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Title:	Computational Load of channel simulation
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1. INTRODUCTION

The aim of this document is to provide some insight into the computational load of online channel generation in system level simulations, as a follow up to previous contributions regarding complexity issues[1].

2. SYSTEM SIMULATION TIME

The computational load of generating channel realizations is a significant portion of the system level simulations. This fact is illustrated below with the help of Figure 1. The times were obtained from a sample forward link system simulation using the methodology employed in 3GPP2 for Release C[2]. The relevant simulation parameters are listed below:

- 19 cells, 3 sectors per cell.
- 120 mobiles.
- 2 transmitter antennas for each base station.
- 1 receiver antenna for each mobile.
- Channel from desired mobile is modeled fully using models A-E. The average number of paths per antenna is 2.7.
- Channels from interfering BS sectors (56 in total) modeled as 1 antenna flat Rayleigh.
- Jakes model with 8 oscillators for each Rayleigh path.

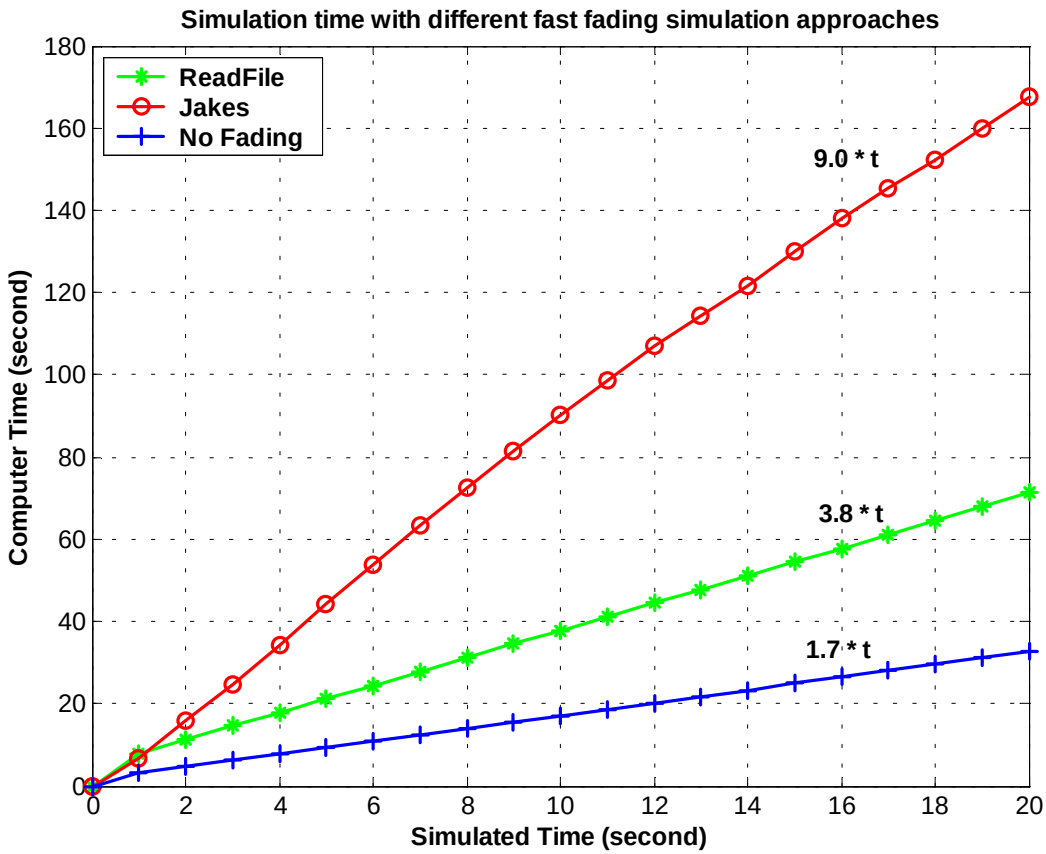
The ratios of the simulation times for the three different scenarios are more important than the actual simulation times. It can be seen that there is a 2.5 factor of increase from generating the channel model online, as opposed to reading the channel coefficients from a file.

3. EFFECT OF NEW METHODOLOGY

With the advent of the new methodology, generating the channel coefficients online will pose further challenges with regard to computational load. The most significant multiplicative factors that will increase this load are

1. The number of transmitter and receiver antennas
2. The mean number of paths for each Tx-Rx link.
3. The interference modeling strategy: As pointed out in the previous section, the interference has been modeled as a single antenna flat Rayleigh fading channel in

previous simulation methodologies. But if the spatio-temporal aspect of interference is modeled, then the complexity will increase proportionally.



4.

Figure 1.

4. REFERENCES

[1] Nokia, SCM-046, "Complexity Issues in System Level Channel Modeling", August 2002.
[2] WG5 Evaluation AHG, "1xEV-DV Evaluation Methodology – Addendum(V6)", July 2001.