TSG-RAN Working Group 4 (Radio) meeting #5
Miami 14th – 16th June 1999

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Agenda Item: 5.1

Source: AH 01 chairman[1]

Title: Report from AH 01

Document for: Discussion and decision

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1. INTRODUCTION

This document shows the status of AH 01 (Test parameters for receiver BB tests).

2. PURPOSE OF LINK LEVEL SIMULATIONS

In the last meeting, it was agreed that AH 01 is also responsible to coordinate link level simulations that are needed for conformance testing.

Many operators have required that capacity simulations and link-budget simulations for WCDMA system are needed. The big question is which WG will make this work. **RAN4 chairman** has stated his opinion that these simulations are out of the scope of 3GPP. However, at least **Omnitel** thinks that these simulations belong to RAN4 as well.

This is the major item to be solved and may solve some disagreements in defining propagation conditions for multipath fading environment. Thus it is essential that this item will be discussed in RAN4 plenary before going any further in defining propagation conditions for multipath fading environments.

3. MULTIPATH FADING ENVIRONMENT

In the last RAN4 meeting 10th-12th of May, proposal for Multipath Fading Environments (Section 10 in R4-99191) was not accepted. AH 01 got an mandate to get a common agreement about multipath fading channels.

Since last meeting active discussions have been taken place in the RAN4 email reflector. This section shows the results of these discussions. However, it should be noted that opinion's of different parties, which are stated in section 3.1, are related very much to their understanding of the purpose of link level simulations.

3.1 Discussions in reflector

There were some worries that the fading profiles with only integer chip periods of delay would not identify some performance problems. However, it was commented that dynamic channel models, which have been already accepted in RAN4, include already noninteger chip positions. Therefore, possible performance problems would be identified in tests with dynamic channels and hence it is not necessary to duplicate testing of this phenomena.

One additional problem was discovered i.e., measurements shall be done with fade simulator, which is capable to tune delays with steps of 25 ns or lower. When this requirement is fulfilled, the impact of inability to place a tap exactly to its predefined position on results is negligible.

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Lucent Technologies' opinion is that there is not much point in making the propagation condition similar to a real one, for two reasons:

1) This propagation condition would only occur for a very small proportion of time 2)

2) As a result, you would need to test a large number of cases to ensure that the equipment worked in all real environments.

Lucent Technologies also mentioned that there is no point defining a propagation condition for testing unless it can be simulated to determine the performance requirements. However, ease of simulation should be with low priority.

Sharp Labs stated that there is a need to enhance the propagation conditions for longer tap delays to reflect higher antenna deployments in hilly terrains, etc. They said that 20 μs is used in M.1225 so that number could be introduced in channel models adapted in RAN4. They think that using the modified M.1225 as a base is a very good suggestion, but we should consider if any simplifications can be made.

Nokia suggested that the delay of the 3rd tap of the case 2 in R4-99191 could be extended to be 20 μs as recommended by Sharp. It was stated that this change might reveal some additional receiver design flaws. Nokia also stated that it is not necessary to have longer delays in other propagation conditions, since it would not reveal any new design flaws.

Ericsson favors the models in R4-99191 and they see no reason to extend the delay in multipath fading channels, since this case is already covered in dynamic moving channel (Tap separation is between 1 - 11 μs in moving channel model). Also they think that a tap with the same strength as the first tap with 20us delay is quite rare.

Telia prefers as long delay profiles as possible due to topography with waterways, so Telia prefers the model with the last tap at 20 μs and equal power. They are also proposing to have the longest tap at ca 60 μs (equal power) as the worst case corresponding to some areas in Norway and Sweden.

Telenor thinks that modified ITU models should be used in RAN4. Also they think that "modified Vehicular B" model should be used in RAN4. By doing so, the channel models used by 3GPP would also have major characteristics corresponding very well to the models proposed by ITU, and they would, as they see it, be very well aligned with requirements from ITU. Telenor opinion is that 'Modified' ITU-models, with non-deterministic variations of delays, are needed in order to test 'system level' performance (link-budget, capacity, handover, etc) of the UE under conditions that are likely to be experienced in several regions, countries and deployment areas.

They think that the new proposed 'channel models' from NOKIA from their point of view : 1) are not justified by measurement campaigns 2) does not reflect a realistic multipath propagation condition 3) will be looked upon with skepticism in ITU-R. However, Telenor adds that there needs to be a propagation model that is testing RAKE-receiver to test any aspect of the functionality of the RAKE-receiver and combination chain.

Comments or indications of channel model preferences with detailed suggestions were not received from other parties.

Table 1 shows the different proposals and the companies who are supporting them. Details of each channel model proposal are described in Annex A. As can be seen, only a few companies have stated their preferred channel models and no consensus has been received. It seems that proposals based on R4-99191 (Options 2 and 3) are getting slightly more support than other proposals.

Table 1. Channel model proposals and support for them.

	Option 1 (Modified ITU models)	Option 2 (Models in R4-99191)	Option 3 (Modified R4-99191 models)
Ericsson		X	
Nokia			X
Sharp Labs	X		
Telia			X
Telenor	X[2]		

4. REORGANIZING THE AH 01

In the last meeting, it was agreed that AH 01 is also responsible to coordinate link level simulations that are needed for conformance testing. Volunteer companies will make simulations. Link level simulations are needed for defining limits to performance measurements. As the scope of AH 01 was enhanced a lot, it was decided that reorganizing the AH 01 is necessary and thus each company tries to find possible participants, who volunteer to take responsible tasks in AH 01 organization.

It is recommended that WG4 plenary nominates a chairman and secretary (and preferably also vise persons) to this AdHoc. This is due to the fact that in future it is seen that many simulations need a person(s) to collect all results and combine them as document for information/decision in WG4 plenary.

Reorganizing should be done in this RAN4 meeting. At the same time the AH 01 title could be modified from "test parameters for receiver BB tests" to, for example, "link level simulations for conformance testing".

5. OPEN ISSUES

One issue what is recognized to be open is whether BER or FER should be used in performance measurements. This issue has not been discussed lately very much in AH 01, but Hewlett Packard, Nokia and Sharp have indicated their preferences i.e., FER should be used as a performance criteria for performance measurements.

T1 has sent LS to RAN1 and RAN4 requesting that clear definition for BER/FER are needed. Unfortunately RAN1 did not go through this LS in its last meeting in Korea. However this issue should be solved in this meeting if possible.

REFERENCES

[1] S25.101 v 1.2.0 “UE Radio transmission and reception (FDD)”.

[2] Also Vehicular B models and models for RAKE-receiver tests should be included

ANNEX A CHANNEL MODEL PROPOSALS

Option 1: Modified ITU channel models

Table A1 shows propagation conditions that are used for the performance measurements in multipath fading environment.

Table A1: Channel Models for multipath fading environment.

Indoor		Indoor to Outdoor and Pedestrian		Vehicular	
Relative Delay [ns]	**Average Power [dB]**	**Relative Delay [ns]**	**Average Power [dB]**	**Relative Delay [ns]**	**Average Power [dB]**
0	0.0	0	0.0	0	0.0
244	-9.6	244	-12.5	244	-2.4
488	-33.5	488	-24.7	488	-6.5
				732	-9.4
				976	-12.7
				1220	-13.3
				1708	-15.4
				1952	-25.4

Option 2: Models in R4-99191

Table A2 shows propagation conditions that are used for the performance measurements in multipath fading environment. All taps have classical Doppler spectrum.

Table A2: Propagation Conditions for Multipath Fading Environments

Case 1, speed 3km/h		Case 2, speed 3 km/h		Case 3, 120 km/h	
Relative Delay [ns]	**Average Power [dB]**	**Relative Delay [ns]**	**Average Power [dB]**	**Relative Delay [ns]**	**Average Power [dB]**
0	0	0	0	0	0
976	-10	976	0	244	-3
		2440	0	488	-6
				732	-9

Option 3: Modified R4-99191 models

Table A3 shows propagation conditions that are used for the performance measurements in multipath fading environment. All taps have classical Doppler spectrum.

Table A3: Propagation Conditions for Multipath Fading Environments

Case 1, speed 3km/h		Case 2, speed 3 km/h		Case 3, 120 km/h	
Relative Delay [ns]	**Average Power [dB]**	**Relative Delay [ns]**	**Average Power [dB]**	**Relative Delay [ns]**	**Average Power [dB]**
0	0	0	0	0	0
976	-10	976	0	244	-3
		20000	0	488	-6
				732	-9