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Agenda item:	7
Source:	Nokia
Title:	Recommended simulation parameters for Tx diversity simulations
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Summary:

As agreed in the AH26 meeting #1, the list of recommended simulations parameters to be used in Tx diversity simulations should be submitted as a formal contribution to R1 for approval. In this contribution, an updated list with further clarification of some of the parameters is provided.

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1. INTRODUCTION

As agreed in the AH26 meeting #1, the list of recommended simulations parameters to be used in Tx diversity simulations should be submitted as a formal contribution to R1 for approval. In this contribution, an updated list with further clarification of some of the parameters is provided.

2. RECOMMENDED SIMULATION PARAMETERS

Table 1 lists the simulation parameters that should be used in the Tx diversity simulations.

Table 1. Recommended simulation parameters for multiantenna Tx diversity simulations.

Bit Rate	12.2 kbps
Chip Rate	3.84 Mcps
Convolutional code rate	1/3
Carrier frequency	2 GHz
Power control rate	1500 Hz
PC error rate	4 %
PC Step Size	1 dB per antenna
Channel model(s) and UE velocities	1-path Rayleigh: 3, 10, 40, 120 km/h Modified ITU Ped A: 3, 10, 40 km/h Modified ITU Veh. A: 10, 40, 120 km/h
CL feedback bit error rate	4 %
CL feedback delay	1 slot
TTI	20 ms
Downlink DPCH slot format	#10 or #11
Min. # of RAKE fingers for modified Vehicular A channel	5
Target FER/BlkER	1 %
Geometry (G)	-3, 0 and 6 dB
Common Pilot	-10 dB total
Correlation between antennas	0
Performance measure	T_x E_b/I_{or}
CL feedback rate	1500 Hz

The following notes should be taken:

1. Definition of Tx E_b/I_{or}

E_b = The average energy per information bit as measured at the base station. Defined after CRC attachment but before channel encoding.

I_{or} = The total power density of the base stations in soft handoff with the mobile, measured at the base station

2. Definition of Geometry (G)

Geometry, G, is defined as:

$$G = \frac{average(R \quad I \quad)}{I \quad + \quad _o} \tag{1}$$

where,

$R_x\, I_{or}$ = The total power density of the base stations in soft handoff with the mobile, measured at the mobile station

I_{oc} = The interference power density at a mobile due to all the base stations not in soft handoff with the mobile

N_o = The termal noise power spectral density

3. Power control step size

The power control step size is 1 dB per antenna. This means that when up/down command is received the tranmitter increases/decreases the T_x power per antenna by 1 dB which also results in 1 dB increase/decrease of the total T_x power.

4. Modeling of downlink channels

The only common channel modeled in downlink is the CPICH. The detailed implementation of the CPICH can vary but the total power allocated to it is 10 % of the total T_x power of the BS. This 10 % allocation needs to be valid only in the beginning of the simulation, i.e. the CPICH total power is kept fixed during the simulation. Thus, the change of the user signal power due to power control does not affect the total CPICH T_x power.

5. Modified ITU channel models

As all of the path delays of the ITU channel models will not be multiples of the the length of one chip the channel models will be modified. In case a path (ray) is between two channel delay samples, the following modification will be done:

- The ray is split into two rays, one to the sample to the left and one to the sample to the right. The power of these new rays is such that the sum is equal to the original power, and the power of each of the new rays is proportional to the (1-normalised distance to the original ray). Finally, the power of all rays on one sample are added up and normalised to yield total channel power of 1.

Consider the example shown in the Figure 1. In this case a path of power *P* located between two delay samples (T_c = length of a chip in time) is split to two separate paths with power 0.75*P* at delay sample *k* and power 0.25*P* at delay sample *k*+1.

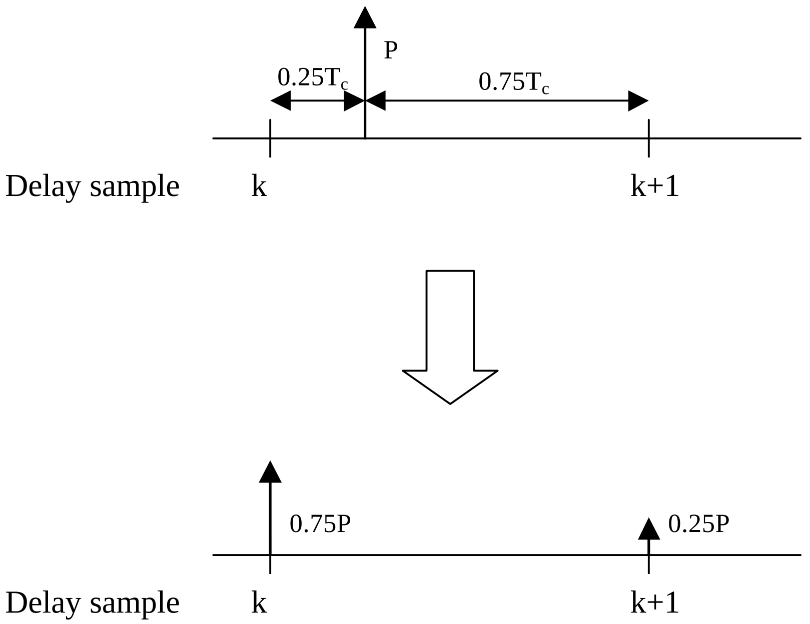

Figure 1. Example of a modification of one path.

6. Number of RAKE fingers

As the ray splitting technique leads to a high number of channel taps in case of Vehicular A channel the minimum number of RAKE fingers that should be used in simulations has been set to 5.