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## **Minutes of the Conference Call**

**Date**

The 14<sup>th</sup> conference call was held on April 12, 2005, at 8 PM EST.

**Participants**

- 1 Gary Baldwin
- 2 Chia-Chin Chong
- 3 Chuck Haymes
- 4 Abbie Mathew
- 5 Alireza Seyedi
- 6 Su-Khiong Yong

**Issues Discussed**

- (1) The conference call next week will be on Monday (Tuesday in Japan and South Korea). We will revert to Tuesday (Wednesday in Japan and South Korea) after this. Please refer to page 2 for details.
- (2) The group agreed to the changes made to [APPENDIX – A](#).
- (3) Abbie and Chia-Chin gave an updates on the task to gather measurement data.
- (4) Abbie discussed with to James Gilb on the effects of distance on the 802.15.3 MAC efficiency. James' email will be put on the reflector for more discussion. Bruce Bosco will take over this task as he already liaisons with the 802.15.3.
- (5) On a related issue.....at the April 5<sup>th</sup> conference call, we spent a considerable time discussing on the compatibility and synergy between the outdoor model and the indoor one which is the focus of 802.15.3c. This led to a suggestion of putting a limit on the maximum distance for outdoor point-to-point links. This subject was put on the Reflector to solicit comments. See [APPENDIX – B](#).
- (6) Briefly discussed the materials we must present in Cairns. Su-Khiong Yong will make a presentation on the parameter structure for the channel model.

**Action Items**

- (1) Discuss the need to include antenna in the channel model. The only response I have received on this issue is from Brian Gaucher. Refer to [APPENDIX – C](#) for more details.
- (2) Initiate discussions on capturing S-V parameters for the environment in [APPENDIX – A](#).

L	Number of clusters
$\Lambda$	Inter cluster arrival rate
$\lambda$	Ray arrival rate
$\Gamma$	Inter cluster decay factor

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$\gamma$	Ray decay factor
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- (3) Continue with the discussion on the materials we must present in Cairns.
- (4) Discussion on the limitation on the link range for outdoor applications and the MAC. Refer to [APPENDIX – B](#) for details. We may postpone this to the week after next.

### **Next Conference Calls**

The next meeting will be on April 18, 2005, Monday, at the times listed below. The dial-in number is (641) 497-7100 and the access code is 657719#.

Eastern Standard Time	8.00 PM, April 18 - Monday
Mountain Time	5.00 PM, April 18 - Monday
Pacific Time	5.00 PM, April 18 - Monday
Japan/South Korea time	9.00 AM, April 19 - Tuesday

**APPENDIX- A**

Environment			Comments	Reviewers
Indoor	Enterprise	Convention center	A	<ul style="list-style-type: none"> <li>▪ Chia-Chin Chong</li> <li>▪ Shahriar Emami</li> <li>▪ Abbie Mathew</li> </ul>
		Open office		
		Warehouse		
	Residential	Intra closed office	B	
		Intra closed room		
	Enterprise	Inter closed office	C	
	Residential	Inter closed room		
Enterprise	Train - platform link	?	Decision was made on March 28, 2005, to move this environment (model D, outdoor) to the indoor. As the distance is less than 3m (assuming this), the multipath effects are similar to that in an indoor environment.	
Outdoor	Enterprise	Campus	D	<ul style="list-style-type: none"> <li>▪ Sean Cahill</li> <li>▪ Eli Pasternal</li> <li>▪ Su-Khiong Yong</li> </ul>
		Stadium		
	Residential	Home-to-home		
		Utility pole-to-home		
		MDU <sup>1</sup> vertical link		

<sup>1</sup> Multiple dwelling unit

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**APPENDIX – B**

**From:** Abbie Mathew  
**Sent:** Thursday, April 14, 2005 4:26 PM  
**To:** 'stds-802-15-3c@listserv.ieee.org'  
**Subject:** Link distance and MAC

Hello.

At a recent conference call on the channel model, we discussed if the outdoor links should be considered because 802.15.3c's objective is to develop a PAN PHY standard. We decided that outdoor links should receive consideration as applications were submitted in response to the CFA and no objections were made at that time. However, there was agreement on placing some limits on the link distance. Concern was expressed on the MAC efficiency with distance as it (the MAC) was developed for PAN applications.

Shown below are emails that have been exchanged on these issues. Please provide your comments. I have reviewed the applications made in response to CFA and found that the maximum range was 220 meters (the stadium application). I propose a maximum distance of 300 m because this translates to a transit time delay of 1 micro second – a nice round number to work with.

Thanks.

-Abbie Mathew-

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**From:** James P. K. Gilb  
**Sent:** Friday, April 08, 2005 3:43 PM  
**To:** Abbie Mathew  
**Cc:** Bruce Bosco  
**Subject:** Re: 802.15.3 MAC

Abbie

The keys to MAC efficiency are as follows:

**Guard time due to clock inaccuracies:** A certain portion of the superframe is taken up by guard times in-between CTAs. Currently we calculate it only from the ppm allowed for the crystals. It might be advisable to add the one way trip time to the guard time just to make sure transmissions are not stepped on.

**SIFS, MIFS and backoff slots:** All of these use zero transit delays in their calculations. However, these are dependent on the PHY, so the only answer here is to make them as short as possible without adding excessive cost. Obviously, the SIFS cannot be any shorter than twice the transit time, whereas the MIFS should be unaffected. I would expect that the backoff slot will only be affected to the extent that the SIFS is affected.

You can find a discussion of all of the effects of propagation times and delays in IEEE Std 802.11-1999 in subclause 9.2.10, page 84.

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Despite all of this effort to precisely define all of these parameters, you will find in the PHY sections, e.g., 15.3.2, that they only define the top level ones and leave the rest as implementation dependent.

Most likely, the air transit time will be secondary to the other delays in determining the throughput. The PHY Preamble, for example, can be pretty long, i.e. 10x the transit delay, so you should probably worry about those first.

James Gilb

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**From:** Abbie Mathew  
**Sent:** Friday, April 08, 2005 9:14 AM  
**To:** James Gilb  
**Cc:** Bruce Bosco  
**Subject:** 802.15.3 MAC

Hi James,

At the last conference call on the channel model, we discussed the effects of distance on the MAC efficiency. Hope you can guide us as we sort through a number of MAC related issues.

Consider a point-to-point link where distance is 300 m. This translates to a transit time delay of 1 micro-second. Assuming that the MAC overheads can be trimmed (because there is no contention), we are trying to understand how the MAC behaves at this distance. What structures within the MAC are sensitive to the transit delay? How will the MAC inefficiencies manifest?

Thanks.

-Abbie Mathew-

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**APPENDIX – C**

From: Brian Gaucher  
Sent: Saturday, April 09, 2005 7:57 AM  
To: Abbie Mathew  
Subject: Re: Antenna and channel model

Hello,

I would like to add my view as well. I think that the 60 GHz band has to be looked at with growth in mind. First, as a simple single antenna omni system, but secondly, given the very nature of 60GHz allowing high-levels of RF integration, we need to consider a future that will have multiple antennas as part of our designs. Today there exists co-designed silicon/antenna/package hardware with all these elements, suggesting that multiple elements maybe used together as in .11n, or in more simplified beam forming networks. So I think the channel model must take into account the antenna type. Both types of data are needed, omni and directional. I envision that we will roll out both types of links in varying levels of complexity as we ratchet up in data rate. So, omni directional data collection is critical is as critical as directional data, since as you have already stated, we loose significant information in just directional data collection.

Thank you,  
Brian

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**From:** Abbie Mathew  
**Sent:** Wednesday, March 30, 2005 4:46 PM  
**To:** Emami Shahriar; Su-Khiong Yong  
**Subject:** RE: AOA

Gentlemen,

I talked to an acquaintance involved in the .11n. They have considered the antenna in the channel model because MIMO is the heart and soul of .11n. As I recollect, 'directional antenna' found its way into the PAR to show that we are not limited to omni-directional antenna. Note that 802.15.3 MAC supports omni-directional antenna. This is why I am on the fence. I agree with you that more investigation is required. I will bring this up at the next conference call.

-Abbie-

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**From:** Emami Shahriar  
**Sent:** Wednesday, March 30, 2005 12:10 PM  
**To:** Abbie Mathew; Emami Shahriar  
**Cc:** 'Su-Khiong Yong'  
**Subject:** RE: AOA

To answer the question, I think we should review the requirement and the channel modeling documents of 11.n, since they had similar if not exact same issue. I agree with Su-Khiong's suggestion to try to get input from other task group members as well.

Shahriar

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**From:** Abbie Mathew  
**Sent:** Wednesday, March 30, 2005 6:55 AM  
**To:** Shahriar Emami  
**Cc:** Su-Khiong Yong  
**Subject:** RE: AOA

Shahriar,  
Your thoughts on this?  
-Abbie-

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**From:** Su-Khiong Yong  
**Sent:** Tuesday, March 29, 2005 8:40 PM  
**To:** Abbie Mathew; Shahriar Emami  
**Subject:** Re: AOA

Hi!

Yes you are right, the antenna effects have to be separated from the channel models. Since I am a newcomer to 3c, I am not sure whether the TG3c anticipates the use of antenna arrays (Maybe we need to clarify this). If that is the case, AOA is a must. Nevertheless in the PAR, I understand that TG3c supports the use of directional antenna which will have significant difference in the delay domain compared to omni-directional counterpart. Other issues which are not part of the channel modeling work need further consideration. Perhaps, we should forward this email to other members in the group to get more inputs.

Thanks

Regards,  
Su-Khiong

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----- Original Message -----

**From:** Abbie Mathew  
**To:** Shahriar Emami ; Su-Khiong Yong  
**Sent:** Wednesday, March 30, 2005 7:14 AM  
**Subject:** AOA

Gentlemen,

Need a clarification from you.

We discussed yesterday for the need to gather information on AOA. As we are only dealing with the channel model, this assumes that the antenna effects have to be modeled separately. I understand that 802.15.3 MAC assumes omni-directional antenna. If these statements are true, should we gather information on AOA?

Thanks.

-Abbie-