

G-Mesh-Lab

Wireless Multi-hop Network Testbed for the G-Lab

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The *G-Mesh-Lab* is a Wireless Multi-hop Network research project of the *Freie Universität Berlin*. As part of the Real World G-Lab Project, the focus of G-Mesh-Lab is to research and develop next-generation multi-hop network algorithms and protocols. It utilizes the *DES-Testbed*[1][2][3], which offers a sophisticated testing and evaluation framework, making it possible to define, schedule, run, monitor and evaluate multi-hop wireless network and wireless sensor network experiments.

The *DES-testbed* consists of 60 *DES-Nodes* spread over two buildings. An extension to 120 nodes, including 13 outdoor nodes, is in the process of being installed. Each *DES-Node* consists of a wireless router equipped with three IEEE 802.11a/b/g transceivers and a sensor node. While the wireless LAN part forms the wireless mesh network *DES-Mesh*, the sensor nodes establish a wireless sensor network called *DES-WSN*. Thus a wireless mesh and wireless sensor network are operated in parallel, making the Testbed one of the largest hybrid networks world-wide. The *DES-Nodes* are deployed in an irregular topology across several buildings on the campus.

The testbed management system *DES-TBMS* supports the definition, scheduling, execution, and evaluation of experiments. As shown in 1, the architecture of *DES-TBMS* consists of five components and four databases. *DES-Cript* is a custom domain specific language based on XML to define experiments either in a textual way or with the help of the web-frontend *DES-Web*. *DES-Exp* is the experiment manager which maintains all experiments stored in the *Experiment Description* database and is responsible for scheduling and executing experiments

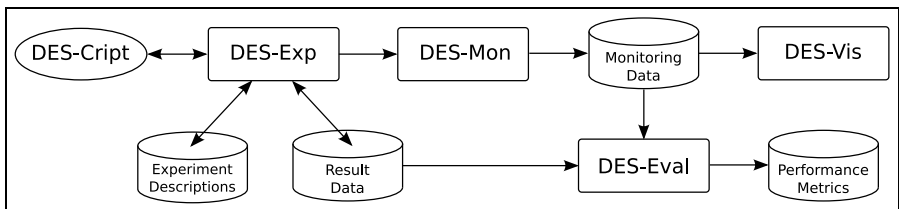


Fig. 1. Architecture of DES-Testbed Management System (DES-TBMS)

and collecting their log files. All raw results of experiments are stored in the *Result Data* database. DES-Mesh is pre- and post-configured by the *DES-Mon* component, which also monitors the testbed during experimentation. The *Monitoring Data* database stores all data required by *DES-Vis* to visualize the network state. Data measured in experiments can be displayed in DES-Vis to get a better insight in the behavior of an algorithm. In a video player like interface any network state during the experiment can be inspected. The *Result Data* and *Monitoring Data* are used by *DES-Eval* for automated evaluation as defined in the experiment description.

In summary, the G-Mesh-Lab provides an easy-to-use wireless multi-hop testbed that enables researchers to evaluate algorithms and protocols, developed only theoretically or by using simulations, on real hardware.

Visit <http://www.des-testbed.net> for more information.

References

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2. Güneş, M., Blywis, B., Juraschek, F., Schmidt, P.: Practical issues of implementing a hybrid multi-nic wireless mesh-network. Freie Universität Berlin, Tech. Rep. TR-B-08-11 (August 2008), <ftp://ftp.inf.fu-berlin.de/pub/reports/tr-b-08-11.pdf>
3. Blywis, B., Güneş, M., Juraschek, F., Schiller, J.: Trends, advances, and challenges in testbed-based wireless mesh network research. In: ACM/Springer Mobile Networks and Applications (MONET) (February 2010); special Issue on Advances In Wireless Testbeds and Research Infrastructures, <http://www.springerlink.com/content/hk25051135m36571/>