Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
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Re:	IEEE 802.16 Session #9 (Denver, Colorado); Joint TG1/TG3 MAC Meeting of 14 September 2000
Abstract	Minutes of Joint TG1/TG3 MAC Meeting of 14 September 2000
Purpose	Review and Approval
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IEEE 802.16 Session #9 Minutes:
Joint TG1 and TG3 MAC Meeting
14 September 2000

(a) Minutes as Recorded by
Dean Chang, 802.16.1 Secretary

Call to order

Roger Marks called the meeting order at 7:35pm, September 14th.

This joint meeting was held to discuss the MAC between TG1 and TG3.

Roger Marks displayed the agenda and there were no objections.

The goal for this group is to work together. The structure doesn't allow the groups to work completely apart from each other. Everything in the standards process is completed under the working group and not a task group.

TG1 MAC Status

Presented by Carl Eklund 802.16.1 MAC Chair.

The TG2 MAC editorial team resolved some of the issues discussed in last night's plenary. The group has tried to take out any specific PHY dependencies from the document and move them into the respective PHY sections.
The biggest part missing are the convergence layers that sit between the MAC and PHY
The group will develop convergence layers for the following:

- Ethernet
- IP
- ATM

The group can also develop a convergence sub layer to support any additional interfaces.

Roger Marks commented that there is a broad consensus that TG1 is not going to letter ballot tomorrow but will initiate a lower level of comment process called a Working Group Review.

TG3 Presentation of document IEEE 802.16.1-00/04 Presented by Brian Kiernan, Chair of the 802.16.3 Task Group.

{The published document also contains the TG1 markups in color; these were not included in Kiernan's presentation.}
This document was put together by TG3 group with the current understanding of the TG1 MAC. "May" requirements not discussed in this document.

Here is a brief summary of the differences and please refer to the document for more detail.

TG3 vs. TG1

Focus on IP
Mandatory support for connection-less
Peak data rates are slower
Maximum delays are longer
Classes of services are IP oriented
Channel bandwidths much smaller
Cell radius larger
ARQ is required

TG1 MAC limitations

MAC is PHY dependent
No fast BW allocation
No Acknowledgement frames
VoIP VAD support (Will be IP voice not connection based)
Multicast and LAN-to-LAN bridging support
No data polling mechanism

TG1 comments on TG3 Document

Carl Eklund presented document IEEE 802.16.1-00/04 (including color-coded markups).

Color-coding
Green means that TG1 MAC can support this now or it is easy to support
Yellow means that TG1 has questions regarding these requirements
Purple means that this is misinformation on behalf of TG3 regarding TG1

Rather than going into the details of the document, please refer to the comments made in Carl Eklund's presentation.

It is obvious that there was a huge misunderstanding between TG3 and TG1 regarding the MAC. Most all of the requirements for the MAC that TG3 thought were not supported are included in the TG1 draft document.

Here is a summary of the comments by TG1:

- The TG1 MAC is optimized for Ethernet and IP
- Support connection-less operation between the Base Station and Subscriber station - allows for things such as header compression
- Capable of scaling from 10 Mb/s and beyond
- Ability to support 5 ms delay but can also can support 20-40ms with no problems.
- Classes of services - Support all classes of service IETF DiffServ, EF (VoIP, video), AF (ISP service differentiation) BES (best effort) Channel with is not a problem.
- Longer frame size is not a problem.
- Issue Cell radius of 50km - need to review parameters but this is a simple change they will gladly make

- ARQ is a requirement - not required in TG1, but now have hooks for ARQ in the uplink, however the same hooks can be added downlink. It is difficult for the downlink with TG1 and easier in the uplink. There is not a specific ARQ requirement for this - the group can look at incorporating this.
- Nothing in the MAC prevents from support of small pipes
- MAC is designed for lower delay but can also support larger delay as well. Can select between 32 different values. Can support short to almost infinitely long frame.
- Ethernet bridging support will be included in the Ethernet convergence layer.
- High vs. Low data rate - built in fragmentation. Bursts can take more than 1ms for long IP packets.
- Code space supports 32 different code lengths per PHY specification. - Time resolution of the frame can be in any length - can be 32 arbitrary values.

TG1 MAC is PHY dependent.
It was true before but as of this week things there were changes made make the MAC independent of the PHY

PHY burst parameters - Used 3 of 256 code spaces for modulation schemes. The rest are available for definition.

The MAC is connection oriented over the air interface, the final destination of a packet is not determined by the connection ID but is carried in the MAC payload.

Discussion

Brian Petry - Comment really appreciate the effort that TG1 has done on the MAC.
Chet Shirali – As a representative of the WDSL group, the MAC is based on DOCSIS v1.1 and we should consider this in TG3.
Roger Marks doesn't appreciate these kinds of comments; TG1 responded to the technical comments supplied by TG1 and it isn't appropriate to introduce other issues.
Glen Sater - hHistori cally, the TG1 MAC started with a D+ and an E+ group. All of the features of DOCSIS v 1.1, are incorporated into the TG1 MAC and more.
David Trinkwon – I appreciate the comments and TG1 was working under an assumption that you were going out to letter ballot however they are really going to working group review.
Roger Marks – the intent is to delay the going to letter ballot to November. It is an opportunity to collect comments further comments from TG3 participants.
Marianna Goldhammer - Happy to see that many of the things in our document received attention. In order to continue the process, I propose to go through the presentation from end to beginning. It is clear that there is a misunderstanding.
No data polling - Base Station says to the subscriber that it can start to transmit.
Juan Carlos Zuniga - There was a sense that the MAC was more ATM oriented vs. IP - this is not true. TG1 would like a specific requirement and make sure TG1 can understand.
Demos Kostas – I feel that we closer than we though on the two MACs. We will start with TG1 MAC and then maybe adopt them to TG3 but it make take a bit of time to get the confidence level higher.
Comment - Disappointed by the TG3 comments - want to know the mindset.
Brian Kiernan - all statements will adopt the TG1 MAC and see if there are changes required. No mindset issues plus quite a bit of things were changed this week.
Marianna Goldhammer - Multicast and LAN-to-LAN bridging support may have greater delays in performance.
Carl Eklund - comment about MAC delay is negligible - may create a 50ns longer delay.
Chet Shirali - TG1 MAC was never thought as applicable for TG3 because it is a different application.
Roger Marks - need to raise these issues with TG3.

Brian Kiernan - we need to review the TG1 make and see if it is applicable for TG3. If we can adopt an existing MAC this is preferred.
Scott Marin - The sense of the industry is to ignore ATM and STM and move to IP. TG1 team has pretty much ignored the TG1 FRD. TG3 group has updated the TG1 MAC meets more of the TG3 FRD than the TG1 requirements. Part of the issue is due to the fact that we are in different groups
Mary Condie - TG3 is doing an evaluating of the MAC need to look at requirements and not implementations. Delay, jitter, bridging are requirements; implementation details are not.
Demos Kostas - Glad to see that we are closer than it sounds on the surface.
Marianna Goldhammer - VoIP VAD support - need a data polling mechanism
Glen Sater- The artifact came from DOCSIS where upstream bandwidth is of utmost importance. The point interval can be set by the service provider.
Gesbert - Will TG3 go though the same process as TG1 and potentially consider the DOCSIS v1.1 MAC?
Brian Kiernan - right now the intention of the group is to focus on the TG1 MAC
Comment - Feel that nLOS, cellular, call for a specific set of PHY technologies - diversity, power control, adaptive modulation, in addition, the MAC must be close to the PHY. Let's not rush the definition of the MAC because of drastically different requirements
Carl Eklund - the only assumption that goes into the MAC is that it is a point to multipoint system. No assumptions for channel model have gone into this MAC.
Jim Mollenauer - the MAC has little dependence on the PHY and parameters that make it future proof.
Marianna Goldhammer - ARQ requires faster transmission support. First,you need to acknowledge the packet. If it is not acknowledged, it must be retransmitted in a fast mode.
Demos Kostas - Wants to support Marianna on fast ARQ.
Comment - TG1 MAC, the Physical channels using FEC instead of ARQ. TG3 noise models will be more bursty and therefore only relying on PHY will be insufficient.
Juan Carlos Zuniga - Need to separate issues regarding the PHY and the MAC.
Marianne Goldhammer - There are enough technical points but now we need to know how to continue. Key is regarding the convergence layers and TG3 people need to understand this. Would like the groups to converge on the same MAC.
Carl Eklund - TG1 doesn't want to wait 6 months for these comments. Please read the document and make comments now.
David Trinkwon – He wants to respond to all of these comments regarding TG3 not reviewing the TG1 MACs. We just finished the FRD. We are not prepared in time. Not many comments from TG1 on TG3 FRD. There is no communication between the different groups.
Jay Klein - TG1 was working in the dark regarding TG3, some discussions in the corridors. And will also have an FRD regarding comments on the FRD. Everyone here is an 802.16 member. It would be beneficial to get comments from TG3 through the comment resolution process.
Yanover - Would like to have a formal procedure to resolve things between the two groups.

Roger Marks – Historically, the groups have been operating independently. Need to bring the groups together. There was a breakthrough between various groups - people in the TG1 MAC group are really attempt to develop a specification that is better and better - resulting in the best MAC for fixed broadband wireless access. Roger's proposal is to agree that there is intent to base 802.16 on a single MAC provided it meets the requirements of various task groups.
Demos Kostas - respectfully disagrees with Roger that once a standard is complete it is difficult to change.

David Trinkwon - concerned about the overhead requirements of the make. Has there been any modeling done on the MAC to give an idea of efficiency? The lower the better.
Carl Eklund - Spectrum is scarce in LMDS as well and the goal is to avoid overhead as much as possible. There have been some preliminary modeling work but so far, as the design is still under way, - however the
Brian Kiernan - respectively disagree with Demos - knows of many standards that do change.

Brian Petry - Fully support Roger's comments - Brian involved in standards for 10 years and to see 802.3 constantly revising the standard to support 10 Base5 to 10Gbps Ethernet on Fiber, coax, twisted pair. Using 1 MAC protocol
Chet Shirali - Requested that people be able to participate in both groups. Applications are now different. Why not adopt a different spec for the MAC in TG3
Carl Eklund - calling for the same process as 802.
Marianna Goldhammer - TG3 voted today and is in line with what has been stated now.
Comment - Only fair to consider the DOCSIS v1.1 MAC - only fair.

David Trinkwon - TG1 still has more work on convergence layer. TG1 is going to start the working group ballot process in November. 40 day voting period. TG1 has no interested in putting out something that does need to be immediately fixed.

Roger Marks - TG3 is about 1 year behind TG1. The goal is to adopt a single MAC that addresses all of the requirements Get working group single MAC and multiple PHYs. WirelessHUMAN t is involves other issues. Roger will put measures in place to resolve these issues.

Brian Kiernan - TG3 will hold a session tomorrow to discuss the results of this meeting.

Meeting Adjourned at 10:00pm.

(b) Minutes as Recorded by Juan Carlos Zuniga, 802.16.1 MAC Secretary

19:30	Roger Marks	Call to order (TG1 – TG3 joint meeting)
	Carl	(Report on actual status of TG1's MAC development and the progress achieved on this week).
	Brian K.	(Report on actual status of TG3's work and concerns about TG1's MAC not being suitable for TG3's needs. Few slides generated in TG3 about this issue were presented).
	Carl	(Response from TG1's MAC group to TG3's concerns, addressed to each specific issue pointed out in TG3's presentation).
	Brian Petry	I apologise for the questions made to TG1.
	Chet	I'm part of wDSL and our MAC will be DOCSIS 1.1 oriented
	Roger	That is not an issue relevant to TG3 assigned task.
	Glen	I represent the original DOCSIS (D+) proposal and feel that all the features that are supported by DOCSIS 1.1 are supported by TG1 MAC.
	David	It was a misunderstanding about the features of the TG1 MAC with respect to the TG1 Functional Requirements.
	Marianna	The Polling scheme that you have described is different to what it is needed in TG3.
	Ken	I would appreciate to receive more comments towards the current development of TG1-MAC and not the one year old TG1Functional Requirements, which are not much in line with our current development.

	Juan-Carlos	The concerns presented from TG3 were confusing. Some slides describe a long delay scheme whereas other ones describe small delay requirements. Also, the BW allocation arguments are contradictory. There was a clear misunderstanding that the TG1 MAC was ATM oriented.
	Demos	The misunderstanding was regarding the specific requirements that we thought were not covered by TG1.
	Remi	I'm disappointed about the TG3 work. It seems to me that you had your minds already set to a different MAC, so I'd like to know which one is it?.
	Brian K.	We didn't have our minds set. We just took TG1 as one possible option and voted for evaluating it against other choices.
	Marianna	The delay that you are using is not efficient for Bridge applications.
	Carl	Today's memory devices take few ns to make functions like header compression, which I think are important for TG3 too due to the limited BW.
	Chet	The feeling was always that the TG1 MAC was developed for LMDS frequencies, so that's why it was not considered by TG3.
	Brian K.	I have always prayed for considering TG1's MAC for TG3.
	Scott	I would suggest for the sake of the process to have both groups working together with common schedules and not at the same time in parallel.
	Mary	Delay and jitter are important parameters to be discussed, not implementation dependant issues like some of the ones that have been addressed in this discussion.
	Demos	A good part of the miscommunication is due to the fact that the rush to have a standard too early didn't allow the two groups to have discussions together.
	Marianna	The UGS/AD waists a lot of BW with this scheme.
	Glen	(Explanation on how the UGS/AD is adopted from DOCSIS was initially developed for a Cable Plant that has a very narrow upstream channel).
	Gesbert	I have some concerns about not having considered all the issues of the specific PHY.
	Carl	The MAC does allow for any PHY to be implemented, since no assumption of modulation, coding scheme, diversity or LOS has been taken when developing it.
	Jim	
	Marianna	
	Demos	
	Yigal	It is clear that a lot of capabilities of the TG1 MAC were not well understood.
	Juan-Carlos	Several times issues like modulation or LOS are used to criticise TG1's MAC. In an obstructed environment ARQ may use CRC to help the channel, but LOS itself is not relevant to the MAC. One MAC doesn't have to see the other MAC.
	Marianna	(explained how another slide in the presentation pointed out issues not well covered by the TG1's MAC)

	Carl	I would appreciate if TG3 read our document and commented thoroughly on it.
	David	Our main task is to comment on Functional Requirement. We didn't have any comments from TG1 for that document.
	Jay	Some companies interested in the process have representatives in both camps.
	Chet (background)	We are individuals representing ourselves in both places.
	Jay	We need to establish a procedure to carry on with these issues.
	???	I agree with Jay and we have to make some procedural changes.
	Roger	(pointed out how the TG1 MAC process has evolved, how difficult was to have a common agreement, and how well defined is nowadays for the needs of any FBWA system) I suggest having a single 802.16 MAC that addresses the different needs of all the TGs.
	Demos	I respectfully disagree with that. I think that both systems have different needs, and in my long standard experience I have never seen a standard being easily modified once it is released.
	Brian K.	I encourage TG3 to read TG1's documents. (After consensus, TG3 decided to reconvene on Friday at 8:00 am to reconsider today's discussions).
	Brian P.	802.3 is an extremely good example for a successful standard. It has been several times revised, it supports multiple PHYs and it does have a single MAC.
	Chet	We cannot take TG1's MAC for our needs. At present we have equipment being installed and this standard would make it obsolete. We are MMDS-DOCSIS.
	Marianna	We have to go for a single process in TG3 in the same way that we went through TG1, and maybe make some modifications to whatever is included in this MAC.
22:00	Roger	Session Adjourned