

Topic: **Neighborhood Discovery in Low Power Mobile Ad-Hoc Sensor Networks**



Presenter: Philipp H. Kindt
Institute of Real-Time Computer Systems (RCS)
Technical University of Munich (TUM),
Munich, Germany

Date: 27.8.2019, 13:30

Location: JKU Linz, SCP1, MT327



Abstract:

Wireless networks that operate without any fixed infrastructure are rapidly growing in importance. Since all devices in such mobile ad-hoc networks (MANETs) run on batteries or rely on intermittently available energy-harvesting sources, the energy spent for communication needs to be as low as possible. Typically, MANET radios are duty-cycled and wake up only for short durations of time for carrying out the necessary communication and then go back to a sleep mode.

The first part of this talk presents two different methods for increasing the energy efficiency in such networks. They are efficient when a connection has already been established and communication is carried out in a synchronous fashion. In particular, protocols such as Bluetooth Low Energy are typically configured for constant data rates. If the required throughput varies over time, the connection parameters need to be adjusted online in an energy-efficient manner. Further, in body-worn sensor networks, the attenuation varies whenever the subject wearing the sensors moves. Here, the transmit power needs to be adjusted online for saving energy. Frameworks for exploiting both methods are presented.

Before a synchronous connection can be established, mobile devices apply neighbor discovery (ND) protocols to wirelessly initiate a first contact within the shortest possible amount of time and with minimal energy consumption. For this purpose, over the last decade, a vast number of ND protocols have been proposed, which have progressively reduced the relation between the time within which discovery is guaranteed and the energy consumption. In the second part of this talk, the fundamental performance limits of this ND procedure are presented. Towards this, relations between the energy consumption and the discovery latency that no ND protocol can beat are derived. Next, the performance of ND in BLE-like protocols, which offer multiple parameters that can be chosen freely, is analyzed. Finally, a parametrization scheme that can be used to obtain optimal parameter values is presented. The resulting discovery latencies coincide with the fundamental performance limits and hence, such protocols can realize the optimal relations between energy consumption and discovery latencies.

TALK

Silicon Austria Labs GmbH
Altenberger Straße 69
4040 Linz, Austria
Inffeldgasse 25F
8010 Graz, Austria
www.silicon-austria-labs.com

**JOHANNES KEPLER
UNIVERSITÄT LINZ**
Altenberger Straße 69
4040 Linz, Österreich
www.jku.at
DVR 0093696



Bio:

Philipp H. Kindt received his Diploma in Electrical Engineering from Technical University of Munich (TUM) in 2012. He has submitted a PhD thesis in the area of low-power communication at Technical University of Munich (TUM) and is currently waiting for his defense. He has authored multiple peer-reviewed papers at venues such as ACM SIGCOMM, IEEE INFOCOM, ACM/IEEE IPSN, IEEE PIMRC or the IEEE Transactions on Mobile Computing. His research interests are wireless communication, mobile computing and the IoT.

Silicon Austria Labs GmbH

Altenberger Straße 69
4040 Linz, Austria
Inffeldgasse 25F
8010 Graz, Austria
www.silicon-austria-labs.com

**JOHANNES KEPLER
UNIVERSITÄT LINZ**

Altenberger Straße 69
4040 Linz, Österreich
www.jku.at
DVR 0093696