A Demonstration of a Management Tool for Assessing Channel Quality Information in Wireless Testbeds*

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Abstract. The gradually growing need for testbed use so as networking algorithms to be validated in real environment, has given rise to optimal utilization of testbed resources. Towards this direction, we present a new management tool that is used for assessing channel quality information in wireless testbed deployments. NITOS Connectivity Tool retrieves data concerning link quality measurements, for providing testbed users with useful information about choosing nodes that occasionally satisfy the requirements (link quality, connectivity) needed, for their experiments. NITOS connectivity tool is a full-fledged managerial tool that exploits testbed utilization by letting testbed users have a complete view about testbed's nodes. This tool allows a more sophisticated way to optimally choose network resources of a testbed.

Lab's website: *"http://nitlab.inf.uth.gr"*[2]

This demo paper is related to the paper entitled *"Towards Maximizing Wireless Testbed Utilization using Spectrum Slicing"* accepted for publication on TridentCom 2010.

Keywords: Testbed, Management, Link Quality.

1 Introduction

A testbed experiment deployment needs node allocation that should satisfy certain topology and link quality requirements. Moreover, the erewhile link quality information gives a testbed user the advantage of properly evaluate the observed experiment/algorithm performance. Since NITOS testbed deployment is not RF isolated, the link quality between any pair of nodes may unexpectedly vary at any point in time due to external interference. For this reason the static distribution approach, that is used in RF isolated wireless testbeds[1][4], is not efficient

* The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement n^{o}224263.

T. Magedanz et al. (Eds.): TridentCom 2010, LNICST 46, pp. 615–618, 2011.

for these deployments. Therefore, there is a growing need for updated information in terms of densely measurements of link quality, that will bring in a long term, a more accurate channel quality estimation.

2 NITOS Connectivity Tool

In this demo, we will present a management tool for assessing channel quality information. The tool was developed for NITOS testbed and measures channel connectivity among wifi interfaces. NITOS is a wireless testbed, located in Volos, Greece with 15 nodes, each node equipped with two wifi interfaces. It is deployed on Computer & Communication Dept. University of Thessaly building. NITOS testbed topology is depicted on the left part of Fig. 1. Although the NITOS connectivity tool was developed on NITOS testbed, it can be adapted for use on any wireless testbed, with minor modifications. NITOS connectivity tool is a NITOS scheduler[3] part, which is used for resource allocation on NITOS testbed.

We have implemented NITOS connectivity tool, based on TLQAP [5], which is a protocol, that is used to assess interconnection topology and link quality by estimating packet delivery ratio (PDR) in downlink communication at each node's wifi interface for all requested channel, rate and transmission power combinations. Specifically, TLQAP builds a measurement history log and creates a channel utilization profile, and stores that information in a database that is used for link quality information retrieval by NITOS connectivity tool.

NITOS Connectivity Tool is comprised of three entities: a web interface, a database and a set of .dot scripts. The web interface is the interactive tool that an experimenter uses to choose testbed nodes for some time and it is depicted on the right side of Fig. 1. A user enters the NITOS Connectivity tool through NITLAB's wiki *http://nitlab.inf.uth.gr*. Now, the user has the ability to navigate through testbed's site and select *"Scheduler → Topology-Connectivity"* menu.

Fig. 1. NITOS Connectivity Tool

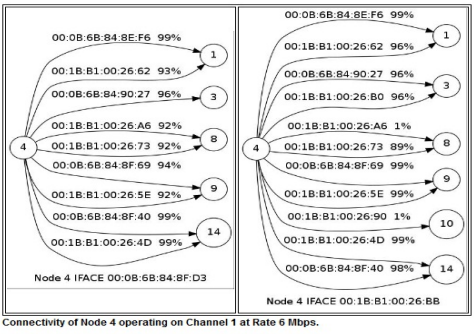

Fig. 2. Link Quality for node 4

Specifically, at first the user selects through web interface, by using a drop-down menu, a sender node that he/she wants to check and might want to use in testbed. Then the user is prompted to select an operating frequency among IEEE 802.11 communication standards 802.11a/b/g and selects the operating rate. Then, he/she goes to the final step where he submits his/her query concerning the link quality of a certain node. In sequence, the tool seeks to a database where the channel quality results are stored and retrieves the information that corresponds to the particular query. This information with the use of .dot files that are used to depict graphs are presented to the users. On Fig. 2, the downlink communication link quality for node 4 among its neighboor nodes is illustrated. Each node is indicated by a circle and the PDR of each link is reported upon edges that indicate link connectivity to certain node's wifi interfaces. Those interfaces are reported with their MAC addresses, with an arrow showing to the node where they belong.

3 Conclusion

In this demo paper we present a wireless connectivity tool that enables better utilization of testbed under effective resource exploitation. In particular, users can select nodes and observe link quality by navigating through a web interface that is built as an extension tool of NITOS scheduler and retrieves information from TLQAP. Thus, users can choose those nodes that satisfy their experiment requirements.

References

1. ORBIT-Radio Grid, `http://www.orbit-lab.org`
2. UTH NITLab, `http://nitlab.inf.uth.gr`

3. Anadiotis, A.C., Apostolaras, A., Syrivelis, D., Korakis, T., Tassiulas, L., Rodriguez, L., Seskar, I., Ott, M.: Towards Maximizing Wireless Testbed Utilization using Spectrum Slicing. In: Magedanz, T., et al. (eds.) TRIDENTCOM 2010. LNICST, vol. 46, pp. 299–314. Institute for Computer Sciences, Social Informatics and Telecommunications Engineering (2010)
4. Raychaudhuri, D., Seskar, I., Ott, M., Ganu, S., Ramachandran, K., Kremo, H., Siracusa, R., Liu, H., Singh, M.: Overview of the ORBIT Radio Grid Testbed for Evaluation of Next-Generation Wireless Network Protocols
5. Syrivelis, D., Anadiotis, A.-C., Apostolaras, A., Korakis, T., Tassiulas, L.: Tlqap: A topology and link quality assessment protocol for efficient node allocation on wireless testbeds. In: Proceedings of the 4th ACM International Workshop on Experimental Evaluation and Characterization (2009)