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Master Thesis

Creating a flexible middleware for low-power flooding protocols

The release of the Glossy protocol [1] in 2011 proved that very high packet reception rate can be achieved in a low-power, multi-hop network. Glossy is essentially a very efficient flooding protocol, based on constructive interference and the capture effect. As flooding is stateless (by opposition to routing) it is very flexible and resilient to sporadic failures, topology changes, etc. Furthermore, flooding allows to abstract the network topology as a virtual single-hop network, which is extremely interesting for scheduling higher-layer applications.

Logically, many protocols building on Glossy have been proposed (LWB [2], Chaos [3], Crystal [4], DRP [5], eLWB [6]...). Yet, all these protocols have integrated Glossy in their own way. Such customized integration is always a tedious task, which often results in a rather static design, i.e., that cannot be easily adapted or modified. Moreover, it is difficult to fairly compare the performance of the different protocol logics (i.e., their design trade-offs) without a common implementation, which is almost never available.

Project description Therefore, this project targets the specification and design of a well-defined interface, or middleware, sitting between Glossy on the one side, and the top-level application on the other side. This middleware provides the application designer with a flexible communication round structure, where each round is a defined sequence of Glossy floods, controlled by the middleware.

The success of this project will enable to easily implement the different protocol logics of many Glossy-based protocols. It will greatly speed-up the development process of new applications and allow for simpler design space exploration. Last but not least, it will offer a common implementation to fairly compare different protocol logics against different application scenarios.

References

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[6] The Design of a Responsive and Energy-efficient Event-triggered Wireless Sensing System, F. Sutton et al., EWSN 2017

Interested?
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