Title:	Complexity issue of the current SCM model
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1   INTRODUCTION

The aim of this document is to emphasize on the awareness of the members of the SCM group on the complexity issue engenders by the current SCM model, as a follow up to the previous contributions [1] and [2] regarding the complexity issues.

2   SYSTEM SIMULATION LOAD

It is acknowledged that the specified propagation environment makes sense from a physical point of view, and most of the effects that are included in the current SCM model have earlier been confirmed by various field measurements. Nokia's primary concern is not whether the model is correct from a physical point of view, but rather related to the complexity of the model and consequently the applicability of the SCM model for system level simulations.

The proposed propagation model is extremely detailed and complex compared to the accuracy of typical system level simulators (symbol, slot, TTI,.. –accuracy), and this raises some concerns related e.g. to its implementation complexity, simulation time, AVI table generation (if needed), etc. When comparing the SCM proposal to the system level scenarios specified for HSDPA in 3GPP for a single SISO scenarios, then it become obvious that the complexity of the SCM model might become a potential problem.

We suggest that the SCM group carefully investigate the complexity of the proposed MIMO model and address the issues listed in the following bullet points. Here is a non-exhaustive list of potential issues from SCM-111:

- For every channel realization, the RMS delay spread (DS) is determined by a random variable (page 19 Line 1) with a certain probability density function (pdf). The delay of each path is furthermore determined by random variables. This implies that the power delay profile (PDP) will be different for each BS-UE connection or drop. Why not just simplify the SCM model, so one can only select Ped-A and Veh-A ? This is a reasonable assumption, which is commonly used.
- Similarly, the azimuth spread (AS) for each connection is also modeled with a random variable (page 18 Line 36). It is not clear whether this is actually needed. In general the use of random variable to model the AS, DS, AoA, AoD, path-delay, etc, for every BS-UE connection requires that each simulation consists of a large number of drops to ensure that there is sufficient statistics hence generating long simulations! It would be much simpler if the AS, DS, PDP were fixed as is typically done in today's system simulators, where for instance it is assumed that all BS-UE connections are experiencing a Ped-A or Veh-A PDP.
- Simulation of the fast fading in the SCM model might potentially also become very complex because every UE is experiencing a different Doppler spectrum, since the AoD at the UE is modeled with random variables. This may result in very long simulations.
- The method describing the generation of the channel coefficient, in section 3.4 on page 22, makes sense, however, it is a very complex and cumbersome approach compared to other methods already accepted in TSG RAN1 for link level especially that in page 16 Line 1 to 3 it is clearly stated that a the AS, DS LN shadowing among others should be fixed for one drop.

3   CONCLUSION

So far only contributions [1] and [2] have raised the issue of the SCM model complexity. Their seems to be no evidence that the current version of the SCM model could be implemented and simulated within reasonable time so that companies who are eager to get fast MIMO results would use this SCM model.

We would like to address SCM group to provide a "simplistic" model, which should be widely accepted and used in the same philosophy than the TSG R1 #23 R1-01-1179 proposal for link level simulations.

4   REFERENCE

[1] SCM-046, "Complexity issues in system level channel modeling", Nokia

[2] SCM-059, "Computational Load of Channel Simulation", Nokia.