Clarification of the 'OPNET NS-2 Comparison' Paper with regards to OPNET Modeler

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We would like to clarify some points arising from the paper G. Flores-Lucio, M. Paredes-Ferrare, E. Jammeh, M. Fleury, and M. Reed,"OPNET-Modeler and NS-2: comparing the accuracy of network simulators for packet-level analysis using a network testbed", in Proceedings 3rd WEAS Int. Conf. on Simulation, Modeling and Optimization (ICOSMO 2003), vol. 2, pp. 700–707, Crete, October 2003.

- The conclusions of the paper should be interpreted as being favorable to OPNET Modeler. We certainly intend to continue to use OPNET Modeler for our research.

- This paper focused on the accuracy of two different network simulators, and the paper concludes with "It was found that OPNET Modeler was more accurate....". The conclusions relate to the words in the title of the paper "Accuracy for Packet-Level Analysis using a Network test bed". We did not intend to perform a comprehensive test of all the simulator features. Words to that effect form the concluding paragraph of the introduction. Both simulators were, in the first instance, compared to a network test bed and not necessarily to each other. The test bed set-up is typical of those used in other papers and cannot mimic an actual network with all its complexity.

- We would also like to mention that comments in the discussion section are simply "discussion"

- At the time that the work was carried out and the paper submitted we had to pay for the OPNET Modeler software. However, since submitting the paper OPNET have pointed out that OPNET software is free for academic research and teaching. Students/institutions may also choose to purchase technical support. NS-2, albeit free, does not offer a technical support program. Both OPNET Modeler and NS-2 model code is "open source" in the sense that models can be added and existing models can be modified. Unlike NS-2, OPNET Modeler simulation kernel code is not open source.

- The goal of the paper was to study the accuracy of both simulators compared to a real test bed, not to compare the speed of both simulators. Based on our experience, simulation speed is dependent on model source code. It would therefore be unfair to compare two models that are not coded identically.

- We clarify that the nature of the simulation has nothing to do with the trace file. The latter is simply an input to the system. In our case, the same trace file was used with both simulators.

- We used a simple network test bed in order to make a 'ground truth' comparison. Comparison with a more complex network test bed awaits a study by somebody else. We could have taken a large number of measurements with different seeds. Our paper is aimed at those researchers who do not use this procedure.

- To clarify the point that OPNET Modeler is "a finite state machine model in combination with an analytical model", we would like to mention that NS-2 is a discrete event driven simulation tool. However, in OPNET Modeler, discrete event simulation is only one type of simulation that the software can perform; the other two types are Flow based / Analytical and hybrid simulation

- In our original paper, we mentioned NAM, NS-2's animation tool but we did not discuss OPNET Modeler's animation tool. We did not explore this tool in our study.

- We agree with OPNET Tech. Inc. that there is an inconsistency in the NS-2 CBR output, which is not present in OPNET Modeler. We are not in the business of explaining such inconsistencies, as this would require detailed knowledge of the source code of each simulation kernel.

- In Section 3's description of the three techniques, technique 1 should read: "OPNET ACE or flow analysis tool" i.e. there is a typo with the word 'or' – it was omitted.

- We clarify that the collection mode of the statistics in all cases was by means of *tcpflw*. We did not use OPNET's native statistical packages. This would have been unfair since NS-2 relies on external statistical tools.

- We did not use flow analysis for the comparisons in the paper. OPNET points out that their Flow Analysis module is appropriate for this purpose had we made this comparison. The reader should check the presence or non-presence of flow analysis in NS-2. OPNET Tech. Inc. also points out that Flow Analysis and the ACE module are currently both available for university teaching and researcher, free of charge with optional discounted technical support if needed.

- Our experiments were conducted with the most recent available versions of the software at the time of the paper submission, OPNET Modeler v. 9.0.A, as pointed out in Section 2.1. If we were to make future comparisons we would use the most recent available version, currently version 10.0.