

Project	IEEE 802.16 Broadband Wireless Access Working Group	
Title	Session #4 Minutes of MAC Task Group [Unapproved]	
Date Submitted	2000-01-05	
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Re:	802.16 Session #4 (Kauai, Hawaii, U.S.A., 8-11 November 1999)	
Abstract	This document contains the minutes for MAC Meeting session #4	
Purpose	The author proposes these minutes be accepted.	
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Release	The contributor acknowledges and accepts that this contribution may be made public by 802.16.	
IEEE Patent Policy	<p>The contributor is familiar with the IEEE Patent Policy, which is set forth in the IEEE-SA Standards Board Bylaws <http://standards.ieee.org/guides/bylaws> and includes the statement:</p> <p>“IEEE standards may include the known use of patent(s), including patent applications, if there is technical justification in the opinion of the standards-developing committee and provided the IEEE receives assurance from the patent holder that it will license applicants under reasonable terms and conditions for the purpose of implementing the standard.”</p>	

Session #4 Minutes of MAC Task Group

Wednesday, November 10, 1999

Announcements:

Roger: Some non-members will be sending their scoring to Brian Petry to compile.

Brian: The final draft for the SysReq document is ready for votes.

Roger: Study group formation will be brought up at the closing plenary

8:45am Opening of the meeting, ask if any suggestions to modify the agenda (Jung Yee)

Ask if any motion to optimize the process (Jung Yee)

No motions for the floor.

Proposal Number	Discussions
80216mc-99_07 (Scott Marin, Spectrapoint)	<p>Title: MAC based on ETSI DVB. Existence of white paper comparing the DVB/DAVIC and MCNS/DOCSIS on the web.</p> <p>[Anders Hebsgaard] QoS proposed does not come from DVB, do you propose another structure? {Scott} the structure used is mature and does provide QoS.</p> <p>[???, Local Wireless] Do you have any statistical measurements to prove the BER and other performance parameters? {Scott} Some Engineers in Spectrapoint carry out many simulations for performance.</p> <p>[Carl Eklund] Do you have any figures of the overhead to be used for the proposed MAC? [Scott] there is a standard ATM standard that defines that value. [Carl Eklund] do you agree it is around 15%? {Scott} I am not sure, may be.</p> <p>[Genzao Zhang] What is your comment on "ATM is supported above the MAC"? Do you optimize above the MAC? {Scott} Downstream, 7 MPEG cells are grouped in an ATM cell.</p> <p>[Yigal Leiba] How does the Mac perform in terms of Scalability? How many subscribers can be supported? {Scott} there are 8 upstream channels per one downstream. With ATM, you can add many VC on top of that.</p> <p>[Brian Petry] Would you agree that combining voice/ data and video is subjective as you have IP and ATM? {Scott} it depends on the target market, and then we can either use DOCSIS or DVB.</p>
80216mc-99_15 (Robert Nii, Wytec Inc.)	No one is here.
<p>Jung Yee: Do we keep to the agenda or move forward? Call for motion to vote to move the next presenter forward. No one objected. Farid Elwailly will be presenting.</p>	

80216mc-99_09 (Farid Elwailly, Stanford Wireless)	Title: ATM based MAC layer This is in conjunction with the PHY presented by Jeff yesterday. [Allan Evans] what type of services are you providing? What type of backbone do you provide? [Marianna Goldhammer] How do you intend to convert VCI to IEEE.802 Signal? {Farid} Why do you need to do that? [Marianna Goldhammer] it is part of the system requirements. {Farid} we do not have it today. [Marianna Goldhammer] what is the length of the key encryption? {Farid} the ETSI type (160 bytes) [Genzao Zhang] how many contention slots do you need? {Farid} four minislots [Jay Klein] what is the number of bytes when you are granted bandwidth? {Farid} one ATM cell [Brian Petry] describe the interdependencies between the Phy and MAC? [Dave??] what is the max contention slots you can have? {Farid} it depends.
Jung Yee: Do we continue with the agenda or take a break and come back at ten? Vote: all come back at ten	
80216mc-99_14 (Allan Evans, Netro)	[Roger Durand] Relative to the PHY, would it be better if all subscriber units can be scheduled for contention? [Anders Hebsgaard] [Yigal Leiba] Traffic simulation performance. Do you any results regarding the case where several subscribers try to access the same channel? {Allan} the slide represents that. [Jim Mollenauer] How do you reliably detect collision in an RF environment? {Allan} if you pass the threshold in the receiver, then that is a collision. [Jim Mollenauer] but is any problem with phase this would be an issue? {Allan} no [Roger Durand] How far can subscribers be separated? There is a need for scheduling.. {Allan} 24 FEC every second [Genzao Zhang] is this at the CPE? [Genzao Zhang] what is the percentage of contention in your traffic? {Allan} 5% [Genzao Zhang] which type of traffic? {Allan} the case presented here represents the worse case. [Yigal Leiba] what is the max number of terminals supported? {Allan} the example in the presentation shows 100 terminals over a 7MHz channel [Naftali Chayat] How do allocate time for scheduling slots? {Allan} it is handled by the user via NMS.
80216mc-99_11 (Ray Sanders, CircuitPath Networks)	
80216mc-99_08 (Carl Eklund, Nokia)	[Roger Durand] can you clarify why do you do dynamic modulation? [Marianna Goldhammer] What is the addressing mode used in this proposal? {Carl} it is based on connection and terminal id. [Demosthenes Kostas] do you support any ARQ? {Carl} not needed in our proposal. [Marianna Goldhammer] how do you support bridging? {Carl} it is done in the convergence layer. We did not think about it yet. [???] do you support bit insertion? {Carl} if you need to.
Go ahead with the presentation [Jim & Jay] and then break for lunch	

80216mc-99_10 (James Mollenauer, Ensemble Comm)	[Ray Sanders] What happens for low stations that are not continuously transmitting? {James} the polling overhead is kept down because only the Tx that have been inactive that do polling. [Demosthenes Kostas] ATM compression? {James} ATM compression is done based on the header. [Marianna Goldhammer] [Yigal Leiba] [Allan Evans] How do you handle varying cell rate type in a frame relay scenario? Is it similar to TDM? {James} you need to do a de-jittering. Two options: Compressed way or normal way. It is more of an ATM conversion. [Demosthenes Kostas] do you only convert the header of the ATM? [???] do you support any type of scheduling? {James} Yes. [Marianna Goldhammer] what is the expected polling loss when dealing with data? {James} It depends [???] is the scheduling done in Software? The scheduling time is around 1ms? {James} yes it is done by software. 1ms is given here as an example.
80216mc-99_17 (Willie Lu, Infineon Technologies)	1:13pm Presentation [Jeff, Stanford] Is this MAC implemented anywhere? {Willie} it is in progress. The simulations are good so far.
80216mc-99_06 (Yigal leiba, Amber)	[Roger Durand] [Allan Evans] what type of BER is expected when using this MAC? {Yigal} It depends on the type of noise. If the type of noise is bursty, the errors will be corrected at the upper layers. [Karl Triebes] was there any analysis carried out to determine the jitter requirements? {Yigal} Yes [Karl Triebes] what type of Crystals are you using? {Yigal} some off the shelf
80216mc-99_05 [Naftali, Breezcom]	
80216mc-99_16 (Karl Stambaugh, Motorola)	[Jim Mollenauer] how do you support STM? {Karl} at the PHY layer, the STM clock rate is reconstructed. The STM frames are split into cells. [Jim Mollenauer] Does this mean that the STM data is encapsulated within the ATM? {Karl} [Roger Durand] Can you define statistical multiplexing rate? {Karl} it depends on the internet. [Marianna Goldhammer] what is the length of the mini-slot size? {Karl} it is a given number that is a multiple of the size of the mini-slot. The length is then dependent on the modulation scheme used. [Zion Hadad] [Jung Yee] what is the overhead in your transmission? {Karl} the best way is to split the MAC frame into smaller PDUs to decrease the latency.

80216mc-99_04 (Genzao Zhang, Nortel)	<p>[Roger Durand] Can this MAC work with Appendix A as well as Appendix B? {Genzao} Yes.</p> <p>[Yigal Leiba] The contention window is set by the BTS, is this correct? {Genzao} Yes</p> <p>[Jim Mollenauer] You support 64-QAM down, but not upstream. Why? {Genzao} in the upstream we support QPSK and 16-QAM. This is based on the link budget, and cost of the components</p> <p>[Allan Evans] you said you are ready for deployment. Yet, you can't prove the transmission of T1/E1. What is your comment on this? {Genzao} No comment</p> <p>[Carl Eklund] type of error in the header. How would you transmit frame relay if I want to use DOCSIS? {Genzao} we use ATM</p> <p>[Jeff Foerster] what symbol rates do you support in the upstream?</p> <p>[Tom Williams] How can you adapt the DOCSIS to improve the speed range? {Genzao} there are lots of variations. Simulations are being run to determine the overall required speed range.[5dB per second as a starting proposal]</p> <p>[Yigal Leiba] DOCSIS was first designed for asymmetric traffic. Are you aware of any symmetric traffic simulations using DOCSIS? {Genzao} yes. Simulations are being carried out.</p> <p>[Jay Klein] Follow up to Yigal's question. How do you account for the symmetric variations? {Genzao} it is an implementation issue.</p>
80216mc-99_13 (Phil Guillemette, SpaceBridge)	<p>[Jay Klein] DOCSIS was optimized for a single connection subscriber. Do you have any simulation results to support the multiple connections per subscriber? {Phil} no. Even it was initially designed for single connection subscriber, it has been modified.</p> <p>[Karl Stambaugh] You mentioned that small PDUs on the MAC are carried insufficiently [I assume that is on ATM]. Can you give any examples when will that happen? {Phil} yes I was referring to ATM. It depends on the type of delay while concatenation as well as what type of traffic...</p> <p>[G??, Analog] QoS deals primarily with asymmetric. How do you deal with symmetric traffic? {Phil} the downstream will not be as much affected as upstream. This depends as well on modulation scheme</p> <p>[Jeff Foerster] Do you have an idea of the number of bytes used for the security? {Phil} I don't know.</p> <p>[Genzao Zhang] [????] how do you optimize the BER for DOCSIS in your MAC? {Phil} change the FEC. Note, it depends on the bandwidth and on the modulation scheme.</p> <p>[Jung Yee] How would you manage the QoS attributes? {Phil} not defined yet.</p>
80216mc-99_12 (Chao-Chun Wang, Malibu networks)	
<p>Motion to let Chet present his submission (late presentation): Called by Moshe Seconded by Arun Votes: 13 Yes, 11 No, 7 Abstain</p>	
Chet's presentati on #18	<p>[????] how to adjust a 30dB dynamic range {Chet} in the case of using QAM can be decreased to a lower format is one way. DOCSIS is a starting point, not a solution.</p>

Motion to allow chet's presentation to be considered as a submission for the scoring process.

Called by George

Seconded by Tom

Is this a procedural or technical? Chair calls for a procedural.

Jay objects to calling the question.

Vote for calling the question: in favor (14), opposed (11), abstain (5)

Call the question: to include Chet's submission for the scoring the process

In favor (5) opposed (20) abstain (3)

The motion fails.

Jay: Each session has its own deadline. Thus the deadlines should be considered.

Call for order (Jung Yee)

Roger and Brian: Tutorial for Scoring

Roger points out that there was an error in the link in the PHY eval.

Roger with Brian showed the whole process.

Deadlines for submitting the evaluation for both the PHY and MAC is by midnight today in case of e-mail submittal, and 12:30pm tomorrow on a floppy to Brian Petry.

Thursday, November 11, 1999

Joint MAC & PHY Meeting

Outline of the next meeting which will be in Dallas January'00

Separate MAC and PHY Meetings

Have one Joint MAC/PHY meeting

Call for Contribution

MAC Session Meeting:

Jung Yee: Any comments on what parameters to ask for the session #5

Chao-Chun Wang: Ask for traffic model

Brian Petry: It is a good idea

Jim Mollenauer: We should be careful on what type of traffic model to ask for. 802.14 had lots of problems...

We should use the document prepared during session #4 for the call of contributions for session #5 as well as the table prepared previously.

Add the following:

➤ Traffic Modeling (formats, Types)

➤ Security

➤ Piggy-backing

Jim Mollenauer: The best approach is to define the list of features we would like to see in a MAC.

➤ Scheduling

Ray Sanders: This is an important issue that requires a group discussion

Many members feel that the Scheduler should be left out from this evaluation.

Willie Lu: We should ask people with similar proposals to merge.

Ray Sanders: We should separate the PHY features from the MAC features.

We should consider the features discussed in session #4 and then build on that for session #5.

Recommendation (Jung Yee):

Take a break and come back to discuss the table of features

Discussion regarding the features for session #5:

- Meets System Requirements: **Conforms to the table in SysReq, meets all the " MUST" and "SHOULD"**
- Mean Access delay and Variance:
 - Should provide the traffic model used
 - This will provide an idea about the delay and variance
 - However, if an evaluation will take place, there should be some common configuration between all proposals
 - Unable to agree on a specific traffic model
 - The best thing is to go ahead and score the description of the Mean access delay and variance within the proposed MAC. Not the values. **In other words, how reasonable and effective are the mechanisms presented in controlling the delay and variance.**
- MAC Delay bound:
 - Is it possible to bound the delay for an unbounded input (Jim Mollenauer)
 - Could be possible that this falls into the first criteria (Phil Guillemette)?
 - It is ok to have some SysReq criteria and an overlapping issues (Brian Petry)
 - Add this into the previous criterion.
 - **Is it possible for an operator to offer a bounded delay for a given service for a limited load?**
- Payload and Bandwidth Efficiency:
 - We keep it as in session #4.
 - Add a common configuration so that the evaluation can be more significant.
 - Give an example
- Simplicity of implementation:
 - Jim: Leave the criterion. Do not delete anything.
 - Other members: add cost
 - No, but rather add low complexity
 - add channel capacity
 - Other members: better to keep **simplicity of implementation and low complexity**
- Scalability:
 - Allan: link it to Gross bandwidth
 - Number of connections
 - Link the above to the services
 - **Does the MAC protocol support a broad range of operational bandwidths and number of connections across all services**
- Service Support Flexibility:
 - Suggests starting different evaluation criteria.
 - Change the wording
 - **How completely does the MAC protocol support the services mentioned in the SysReq Document?**
 - **How does the MAC protocol support additional services?**
- Robustness:
 - **Can the MAC protocol continue normal operation when presented with various unexpected events?**
 - **Is the MAC protocol able to recover from events such as unexpected shut down?**
 - **How well does the MAC layer react in the face of PHY errors?**

- Security
 - **How well does the MAC protocol provide mechanisms to meet the system requirements security?**
- PHY Channel Configurability:
 - Delete the whole criteria
- Maturity:
 - Leave the text as is.
 - **Does the proposed MAC protocol have data to demonstrate its ability to operate in actual system that is representative of the BWA networks target for 802.16.1**
- Sign-on Process:
 - How well does the MAC protocol resolve initial two way ranging delays and subscriber transmit power.
 - Delete subscribe transmit power.
 - Add: How automatic is the process?
 - **How well does the MAC protocol resolve initial two-way ranging (delay, power)? And how automatic is the sign-on process?**
- Adequacy of Management Functions:
 - **How well does the MAC protocol provide link management functions for subscribers timing, power and frequency?**
 - Suggestion to add modulation scheme and transmission rate
 - Objection to add transmission rate
- Convergence with existing technologies (change technologies to Protocols)
 - Change wording
 - **How simple is it to adapt the proposed MAC protocol to LAN and WAN protocols?**
- Ability to work with physical layer variations
 - **How independent is the proposed MAC protocol of the PHY protocol**

Motion to take this as the table for criteria for session #5 (Jung Yee)

Called by Jim Mollenauer

Seconded by Ray Sanders

All voted Yes

Break for Lunch

Appendix:**Request for Contributions - Session #5**

The 802.16 MAC Task Group is prepared to accept contributions from interested parties that represent accepted MAC submissions from Session #4.

The 802.16 Working Group session will be held January 10-14, 2000 (location Dallas). Participants will be given time during the session to present a detailed description of their MAC.

In order to be considered for presentation at the January session, submissions are due by December 24, 1999. Submissions must be in the form of the 802.16 Document Template.

Submissions **MUST** follow the guidelines below:

- The document should address all items of Section 5, Media Access Control Layer, of the 802.16.1 Air Interface Specification Document as closely as possible to simplify evaluation and comparison submissions.
- Submissions, which are created from, more than one previous submission are encouraged.
- Suggested improvements or merger proposals in the nature of a friendly amendment will be accepted until January 5, 2000.

Criteria	Discussion
Meets system requirements	How well does the proposed MAC protocol meet requirements as described in the current version of the System Requirements Document 802.16s0-99?
Mean access delay and variance	How effective are the mechanisms presented in controlling the delay and variance? Does it seem possible for an operator to offer a bounded delay for a prescribed offered load?
Payload and bandwidth efficiency	<ol style="list-style-type: none"> 1. How well does the overhead due to the proposed MAC PDU headers allow for efficient user data transfer over the 802.16 air interface? 2. Is the proposed MAC protocol designed such that the MAC signaling is efficient in terms of not requiring excessive overhead? 3. How well does the proposed MAC protocol provide the mechanisms for fair allocation and sharing of the bandwidth among users? (Please include payload example.)

Simplicity of implementation/low complexity	How well does the proposed MAC protocol allow for an implementation that is simple and generic enough that it is likely to be accepted by industry?
Scalability	Does the MAC protocol support a broad range of operational bandwidths and number of connections across all services?
Service Support Flexibility	<ol style="list-style-type: none"> 1 How completely does the MAC protocol support the services mentioned in the System Requirements Document? 2 How well does the MAC protocol support additional services?
Robustness	<ol style="list-style-type: none"> 1. Is the MAC protocol able to recover from events such unexpected shut down or loss of link? 2. How well does the MAC Layer react in the face of errors arising from the Physical Layer
Security	How well does the MAC protocol provide security mechanisms to meet the System Requirements?
Maturity	Does the proposed MAC protocol have data to demonstrate its ability to operate in an actual system that is representative of the BWA networks target for 802.16.1?
Sign-on process	<ol style="list-style-type: none"> 3 How well does the MAC protocol resolve initial two way ranging? 4 How automatic is the sign-on process?
Adequacy of management functions	How well does the MAC protocol provide link management functions for subscribers timing, power, and frequency?
Convergence with existing protocols	How simple is it to adapt the proposed MAC protocol to well known LAN and WAN protocols?
Ability to work with physical layer variations e.g., duplexing, constellation,...	How independent is the proposed MAC protocol of the PHY protocol.