

3GPP TSG RAN1 #85

Nanjing, China, May 23 - 27, 2016

Agenda Item: 7.2.3.2

R1-165354

# **WF on further enhancements for spatial consistency**

Ericsson, Intel, AT&T, ETRI, Huawei,  
HiSilicon, KT Corporation, Nokia, NTT  
DOCOMO, Qualcomm, Samsung

# Background

- Spatial consistency modelling has been agreed in R1-163475/R1-161726
  - Includes the following:
    - » “Proposal 4: If **soft LOS/NLOS and soft indoor/outdoor state** is modelled, introduce soft LOS/NLOS state and soft indoor/outdoor state to describe the transition regions between LOS/NLOS and indoor/outdoor.”
  - It should be clarified whether soft states are included in the model

# Proposal

- Proposal 1: Soft LoS states are modeled in spatial consistency modeling
  - Soft LoS state is a float number between 0 (NLoS) and 1 (LoS)
  - Soft LoS state generating method is according to the appendix
    - »  $d_{LoS}$  is [20]
  - Define path loss and channel matrix to be a function of soft LoS state
    - »  $PL(LOS_{soft}) = PL_{LOS} \cdot LOS_{soft} + PL_{NLOS} \cdot (1 - LOS_{soft})$
    - »  $H(LOS_{soft}) = H_{LOS} \cdot \sqrt{LOS_{soft}} + H_{NLOS} \cdot \sqrt{1 - LOS_{soft}}$
  - Note: Not restricted to mobility simulations only
- Proposal 2: Soft indoor/outdoor states are not modeled in spatial consistency modeling
  - Note: The model thus doesn't support move between indoor/outdoor states in mobility simulation

# Appendix: generating soft LOS/NLOS

- A spatially consistent Gaussian number  $G$  with autocorrelation distance  $d_{LOS} = 50\text{m}$  is generated. This is combined with a threshold value  $F$  determined via

- $F(d) = \sqrt{2} \operatorname{erf}^{-1}(2P_{LOS}(d) - 1)$
- Here  $d$  is the distance and  $P_{LOS}(d)$  is the LOS probability function. The soft LOS state is determined by a function approximating knife-edge diffraction:

- $LOS_{soft} = \frac{1}{2} + \frac{1}{\pi} \arctan \left( \sqrt{\frac{d_{LOS}}{\lambda}} (G + F(d)) \right)$

