IEEE P802.15
Wireless Personal Area Networks

Project	IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)	
Title	**Minutes of the conference call on the channel model**	
Date Submitted	[27 April 2006]	
Source	[Abbie Mathew] [NewLANS, Inc.] [43 Nagog Park, Suite 200], [Acton, MA 01720, U.S.A.]	Voice: [+1-617-283-1363] E-mail: [amathew@newlans.com]
Re:	[Minutes of the conference call – TG3c Channel Model Subgroup]	
Abstract	[]	
Purpose	[]	
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Date

The 43rd conference call was held at the times listed below.

Los Angeles	April 27	Thursday	8:00 PM
Boston	April 27	Thursday	11:00 PM
Moscow	April 28	Friday	7:00 AM
Seoul, Tokyo	April 28	Friday	Noon
Canberra	April 28	Friday	1:00 PM

Participants

1	Alexei Davydov
2	Zhiguo Lai
3	Alexander Maltsev
4	Hirokazu Sawada
5	Abbie Mathew
6	Ali Sadri
7	Hirokazu Sawada
8	Su-Khiong Yong

Issues Discussed & Action Items

a) Su-Khiong gave an update on the IBM measured data. Shahriar has contacted the authors of the IBM data for separate LOS and NLOS measurements. As the authors have moved on to different projects and different companies, a delay in their response is expected. There was some discussion on how much to wait for their response. It was agreed that the time allocated would be comparable to that allocated for the UMass to submit their analysis.

b) Su-Khiong then gave an update on the France Telecom measured data. He reviewed the contents in APPENDIX – A. The France Telecom team will provide both the path loss and the SV model temporal information in Jacksonville.

c) Sawada-san reviewed the contents in APPENDIX – B. NICT will submit an updated 2-path model in Jacksonville, and it will contain results and justification that will link 2-path model with SV model.

d) Alexander reviewed the contents in APPENDIX – C. He proposed using a ray tracing method to resolve the ambiguity relating to the angular information. This lead to the discussions if this approach would resolve the ambiguity. We ran into the one-hour time limit and decided to continue this discussion at next conference call.

Next Conference Call

The next conference call will be at the following times.

Los Angeles	May 1, Monday	8:00 PM
Boston	May 1, Monday	11:00 PM
Moscow	May 2, Tuesday	7:00 AM
Seoul, Tokyo	May 2, Tuesday	Noon
Canberra	May 2, Tuesday	1:00 PM

The dial-in phone number and the access code are + (641) 985-8000 and 657719# respectively.

Agenda

The agenda will be as follows.

a) Continue the discussion on Alexander's presentation
b) Lai's UMass measurement presentation
c) Discussion on the measurement table – we will pick up where we left off two weeks ago

APPENDIX – A

From: Su-Khiong Yong [mailto:su.khiong.yong@SAMSUNG.COM]
Sent: Tuesday, April 25, 2006 11:26 AM
To: STDS-802-15-3C@listserv.ieee.org
Subject: [802.15.3C] FT's Channel Model Contribution

Hi All,

After my conversation with the members of the France Telecom (FT), the following issues were agreed in order to integrate FT's contributions to the framework of TG3c.

Path Loss (PL)

1) PL models which with antenna gains removed will be provided to emulate the omni/widebeam antenna setups. This model will be useful for the link budget analysis.
2) PL models for narrowbeam antenna will be provided since when narrowbeam antennas were used the PL exponent could be very much difference.

SV model temporal information

1) Currently the FT's results were in the form of tapped delay line and FT will re-analyse the data to derive set of parameters for the SV model such as cluster decay rate, time between successive clusters and number of cluster from the proposed tapped delay line models.

AOA information

1) Results will be given in terms of the azimuth spread of the channels. However, no distribution will be proposed. The parameter AS given can be integrated into the model proposed by other contributors. The parameter ASs are already given in their contribution back to the Hawaii's meeting .

Doppler variations

1) Link level propagation channel models have to consider time variations of the channel. These variations may result from the environment time variability due to the motion of obstacles and mulipath combination. FT propose to provide typical Doppler Power Spectrum Density shapes associated with every tapped delay line models.
In a interpolator-decimator filering processing applied to an AWGN process, the Doppler Power Spectum Density shall be simply implemented in simulations to generate approriate time variations of the channel in connection with the interest scenarios as defined in the group.

They will be trying hard and hopefully to finalize the first two issues before Jacksonville's meeting next month.

BR,
Su-Khiong

APPENDIX – B

From: Yozo Shoji [mailto:y-shoji@ieee.org]
Sent: Wednesday, April 26, 2006 3:19 AM
To: STDS-802-15-3C@listserv.ieee.org
Subject: [802.15.3C] Fwd: Re: [802.15.3C] Reply to Su-khiong Yong comments no.2

Dear Sirs,

As a response to kind Dr. Su-Khiong Yong comments referring below, I'd like to describe some comments in advance of conference call, but these will be supported by Sawada-san and Chang-Soon Choi tomorrow.

1. In what cases 2-path model is dominant?

Most likely cases when 2-path model is dominant is when devices are trying to communicate on a flat desk and there is no obstacles between them. But even in some other cases where the transceivers are surrounded with high reflection material, we can observe the 2-path dominance.

The 2-path becomes more dominant when devices use directional antennas because many scattering components are removed at the receiver directional antenna.

2. Why or How it leads to worse case scenario

In the condition where 2-path model is dominant, the time difference between 2-path, Dt, generally results in coherent bandwidth 1/Dt.

In a short range communication on a desk, the coherent bandwidth tend to be really broadband since Dt is really short time. The problem is 2-path can cause interference with each other andunexpectedly cause serious fading as presented in 06/109.

In fact, the broadband coherent bandwidth means broadband flat fading
can occur at worst case.

3. How to merge 2-path model with SV-model

As Dr. Su-Khiong Yong kindly pointed out to us before, there is a critical
concept difference between 2-path model and SV-model. I believe his comment was like this.

2-path model is a deterministic model whose characteristics can be critically determined or changed according to the position of the transceiver, whereas SV-model is probability model characterized by some parameters extracted from actually measured data.

We fully agree and understand that this will become a problem in merging process.

Actually, in our previous NOT-successful system demonstration, we experienced that under the condition where 2-path mode was dominant, the propagation condition, that is path loss,really sensitively changed according to the device position.

It was really hard to find the same position thatgave the same channel condition. This is because wavelength of 60GHz is just 5mm and just moving roughly the device by 2.5mm rotates the received signal phase by PI.

From these our real experience, we reached to a kind of idea to introduce a probability function into the conventional too simplified 2-path model by handling uncertainty about the receiver position.

It's our great pleasure if we are given a chance to make a presentation about this method.

Thank you.
Sincerely,

APPENDIX – C

Statement on the ambiguity in the IMST data:

We agree that IMST data sources have ambiguity relating to the angular information.

We will be able to remove this ambiguity explicitly for two positions when two dimensional measurements are available.

For other positions we can only evaluate the real angle of arrival for clusters by exploiting some simplified geometry-based ray-tracing model.

But I would like to remind that our Channel Model Subgroup is going to create a Statistical Channel model. I hope everybody from our team agree with this. The Statistical Channel model should provide good approximate description of the real wireless channel for indoor environment.

The majority of the subgroup are sure that the Statistical Channel model should be based on Saleh-Valenzuella (S-V) Model with Angle-of-Arrival extension. Our goal now to extract and estimate all needed parameters (distributions) for this Statistical Channel Model for all environments.

Let's review main needed parameters:

1. cluster arrival rate (cluster distribution in time domain)
2. ray arrival rate (statistics of rays inside a cluster)
3. cluster decay factor
4. ray decay factor
5. ray AoA distribution inside of a cluster (type of distribution and main parameter-standard deviation)
6. time and angle statistical dependence for rays inside of cluster (if needed)
7. cluster AoA distribution (type of distribution and main parameter standard deviation)
8. time and angle statistical dependence for clusters

It is obvious that for all these parameters except the last two the ambiguity in IMST data sources is not essential.

Moreover, we will be able to use all IMST data for estimation of the parameters of two last distribution functions **if the type of these functions will be determined from NACT data explicitly**.

In this case we will be able to estimate needed parameters of the distribution functions (in ##7, 8) from INST data simply taking into account the angle ambiguity.