Agenda Item:

Source: Siemens

Title: Simulation parameters for Tx diversity simulations using correlated antennas

Document for: Approval

Introduction

For Tx diversity simulations using correlated antennas a channel model was introduced in [1]. This model is described by a covariance matrix R corresponding to an assumed propagation environment (angular spread) and antenna configuration. The derivation of the covariance matrix from the propagation environment was shown in section 3 in [1]. One parameter set was already given in [1] by Eqn. (7). However, an additional parameter set was requested in the discussion at the last AH 26 in Berlin (WG 1 #15).

This set is now added, which leads to a total of 3 scenarios for the simulations as shown below. The simulation parameters were chosen to represent realistic scenarios.

For the definition and derivation of the covariance matrix R please refer to [1]. The definition of the path models (modified Ped A, modified Veh A and 1-path Rayleigh) can be found in [2]. In general all other parameters are the same as in [2].

1. *Macro cell (rural area)*

- Planar waves with power uniformly distributed on an angular region of 10° and centered around 75°
- The covariance matrix corresponds to (see [1]):

$$R = \begin{pmatrix} 1 & a & b & c \\ a^* & 1 & a & b \\ b^* & a^* & 1 & a \\ c^* & b^* & a^* & 1 \end{pmatrix},$$
where $a = 0.97\,e^{-j0.8}$, $b = 0.94\,e^{-j1.6}$, $c = 0.88\,e^{-j2.4}$

- For the delay path two options are possible:
  1a) modified Veh A
  1b) 1-path Rayleigh

Note: This is the parameter set which has been added.

2. *Micro cell (urban area)*

- Planar waves with power uniformly distributed on an angular region of 45° and centered around 60°
- The covariance matrix corresponds to (see [1]):

$$R = \begin{pmatrix} 1 & a & b & c \\ a^* & 1 & a & b \\ b^* & a^* & 1 & a \\ c^* & b^* & a^* & 1 \end{pmatrix},$$
where $a = 0.7\,e^{-j2.2}$, $b = 0.1\,e^{j1.2}$, $c = 0.2\,e^{-j3.0}$

- The modified Ped A model is used for the delay path.

Note: This is the parameter set of Eqn. (7) of [1].

3.   *Pico cell (urban area)*

- Large angular spread
- This is the uncorrelated case (the "regular" TxD parameters as in[2]) and the covariance matrix corresponds to

$$R = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}.$$

- The modified Ped A model is used for the delay path.

References

[1]   Siemens, "Channel model for Tx diversity simulations using correlated antennas", Tdoc R1-00-1067

[2]   Nokia, "Recommended simulation parameters for Tx diversity simulations", Tdoc R1-00-0867