Project	**IEEE 802.16 Broadband Wireless Access Working Group**
Title	**IEEE 802.16.1 MAC Task Group Meeting Minutes for Session #6**
Date Submitted	**24 March 2000**
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Re:	IEEE 802.16 Session #6.
Abstract	Session #6 802.16.1 MAC Task Group minutes.
Purpose	This contribution provides the minutes of the 802.16.1 MAC Task Group for Session #6.
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IEEE 802.16 MAC Task Group Meeting Minutes for Session #6

Editor and Acting Secretary: Phil Guillemette
SpaceBridge Networks Corporation

Session # 6.

Tuesday, **March 7, 2000**

Time	Speaker	Discussion
1330	Jung Yee	Call Meeting to order. Review Approved agenda from yesterday.
	Moved by: Phil Guillemette Seconded by: Baya Hatim	**Motion to approve Minutes from Meeting #5. Vote results: Passes Unanimously**
1335	Jim Mollenauer	E+ MAC proposal presentation
1415	Baya Hatim	Start Q&A session
	Glen Sater	Strategy going forward regarding convergence layers?
	Jim Mollenauer	?
	Glen Sater	Can not currently evaluate it
	Jim Mollenauer	Air link is just an extension of the ATM network
	Glen Sater	T1… is it more important to support directly or should we use existing technology that does it already
	Jim Mollenauer	Why use overhead of ATM
	Ken Standwood	TDM native is important regarding bandwidth. Either way, they can both be done using the appropriate convergence sublayer.
	Shaul Shohat	Bw allocation and convergence layers and QoS. How can you separate bw allocation for phy and the upper layers do to their end to end
	Jim Mollenauer	?
	Shaul Shohat	?
	Carl Eklund	More of a question regarding convergence layer than MAC. MAC needs the tools for setting up the connections for different higher layer protocols, exactly how it is being done is not what is currently being standardised.
	Shaul Shohat	Variable length packet support?
	Jim Mollenauer	Yes
	Shaul Shohat	ARQ and impact on PHY layer. Must always consider the availability of ARQ?
	Jim Mollenauer	Good discussion for impact on coding scheme
	Glen Sater	Why is that the key sequences must change in separate messages.
	Jim Mollenauer	Thought it would be more robust
	Carl Eklund	Explaining how counter changes and that you can not lose sync.
	Glen Sater	If key gets lost, how does receiving mac recover
	Carl Eklund	Key exchange protocol has not yet been defined, but ack should be required in process.
	Allan evans	Packet size, is it dynamically variable depending on traffic or is it per channel.
	Jim Mollenauer	Is as large as when it arrives in the system.
	Allan evans	Scheduling and connection id. How is prioritization done between subscribers
	Jim Mollenauer	Weighting will be used based on majority of traffic from subscriber.
	Arun Arunachalam	Comments regarding international standard and comment regarding support of ATM versus native STM traffic.
	Jim Mollenauer	Re: ATM and STM, will depend on network architecture
	Allan evans	Priority recognition in request grant mechanism? How is traffic prioritization done for allocation
	Jim Mollenauer	Do not want to try and reinvent the solution to that problem.

	Ken Standwood	Comments on BW allocation. Having BoD in terminal as well as central scheduler aids in prioritization problem.
	Jung Yee	Convergence layers are part of MAC, TDM mode in particular.
	Jim Mollenauer	Must work with existing defined signaling. It is to be accepted as part of the MAC.
	Jung Yee	Not enough information regarding convergence sublayers to really support the proposal.
	Jim Mollenauer	Not written out yet. No new signaling will be involved.
	Ken Standwood	Key exchange is slightly different from DOCSIS. Sequence number could be added. Decided to do it differently though. Fixed duration frame exists in proposal and this is used for scheduling of events, key sequencing is one such event. Key exchange has its process as well. Done with TCP/IP connection between BS and subsciber station connection control modules… Key sequence protocol must be reliable for it to be robust.
	Andrew Sundelin	Jitter being introduced for CBR type connections if CPE based BW allocation scheme is used?
	Jim Mollenauer	Assume that there is at least on burst per frame.
	George Stamatelos	Many of the ideas draw from 802.14 and DOCSIS
	Jim Mollenauer	Yes
	George Stamatelos	Since 802.14 is now discontinued, will this affect your protocol?
	Jim Mollenauer	No! many sources have been used for different parts of the proposal.
	George Stamatelos	?
	Jim Mollenauer	Reusing some ideas, but chose the ones that are best for the job.
	Demos Kostas	A given cpe gets a single burst per mac frame and burst contains no prioritization of the messages within burst.
	Jim Mollenauer	There is prioritization.
	Andrew Sundelin	Are you inventing new TDM signalling
	Jim Mollenauer	No, we propose to use existing signalling recommendations
	Phil Guillemette	Is the BW allocation matching the CPE request
	Jim Mollenauer	CPE can always do full fill of the allocation
	Glen Sater	?
	Ken Standwood	Downlink map will vary in size depending on what duplexing is being used.
	Glen Sater	Do you have a percentage?
	Ken Standwood	The answer will vary.
1500	Baya	Break
1530	Glen Sater	D+ MAC presentation
1620	Baya Hatim	Begin Q&A
	Yigal Leiba	CPE/multi-tenant building. How would bandwidth be assigned to each tenant.
	Glen Sater	Service flows would be established for the tenants. Request is done on a per service flow basis.
	Carl Eklund	What happens when you lose an MPEG packet is lost.
	Andrew Sundelin	?
	Shaul Shohat	Service level agreement being end-to-end means BS to SS?
	Glen Sater	Service flow is a connection between BS to SS
	Shaul Shohat	Header contains traffic and control information?
	Glen Sater	Yes, i.e. power control bits.
	Shaul Shohat	Does this cause problems
	Glen Sater	Only can be used when there is symmetric traffic
	Juan Carlos Zuniga	Convergence layer is up to manufacturer or is it to be included in the standard. (generic traffic)
	Glen Sater	It will not be included in this standard. It is to be left open.
	Juan Carlos Zuniga	What happens if too many grants are received for USG
	Glen Sater	Does not need to use extra grants
	Ken Standwood	Tradeoff between difference in overhead for multiple FEC…?

	Glen Sater	Adaptive modulation has generated much discussion within D+ group. Do not currently have sufficient data for presentation on tradeoff.
	Carl Eklund	Why was it stated that D+ cyphering is better than E+
	Glen Sater	Cleartext is not affected
	Carl Eklund	How is it to be done for bwa scenario
	Glen Sater	Encryption schemes are fairly week, and will likely be discarded in next few years.
	Carl Eklund	Is there error propagation due to error in encrypted text
	Glen Sater	Think so, but not sure
	Carl Eklund	??
	Glen Sater	Same as block size.
	Carl Eklund	Must stick to block boundaries? (stuffing)
	Glen Sater	No additional bytes are required.
	Jay Klein	Only weakness in E+ encryption will not be relevant in BWA. What is being done regarding d/s? Is there to be additional support for adaptive modulation on d/s?
	Glen Sater	Believe that other duplexing can be supported, so can adaptive modulation
	Jay Klein	Are phy latencies taken into account when transfering ss to different channel.
	Glen Sater	There are a couple steps to be followed. Takes connection requirements into account.
	Jay Klein	Separation between PHY and MAC?
	Glen Sater	Not 100% separation.
	Baruch Halachmi	Centralized scheduling… allocation per connection… MIPS required for support of this scheme in BS scheduler?
	Glen Sater	Current schedulers can support up to 1.5k cpe's with 16 service flows each.
	Baruch Halachmi	Must require QoS shceduling in CPE?
	Glen Sater	No! only has to use connection information to serve proper queue for CBR connections.
	Baruch Halachmi	A little scepticle about claims of number of subcribers supported.
	Glen Sater	This is based on DOCSIS cable system. Not every source is on at the same time.
	Baruch Halachmi	Worst case must be considered.
	Andrew Sundelin	D+ is substantially different from E+ is the authentication of many management messages
	Ken Standwood	Encryption of messages and …?
	Glen Sater	…?
	Ken Standwood	Question of level of security provided by D+ security on upstream. Is mostly a synchronisation issue.
	Glen Sater	Not really sure.
	Ken Standwood	How are general service PDUs identified if id is not there
	Glen Sater	Additional header mechanism gets it to through convergence layer. …
	Allan Evans	Clarify of mapping of ATM to SIDs
	Glen Sater	Mapping of underlying scheduling services to service flow
	Allan Evans	1-2-1 mapping of VPI/VCI to SID?
	Glen Sater	Does not have to be that way. Can have many ATM connections per SID if same QoS.
	Jim Mollenauer	Unsolicited grants…
	Glen Sater	Not just addressing ATM only…
	Jim Mollenauer	VoIP is not as strict wrt jitter. Ethernet… header suppression… ability to priorities.
	Glen Sater	Built into the ethernet portion of mac
	Jay Klein	Generic pdu reveals issues brought up in other sections. Important information is missing such as how to talk to this convergence layer. What advantage is obtained by the D+ approach.

	Glen Sater	Addressing is inherint within Ethernet and ATM. Generic PDUs do not contain addressing within mac header. Higher SAP addresses are not contained within the MAC header.
	Jay Klein	How would the proposed mac be adapted to support a frame based PHY
	Glen Sater	Looked at how the mac would support TDD and other PHY features. Exact framing …
	Jay Klein	How to support event driven scheduling such as 1ms framing?
	Glen Sater	Can modify the mac to support such things. How to actually do it is tbd.
	Jay Klein	What triggers the framing
	Glen Sater	Will be vender dependant within there scheduler
	Jay Klein	U/S and d/s relation ?
	Glen Sater	Haven't looked at that
	Shaul Shohat	???
	Glen Sater	Concatenation can be done if same QoS is required from the different service flows. Queues are associated with the service flows.
1700	Jung Yee	Opening floor for questions regarding either proposal. Soliciting questions from neutral observers.
	(harris)	Claim a lot of nice features, but it does not seem to be supported by any performance analysis.
	Glen Sater	Real modeling simulation data is not yet available.
	(harris)	How can you say that a single asic implementation will be available in the near future
	Glen Sater	The main additions to current chips design seem to be minimal. Most changes will be in software.
	Gene Robinson	To both groups. How does your approach allow for billing to be done.
	Glen Sater	Existing MIB already contain much of the information required, but no complete solution is ready yet.
	Jay Klein	Think it is more than only MIBs. Must consider all of the technologies being used. ETSI BRAN seems to be the closest so far. It is in evolution.
	Glen Sater	Other things that would be required is provisioning and establishment of different QoS parameters.
	Gene Robinson	How many hundreds of man years of s/w development are estimated for these systems.
	Glen Sater	Can't really estimate it. Most work will be in scheduling and BS. Using existing processes such as ATM AALs will cut down on development.
	Ken Standwood	A lot of it depends the reuse of existing technology….
	Demos	What operational and maintenane features do you have in your systems?
	Ken Standwood	Any telecom system has to have features for maintenance issues. Some of these issues are simple to keep track of and some aren't. As an example the network management…
	Jim Mollenauer	…..
	Juan Carlos Zuniga	Is there a way that we can agree upon the commonalities of the proposals and then work at solving the other issues.
	Jung Yee	802 is a contribution driven organization…
	Glen Sater	Need more details before any real decisions can be made. The details are really going to be the things that count in the end.
	Juan Carlos Zuniga	Don't really like voting on a whole proposal when I only agree on certain aspects of it but not on others.
	Jung Yee	Tomorrow there will be time to discuss the strengths of one compared to the other.
	Ken Standwood	D+ is a little vague in handling of PHY, rain… There are areas in E+ that does have a little less detail than D+. Fundamental details in philosophy that must figured out.

	Jim Mollenauer	Some large scale issues are as relevant if not more import than the details, i.e. TDD support, adaptive modulation support, ARQ. Other differences are only in details though.
	Lou Olsen	On both proposals, how does detection of problem occur by MAC.
	Glen Sater	Tomorrow's presentation will only address the loss of a single link. Agreed that redundancy and availability should be included within MAC and PHY discussions.
	Ken Standwood	Many types of errors are implementation dependent.
	Glen Sater	May be a set of requirements set on the mac and phy implemented by vender(?)
	Shaul Shohat	How is system to be connected to backbone? What is the algorithm for allocation of bandwidth.
	Glen Sater	Mac is toolkit around which a scheduling algorithms are designed for specific types of services to be in network.
	Shaul Shohat	???
	(harris)	What is the scheduler
	Glen Sater	Left up to vendor.
	Ken Standwood	Agree. Who ever writes the scheduling algorithm must know what traffic is to be supported.
	Shaul Shohat	With the same scheduler, which mac will provide the most throughput
	Glen Sater	This should be determined through the modeling part of our process. It is a non-trivial issue
	Demos Kostas	E+ supports SLAM. Can D+ also support this?
	Glen Sater	The mac and the phy can vary on a burst by burst basis based on a burst profile… interval usage code basis …
	Andrew Sundelin	SLAM on upstream and CLAM on downstream
	Gene Robinson	With higher order of modulation, interference comes in to play which leads to link budgets that need to be computed. Once this is computed, the separation between the two proposals can be seen once these link budgets are computed. Has this type of analysis been done yet?
	Jay Klein	Have presented some information this morning that was done by Ericcson…
	Jung Yee	Give a rough outline regarding what number you are looking for, then allow the two groups to attempt to supply the values.
	(harris)	Link budget only shows efficiency of PHY layer.
	Gene Robinson	Not all the complexity in the mac may be justified.
	Ken Standwood	If assuming a 5km cell, higher modulation may be used by…
1740	Jung Yee	Ending today's session.

Minutes from Wednesday March 8,2000:

Q: if changing the backoff window, does this improve the delay that you presented?
A: Yes.
Q: Does this model take into consideration the case when the basestation goes down?
A: no. It only takes the case when the CPE. When the base-station goes down and comes back again, there is not much problem.
Topics for MAC Straw polls:

1. Centralized and distributed bandwidth allocation scheduling
2. Support of multiple duplexing schemes (HFDD, FDD, TDD)
3. Routing information in MAC header to support multiple customers behind a single terminal/information carried in extension header.
4. Concatenation of multiple packets to a single burst regardless of service (SID/CID)
5. Supporting new protocols through addition of convergence layers vs. a single generic data
6. Support of T1/E1
7. ARQ in the upstream/downstream

Any suggestions?

Time	Speaker	Discussion

	Ensemble [Ken Standwood]:	I worry about the relationship between the items mentioned. There is more of a philosophical issues..
	Jung Yee:	Any proposals?
	Ensemble[Ken Standwood]:	Suggest removing T1/E1 topic.
	Jay Klein:	Add Addressing in MAC header
		Discussion of topics: • Centralized and distributed bandwidth allocation scheduling • Should we consider a centralized bandwidth allocation scheduling architecture? Should we consider a distributed bandwidth allocation scheduling architecture?
	Jim Mollenauer:	By distributing the process we can keep up with the
	??:	Agrees with Jim's comment. This will save us
	??:	I don't think that we will have any savings!!
	Jay Klein:	to clarify that Distributed means really semi-distributed
	Glen Sater:	There are 3 issues. One is the complexity of the CPE. Second is to maintain the QoS. Third, issue is interoperability
	Allan Evans	This has to be one way or the other
	Phil Guillemette	Agrees with Jay
	Ken Standwood	points out that some systems apply QoS to the data that is being transmitted. It is thus hard to determine if it is fast enough.
	Yigal Leiba	There is a difference between bandwidth allocation, which is a vendor specific. This I would suggest to give the tools in the standards and let the vendors to make their own decisions
	Jay Klein:	Agrees with ken. There is more just Delay to consider in QoS. There is delay and BER. That is why we choose in the E+ proposal.
	Allan Evans:	the complexity is the same in either proposal. I think this is more of the implementation of granting
	Tom Kolze:	is this means that we support the Duplexing schemes in the same cell?
	Carl Eklund:	this is assuming that thee is no existence of FDD and TDD on the same frequency channel
	Naftali Chayat:	We have to be careful of what we choose, as this will affect the 802.3
	Jung Yee:	it is difficult to predict the requirements from other committees
	Naftali Chayat:	I would like to support FDD and HFDD
	Ken Standwood	the E+ MAC header contains an address that allows routing info; whereas the D+ does not contain that. It would be better to have a MAC that knows where the info is going to
	Phil Guillemette	My opinion is mainly about the Upstream and downstream
	Jay Klein	that is a philosophical issue. That is true only in the case where you have a single user. However, my comment is that the MAC header contains as well the addressing from upper layers
	Phil Guillemette	As an example the Ethernet traffic …
	??:	I don't understand why do we need to redundantly add another Addressing in the MAC
	Lou Olsen	My perspective is as follows: I put a radio somewhere for which I have a set of customers. On the upstream may be the radio needs to know. I want to address the CPE and the subscribers to that CPEs.
	Jay Klein	: there is no WAS that has its address MAC layer hidden…The goal is to address the processing scheme …
	???	Why do we need routing info in the MAC if you already have layer-3?
	Ken Standwood	in case of multiple types of traffic on the same layer 2, as an example IP and ATM are higher layers

	Allan Evans	I don't see the point of this whole discussion
	??	I don't understand this discussion either. You can include the header if you want but it is not a ???: The terminal type should not be in the header..
	Jim Mollenauer	I think we have a real issue. What is the raw material that the MAC deals with. It is the connection ID or service ID.. (it is not always IP or Ethernet…)
	Baruch Halachmi	How can you do QoS without addressing?
	Ken Standwood	Clarify for the people who are having problems with this discussion. The E+ and D+ are not equivalent.
	Glen Sater	to E+ proposal, for each connection ID, you aggregate a different CID?
	Ken Standwood	there are different levels of aggregations. The CID in E+ are may be close to the D+ SIDs
	Juan Carlos Zuniga	the main issue here is does the MAC provide QoS?
	??:	I agree with the question but I don't agree with all of this discussion

		Call for a stroll poll:
		• Centralized and Distributed:
		  • Yes =22 to adopt the first part (consider a centralized bandwidth allocation ..), No = 8
		  • Yes = 19 , No = 14
		• Multiple Duplex Schemes:
		  • Yes = 27; No = 1
		• Addressing in MAC header:
		  • Should the MAC header contain info that distinguishes between multiple customers behind a single subscriber terminal? Yes = 19; No = 8
		Deffer this: Should the MAC header contain info that distinguishes between multiple customers, radio terminal behind a single subscriber terminal

Thursday, **March 9, 2000**

Time	Speaker	Discussion
815	Jung Yee	Call meeting to order and go over agenda. Will hopefully come up with an agreement regarding a tool for modeling the MAC and the criteria that should be used for evaluation. Invite any suggestions/comments on criteria. Session #7 submission should be both PHY and MAC.
820	Andrew Sundelin and Taylor Salman	Presenting "802.16 MAC Layer Modeling: A common Simulation Framework"
840	Q&A	
	Jim Mollenauer	802.14 initially simulated with NIST simulator. Why did they change to OPNET.
	Taylor Salman	Not sure of the history there.
	Baruch Halachmi	Traffic sources, QoS… how to verify robustness without accurate model. How to create accurate sources.
	Taylor Salman	Can actually use trace data. In view of QoS, can gather statistics of interest. OPNET can not actually do the work for 802.16 in terms of creating the 802.16 MAC module. Proprietary information can be protected.
	Baruch Halachmi	??
	Taylor Salman	Be up to each team to implement their own scheduler.
	Andrew Sundelin	Schedulers can be implemented and the IPR protected.
	Jim Mollenauer	Need to look for differences in the details, thus more detailed level of simulation is required. This means that PHY must be accurately modeled as well.
	Taylor Salman	Usually abstract the model for first phase of testing. While the first phase of testing is being conducted, a more detailed model can be developed.

	Andrew Sundelin	Can model different aspects of PHY such as adaptive modulation with more abstract models such as variable sized pipes.
	Jim Mollenauer	What about rain attenuation.
	Andrew Sundelin	Can also be done
	Jim Mollenauer	How quickly can this be implemented.
	Andrew Sundelin	Should not take too long
	Taylor Salman	Regardless of the tool, this will take time, and it may even be quicker to if using OPNET.
	George Stamatelos	What benefit is there by using OPNET. What about cost
	Taylor Salman	There are free tools out there, but OPNET has a much larger number of build in models and has many more features. Time to build models in other tools will probably cost more than an OPNET license.
	George Stamatelos	Cost of OPNET license
	Taylor Salman	Have C4 centers where people can come and create models that will be shared. Academic institutions can obtain free licenses.
	Carl Eklund	It seems like it should be easy to change the scheduler in the MAC evaluation model.
	Andrew Sundelin	One thing that was done for 802.14 was to provide a very simple scheduler and MAC model as an example for the groups to understand how to build their own.
	Khaled	Is there a structured way of defining the interfaces between protected modules.
	Taylor Salman	Yes. This was done for 802.14
	Baruch Halachmi	Does OPNET allow for process oriented constructs?
	Taylor Salman	It is a discreet event simulator, but models such as circuit models can still me created.
	Baruch Halachmi	Major decisions will be based on the simulation results, so the simulation model must be well designed and implemented. If support will not be provided for the main component of the model for 802.16, it will be difficult for an inexperienced individual to come up with a good model from which to obtain results.
	Phil Guillemette	Doesn't OPNET create models on a contract basis?
	Taylor Salman	We do provide consulting services, but it is a tricky situation due to resource availability at this time. Also provide support to license holders.
	Khaled	There are companies that will do this also.
	Glen Sater	Is OPNET available for the validation of a model for accuracy.
	Taylor Salman	There is tech support for this.
900	Jung Yee	What is the feeling about using OPNET for the simulation.
	Carl Eklund	The cost of licenses may be an issue.
	Jung Yee	What type of companies would we be considering.
	Jim Mollenauer	Will common simulation framework be freely available to 802.16?
	Taylor Salman	It will be freely distributed. There exists repositories for model sharing.
	Jim Mollenauer	So vendors will be able to use this repository of models to validate there scheduling algorithms later on.
	Carl Eklund	Two months may be tight for those companies that who are just learning OPNET
	Jung Yee	Picked it up quickly.
	Taylor Salman	Training course for a week. May be possible to provide a free 802.16 training session.
	Jim Mollenauer	Using the tutorial made it very easy to learn OPNET.
	Taylor Salman	All you need is communication systems and C to really pick it up.
	Lou Olsen	How do we know if we can accurately model somebody's MAC. Understanding the tools of OPNET is not the same as understanding how to model a system.
	Jim Mollenauer	???
	Khaled	Agree with Lou.
	Jung Yee	Knowing the tool is not sufficient. Understanding of the communication system and how to create models of physical systems is required.
	Taylor Salman	This is the same for any tool.

	Lou Olsen	Do companies have experts that they are willing to put on this project.
	George Stamatelos	NIST has already offered to do the modeling for a small fee.
	Carl Eklund	NIST also uses OPNET
	Jung Yee	Cost is part of the issue, but the time required to develop source models is also a cost.
	Khaled	Willing to assist in model creation. Already has much experience with OPNET.
	Jung Yee	It is nice to have a tool, but we must now consider what kind of input and output that is required
	Baruch Halachmi	More than just input and output is important. Much information will have to be provided to enable the development of the mac models and this will lead to assumptions being made.
	Carl Eklund	Both teams are probably willing to answer questions to assist in the modeling.
915	Glen Sater	Presenting "IEEE 802.16 MAC Modeling Evaluation Criteria"
	Jung Yee	This is only for the next two months, not for going beyond that.
	Glen Sater	Yes.
	Jim Mollenauer	This is too simple of a model. Asymmetric traffic must be considered. 50Mbps of the 100BT is okay. User data must always be encrypted for the model. It should show difference due to header sizes
	Carl Eklund	One of the main differences is how the MACs support several users behind one terminal.
	Andrew Sundelin	???
	Carl Eklund	Could be useful to have a case where a couple V.35 ports are used.
	Glen Sater	Typically, high speed serial interface is like a T1
	Jim Mollenauer	10 different customers and 4 different users behind each terminal. Dynamic change in users should be reflected.
	Baruch Halachmi	Should have dynamic sources that come and go. Ideal channels are not realistic.
	Glen Sater	Can use a BER can be used.
	Baruch Halachmi	5 to 10 terminals is not sufficient for evaluating scheduling algorithms
	Glen Sater	Chose those numbers to make the development of models quicker.
	Baruch Halachmi	Creating the models is as easy for 100 as it is for 10 terminals.
	Jung Yee	Should consider 100 terminals.
	Baruch Halachmi	The number of connections per CPE should be different
	George Stamatelos	Delay should possibly be changed
	Glen Sater	Took criteria out of call for contributions.
	George Stamatelos	This is a pretty simple model.
	Khaled	For the amount of time that we are talking about, Glen's proposal makes sense. However, some of the comments make sense and should not add much to the development time. In the case of encryption overhead, there is more than only the MAC overhead.
	Glen Sater	This is not for delay information.
	Jim Mollenauer	Only to see overhead contribution
	Khaled	In terms of users coming on and off, how useful is this in the first phase of the simulation?
	Andrew Sundelin	Should not be too important at first.
	Khaled	Can evolve to that later. Minimum and Maximum delays is not very meaningful in terms of simulation. Percentiles should be used instead. Runtime increases considerably for the addition of users.
	Juan Carlos Zuniga	Adding the number users…??? Randomly distributing the traffic is not clear enough. Burst size and other such information should be included to really compare the two MACs.
	Jim Mollenauer	BS will have to check service level agreements before any aggregation can be made. 100% aggregation can not be done.
	Phil Guillemette	Not for evaluating scheduling algorithms.
	Andrew Sundelin	Will come out somewhere.

	Jim Mollenauer	A 50 to 1 ratio between types of traffic.
	Andrew Sundelin	Agrees that more thought is required. Should possibly have a conference call.
	Jung Yee	Want to see what is worth while.
	Andrew Sundelin	If we don't think about it enough there will be problems
	Lou Olsen	The original intent of simulation was to weed down the proposals. Does not see value in simulating. Is one better than the other is not necessarily an issue. The issue is whether the MAC meets system requirements.
	Jung Yee	What would you propose be the measuring stick to move forward.
	Lou Olsen	The whole system must be considered for evaluation.
	Phil Guillemette	The 50% is a little high.
	Khaled	Are we talking about full duplex or shared Ethernet?
	Glen Sater	At the service access point, it would be full duplex.
	Khaled	Then 50% is not too high. Simulation would allow to see which MAC would provide a good idea of the statistical performance of the two proposals. This is probably very important if they both meet system requirements
	Glen Sater	Based on the schedule, we are mandated to provide simulation data for the next session.
	Baruch Halachmi	In the time frame that we have, it is certain that the simulation data will be subjective. Would suggest looking at the long term and not as a way to weed proposals. It will be able to help determine bottlenecks and how to improve the proposed MAC. Perhaps the charter of the simulations should be modified to reflect this. This will force the vendors to provide all the technical information to make the development of these systems viable
	George Stamatelos	Agree with Glen. Should we talk with E+ to come up with an acceptable model.
	Glen Sater	This should probably be something that comes from the work group not the two teams..
	Allan Evans	The proposed model is not sufficient. Should add a couple diabolical cases.
	Jung Yee	Should add such cases to this model.
	Carl Eklund	25% of the volume is should not be small packets. It should be higher.
	Andrew Sundelin	This model does not make a difference between up and down
	Jim Mollenauer	15 to 1 on upstream versus downstream off of the modem
	Glen Sater	Not looking at residential
	Andrew Sundelin	Will this give us any real meaningful data for the next session.
	Carl Eklund	It is surprising that there is no downstream data proposed in the downstream. There is a definite difference between the sources for the upstream and the downstream.
	George Stamatelos	Can you give …
	Andrew Sundelin	Is there a way to talk and get something proposed quick enough to provide meaningful data for the next session.
	Jung Yee	Will ask Roger is something can be done offline to get this done.
	Baruch Halachmi	If we do not start now, we will end up in the same place next session. There is not enough data presented for us to create a viable model for 802.16. BW management, QoS, traffic characteristics…
955	Jung Yee	Take a 20 minute break.
1035	Jung Yee	Spoke to Roger. Let him know what we are trying to decide on. We will bring our intent to the plenary. Looks like we agree with OPNET as being the tool of choice for simulation.
	Taylor Salman	Summarize what OPNET can provide to the group.
	Jung Yee	Will entertain
	Motion by Jim Mollenauer, and seconded by Phil Guillemette	**Move to accept OPNET and develop a common simulation framework for simulation of MAC protocols for 802.16.** **For: 6** **Against: 0** **Abstain: 0**
	Glen Sater	Does this include the common simulation framework as well.

	Jung Yee	Yes
	Baruch Halachmi	This should not exclude the use of other tools to be used.
	Jim Mollenauer	Does not accept friendly amendment from Baruch. OPNET is the best thing out there. If no problems are encountered, then no other tools need to be considered.
	Glen Sater	Present draft for simulation criteria.
	Jung Yee	Intent is to present a draft of what we want to do to draft.
	Andrew Sundelin	We should present a date and those responsible for creating the criteria.
	Glen Sater	Going over draft.
		Range of BER should be considered. 10^-6 to 10^-9
	Carl Eklund	Would like clarification whether a PHY TC layer will be required.
	Andrew Sundelin	Packet will be market as errored.
	Glen Sater	Maybe we should …?
	Taylor Salman/Andrew Sundelin	Discussing how this can be accomplished in OPNET
	Glen Sater	The BER is before TC sub-layer
	Jim Mollenauer	Questions regarding channel description, i.e. bandwidth and gain from adaptive modulation.
	George Stamatelos	May look at this later on. This is only a simple model.
		Disagreement as to how important the PHY layer assumptions are on initial MAC simulation criteria.
	Jim Mollenauer	Jitter will be affected by the PHY.
	Andrew Sundelin	Same scheduler will be different for FDD and TDD are different. Will not be used in same sector.
	Jim Mollenauer	They are very similar though. Must come up with a plan that can build something simple that is more of a sanity check then for comparison purposes. Otherwise, the results may be misleading.
	Carl Eklund	Serious concerns.
	Andrew Sundelin	Do not see the point in having adaptive modulation for this simulation.
	Juan Carlos Zuniga	Do not need to specifically say what modulation is being used. It is the rates that will change.
	Taylor Salman	Put a disclaimer that says the results may not be representative.
	Jung Yee	Is what Jim proposing feasible in the two month time frame
	Jim Mollenauer	Nothing being proposed is feasible in two months. For the next session, the performance numbers will be done not through simulation but through pen and paper with excel spreadsheet calculations. More complicated issues will be addressed through modeling.
	Jung Yee	…?
	Jim Mollenauer	Not necessarily. If we are going to do simulation, we should realize that it will take time and useful results are not obtainable by May.
	Andrew Sundelin	Isn't what Glen is presenting just a rough idea of the type of information that we will determine as necessary to have. This list will be completed over the next month.
	Baruch Halachmi	….? Can not make reasonable assumptions as to the time to develop the models until more details are know regarding what we are trying to get out of the simulations. Start with something that we now will be useful down the road but not try to make assumptions of the amount of time required to get a more complete amount of detail to our simulation requirements.
	Carl Eklund	We have to adopt a draft standard at the next session, so this is not necessarily worth while
	Jung Yee	What does a draft standard mean?
	Lou Olsen	We don't know.
	Jung Yee	It only means that the work now belongs to the work group and not the original authors.
	Jim Mollenauer	….?

	Khaled	Options may be pulled out later on as they are found to not be required.
	Jung Yee	We have to start even though we are not sure of what will be needed in the end.
	Carl Eklund	Agree
	Jim Mollenauer	Should try to come up with agreeable simulation conditions. The actual implementation order can be decided later. Some conditions may short change one proposal or the other
	Jung Yee	Glen and Jim volunteer to cooperate on creating a list of simulation conditions that we should be aiming for. This will be done by March 31. This should be made public to anyone.
	Jim Mollenauer	For every other person that participates will likely add a week to the completion date.
	Jung Yee	We are not actually looking for decisions to be made.
	Glen Sater	May be able to use email reflector
	Jim Mollenauer	Would prefer an offline discussion with Glen than provide the results to the group.
	Jung Yee	Will assign a sub-committee, Glen and Jim, to come up with the recommendation for evaluation criteria for simulation. Will be mandated to submit results to task group the first week of April.
	Baruch Halachmi	Model description is should come out of the sub-committee, not just the criteria. Level of details required should be specified.
	Taylor Salman	I think you mean the functionality that should be provided.
	Jim Mollenauer	What is the intellectual property problem.
	Jung Yee	There should be no problem since the algorithms will not be specified.
	Baruch Halachmi	Many assumptions must be clarified in terms of the algorithms that will be used.
	Jim Mollenauer	True, but that is in the box that says system under test. Glen and Jim are not going to be looking at that box. They will be coming up with the conditions for the simulation.
	Baruch Halachmi	Model will be based on your own assumptions, so without bounding what is within the system under test box, the results will have to be accepted on faith of accuracy.
	Glen Sater	What functional assumptions are being considered
	Baruch Halachmi	If it is stated that something will be addressed, you are committed to it and otherwise, people can put what they want in the MAC module.
	Jim Mollenauer	Not considered getting into details such as how often ranging should be done
	Baruch Halachmi	A brief functional description should be included for the MAC.
	Jim Mollenauer	This is not what we (jim and glen) have been tasked to do. Protocol may have its own proprietary parameters that may be varied.
	Jung Yee	The conditions under which the results were obtained must be specified when presenting results.
	Jim Mollenauer	Some parameters may not be common to both MAC so internal parameters need not be specified. The protocol should be allowed to be optimized.
	Jung Yee	That information will be in the technical submission of the results.
	Jung Yee	Move forward we will show Glen's slide to let WG know what type of information that we are going to determine in the ad-hoc group.
	Lou Olsen	…??
	Jung Yee	The two points: evaluation table for the MAC and the call for contributions must now be determined.
	Jung Yee	Planning for session 7
		Call for contribution = general proposal?
	Jim Mollenauer	Contributions for the existing proposals no more primaries
	Glen Sater	Set the system requirments
	Jung Yee	Comments that have been made are that more detail should be provided wrt how the system requirements are met.
	Carl Eklund	Not sure if it makes sense, but it is better than the current way that we are using the evaluation table.

	Jung Yee	What is your suggestion for evaluation criteria.
	Lou Olsen	Need criteria, but the current table is not sufficient. Maybe the system requirements would be better for a list of criteria. Voting system does not have to be used the way it has been used in the past.
	Jung Yee	Voting system may have no real use. How do we come up with a way to make a better decision as to how to move forward from the next meeting.
	Glen Sater	Plan, model criteria. Complete submissions are required
	Jung Yee	Complete is ambiguous.
	Andrew Sundelin	If you can't simulate it, you can't build it.
	Glen Sater	Some method is needed to judge the completeness of the proposal.
	Jim Mollenauer	DOCSIS has several different documents
	Glen Sater	Don't mean that level of completeness.
	Jim Mollenauer	Minor details may be flushed out after draft is accepted.
	Glen Sater	Difficult to evaluate without complete proposal.
	Jung Yee	Comes down to the need for some sort of criteria.
	Lou Olsen	This group can accept both MACs. The work group can then figure out how to proceed. Then picking and choosing from both proposals can be done.
	Phil Guillemette	Agree with Lou.
	Jung Yee	How to deal with third party contributions
	Glen Sater	Follow same format as the last call for contributions.
	Jung Yee	Use same call as last time and change the dates and location.
	Carl Eklund	Agree with Lou's proposal about assessing against system requiements.
	Jim Mollenauer	Functional requirements should be used instead of criteria table.
	Jung Yee	Should already be using the functional requirments.
	Jim Mollenauer	Get rid of other items and focus on the functional requirments
	Jung Yee	Just use first criteria from table.
	Carl Eklund	Should be changed to how does the proposal meet the system requirements. Actually include references within the proposals.
	Andrew Sundelin	Change 'how' to 'by what mechanism'.
	Motion by Jim Mollenauer and seconded by Phil Guillemette	**Motion: Only have one criteria for next call for submission. "By what mechanism does the proposed MAC protocol meet requirements as described in the current version of the System Requirements…"** **For: 5** **Against: 0** **Abstain: 2**
	Jung Yee	Ad-hoc group will come up with call for contributions for evaluation of MACs.
1150		adjourn