layers. A lot of these attacks are not .11 specific. All 802 protocols can have forged MAC addresses.

1.2.5.4.1.2. A – The .11 specific issue is that the attacker can sit in the parking lot. You don't have to have physical access for .11

1.2.5.4.1.3.   Q – A number of things can be solved without changing the MAC. EG at bridging function on top of the MAC in the AP

1.2.5.4.1.4.   Q – if someone puts a microwave oven in the parking lot without a door, it would mount an equally effective denial of service attack.

1.2.6. Conclusion

1.2.6.1.   *Chair will review papers and consolidate the different areas into more comprehensive text.*

1.2.6.2.   *Next session we will start working towards the draft.*

1.2.6.3.   *There are two sessions left. We may break off into subgroups if it is not effective to work in committee.*

1.2.6.4.   *We hope to have draft text to present to Plenary tomorrow.*

1.2.7. Adjourn Session

1.3. Thursday AM

1.3.1. Call to Order

1.3.2. Status

1.3.2.1.   *Completed presentation of 10 papers.*

1.3.2.2.   *No additional papers to be submitted. Submission of papers closed.*

1.3.2.3.   *Remaining work – working on draft text for the PAR.*

1.3.3. SG Schedule to completion

1.3.3.1.   *Sept 1999 – Generate Candidate Enhancement Projects. Initial Draft of Objectives*

1.3.3.2.   *Nov 1999 – Generate Candidate Enhancement Projects. Initial PAR draft.*

1.3.3.3.   *Jan 2000 – Finalize Projects lists. Update PAR draft.*

1.3.3.4.   *March 2000 – Finalize PAR, Submit PAR to ExCom.*

1.3.4. Review of the existing work area and scope table

CANDIDATE PROJECT	PROPOSER	SCOPE	COMMENTS/ SCOPE
QoS Multimedia over wireless Voice over IP	Maarten, Amar, Bob	Enhance the 802.11 MAC to support streaming over wireless with Emphasis on enhancements in the areas of Latency, bandwidth, Priority, error correction, data streams, channel agility policies.	Enhance the 802.11 MAC to perform quality of service based on PCF or DCF. Soft real time services. Ways to prioritize traffic. Integration of IETF in wireless. Enhance the 802.11 MAC to define and accommodate multimedia applications. Emphasis of enhancements in the areas of Latency, BW, Priority, channel

			protection, data streams. REQs Maximize bandwidth Enhance the 802.11 MAC to facilitate voice over IP capability.
Enhanced Privacy	Richard	Enhance the 802.11 MAC to implement stronger privacy protection. Enhance MAC management functions in the areas of algorithm negotiation , key length, key management to accommodate a more secure 802.11 system.	Enhance the 802.11 MAC to implement stronger security protection. Scalable mechanisms for security as applicable and required form users and within regulatory restrictions. Eliminate existing algorithm flaws that compromise security. Enhance MAC management functions in the areas of key management, length, negotiation , distribution and algorithm selection to accommodate a more secure 802.11 system. Note: evaluate other existing schemes i.e. IETF, BT
IAPP	Richard, Maarten	Enhance the 802.11 MAC to establish an inter AP protocol to maintain connectivity and ensure smooth hand off and continuity of services between APs.	Enhance the 802.11 MAC to establish an inter AP protocol to maintain connectivity and ensure smooth hand off and continuity of services between APs.
Load Balancing	Maarten	Enhance the 802.11 MAC to facilitate load balancing.	Enhance the 802.11 MAC to accommodate load balancing and avoid interoperability issues.
Extend the MAC to include proprietary vendor specific information.	Maarten	Enhance the 802.11 MAC to accommodate proprietary vendor specific information without compromising interoperability.	Enhance the 802.11 MAC to include proprietary vendor information without compromising interoperability.
Enhanced Authentication	Bob O	Enhance the 802.11 MAC to use stronger authentication mechanisms.	Enhance the 802.11 MAC to use stronger authentication mechanisms. AP to server authentication protocol with privileged classes.
Dynamic Frequency allocation	Jan		
Power control	Jan		
DCF acknowledgement scheme and frame aggregation enhancements	Alan		
Enhanced PCF mode.	Alan		

1.3.5. Review of Five Criteria

1.3.6. Discussion

> *1.3.6.1.   Motion to strike from the PAR scope and purpose statement any language inconsistent with the motion that chartered the study group.*

>> *1.3.6.1.1.   Moved D Bagby, Second K Admundsen. Fails 6/20/6*

1.3.6.2.   Does the draft scope text violate the scope of the charter? Straw Poll – 7/24/6. Based on that, we will continue with the scope as it is.

> *1.3.6.3.   Motion to delete the clause in the PAR Scope statement regarding Inter Access Point coordination, and create a second PAR for an 802.11 Recommended Practice document to cover Inter Access Point Protocol.*

>> *1.3.6.3.1.   Moved D Bagby Second B O'Hara,*
>>
>> *1.3.6.3.2.   Question Called H Worstel, 2nd John: 20/1/3*
>>
>> *1.3.6.3.3.   Vote on main motion: Passes 23/0/10*

1.3.6.4.   Consider whether vendor specific extensions are allowable within the scope of the standard.

> *1.3.6.4.1.   Straw Poll – In favor of leaving the statement on vendor extensions: 14/10/7*
>
> *1.3.6.4.2.   Leave vendor specific extensions.*

1.3.6.5.   What work is necessary to provide an interface to higher layers to support QoS?

> *1.3.6.5.1.   802.1d provides prioritization of data, and requires the MAC to support classes of service.*

1.3.6.6.   Consider striking the second sentence of the Scope statement.

> *1.3.6.7.   Motion to strike second sentence of PAR Scope statement in its entirety.*

>> *1.3.6.7.1.   Moved D Bagby, 2nd Hitoshi.*
>>
>> *1.3.6.7.2.   Vote on motion: Passes 13/10/6*

1.3.7. Draft Scope Statement

> *1.3.7.1.   [Enhance the 802.11 Medium Access Control (MAC) to improve and manage Quality of Service, provide classes of service, and enhanced security and authentication mechanisms. Consider efficiency enhancements in the areas of the Distributed Coordination Function (DCF) and Point Coordination Function (PCF)]*

1.3.8. Adjourn Session

1.4.   Thursday PM

1.4.1. Call to Order

1.4.2. Discussion of Purpose statement from draft PAR

1.4.3. Review of 5 criteria

1.4.4. PAR 1st Draft document 99/273

> *1.4.4.1.   Motion to accept the PAR draft 99/273 for the MAC enhancements study group.*
>
> > *1.4.4.1.1.   Moved Greg Parks, 2nd Jan Boer*
> >
> > *1.4.4.1.2.   Vote on motion: Passes 24/0/3*

1.4.5. Process

1.4.5.1.   PAR should be submitted to ExCom 30 days prior to their meeting for review.

1.4.5.2.   This PAR should be submitted by February.

1.4.5.3.   Discussion on authorizing the Interim to complete the PAR.

> *1.4.5.3.1.   Proposal for Letter Ballot after January Interim.*
>
> *1.4.5.3.2.   We have the option to close on the PAR now and submit it now.*
>
> *1.4.5.3.3.   Only the Plenary WG session can authorize the PAR completion.*

> *1.4.5.4.   This session will ask the WG to send out a WG Letter Ballot on the MAC enhancements PAR Draft. If the Letter Ballot has 75% approval, the January 2000 Interim will be authorized to resolve all comments and submit the PAR to the ExCom. If the Letter Ballot has under 75% approval, the January 2000 Interim will resolve comments, and start a recirculation ballot.*
>
> > *1.4.5.4.1.   Motion to accept text. Moved Tom T, 2nd Dick Eckard*
> >
> > > 1.4.5.4.1.1.   Discussion
> > >
> > > 1.4.5.4.1.2.   Q – In March, is the PAR approved on Monday or Thursday? A – They will look at it Monday, and approve / disapprove Thursday.
> >
> > *1.4.5.4.2.   Vote on motion: Passes 27/0/3*

1.4.5.5.   We will have a Task Group by the end of the March Plenary.

1.4.6. Extension of SG

> *1.4.6.1.   Motion to request extension of the MAC enhancements SG until the March of 2000 Plenary.*
>
> > *1.4.6.1.1.   Moved Jan Boer, 2nd Amar Ghori.*
> >
> > *1.4.6.1.2.   Vote on motion: Passes 27/0/1*

1.4.7. PAR for IAPP

> 1.4.7.1.   *Put IAPP PAR on same letter ballot as the MAC enhancements PAR?*

> 1.4.7.2.   *Review of proposed PAR text*

> 1.4.7.3.   *Motion to ask the WG to send out a WG Letter Ballot on the IAPP PAR Draft, which is document 99/275. If the Letter Ballot has 75% approval, the January 2000 Interim will be authorized to resolve all comments and submit the PAR to the ExCom. If the Letter Ballot has under 75% approval, the January 2000 Interim will resolve comments, and start a recirculation ballot.*

>> 1.4.7.3.1.   *Moved Tom T, 2nd Albert Young.*
>> 1.4.7.3.2.   *Vote on motion: Passes 20/0/5*

1.4.8. Adjourn Session