

On the Scope of Test Bench Development for IEEE 802.11-Based WLAN Models Verification

Vitaly Petrov, Sergey Andreev
Tampere University of Technology
Tampere, Finland
{vitaly.petrov, sergey.andreev}@tut.fi

Maxim Egorov
Yaroslavl State University
Yroslavl, Russia
max.egoroff@gmail.com

Abstract

The IEEE 802.11 (WiFi) is now the de-facto standard for the overwhelming majority of Wireless Local Area Networks (WLANs). Up to now, many different 802.11 models, including channel models, stack models and traffic models, were proposed to estimate the protocol characteristics [1]. Almost all of them are based on the network simulation in MATLAB [2], OPNET [3], ns-2 [4] or other packages. Unfortunately, some assumptions made by the simulator developers do not come to the standard. Moreover, WiFi card vendors may add proprietary algorithms in order to provide better characteristics for customers. Therefore, the model verification with the real hardware is topical.

To obtain this, a test bench development, where each and every client could be a senders, a receivers, or sender and receiver simultaneously, was proposed in [5]. Using this test bench, different types of traffic (TCP, UDP, VoIP, Video, etc...) could be generated in both saturation or not. The traffic analyser provides the possibility to estimate major network characteristics, such as throughput, delay, collision probability, etc... However, the accurate experiments require access to the system parameters (such as Packet Error Trace (PET) and packet arrival time) and several changes in the client wireless card behaviour. In particular, the manual rate control scheme should be enabled and the number of attempts to send a single packet should be set to 1 [6].

To perform this, a Linux PCs and laptops with ath9k [7] open-source WiFi driver installed were used. And a manual rate control for this driver with several extensions was developed. The usage of a test bench helps in verification, refinement and harmonisation of the existing IEEE 802.11 models.

Index Terms: 802.11, WiFi, Test Bench, ath9k, Driver Modification, Rate Control, Model Verification.

REFERENCES

- [1] L. de Sousa, "MAC Regenerative Analysis of Wireless Ad Hoc Networks," *Tampere University of Technology, M. Sc. Thesis*, 2010.
- [2] MathWorks Inc., "MATLAB overview," <http://www.mathworks.se/products/matlab/index.html>.
- [3] OPNET Technologies Inc., "OPNET official web page," <http://www.opnet.com/>.
- [4] "The Network Simulator - ns-2," <http://isi.edu/nsnam/ns/>.
- [5] V. Petrov, S. Andreev, "Test Bench Development for IEEE 802.11-based WLAN Performance Evaluation and Measurements", *Proceedings of 10th Conference of Open Innovations Association FRUCT*, 2011.
- [6] K. D. Huang, D. Malone, and K. R. Duffy, "The 802.11g 11 Mb/s rate is more robust than 6 Mb/s", *IEEE Transactions on Wireless Communications*, 2011.
- [7] "The ath9k Project Homepage," <http://linuxwireless.org/en/users/Drivers/ath9k>.