



Cooperation between multiple RPL networks

Context

The IoT refers to a set of physical objects (ranging from sensors to common household electrical goods) with communication capabilities that are able to collect, exchange and receive information throughout the Internet. Interconnecting smart objects with Internet is made possible by the IPv6 over Low power Wireless Personal Area Network (6LoWPAN) IETF standard. Routing inside the smart object network is assured by the IPv6 Routing Protocol for Low-Power and Lossy Networks (RPL). This protocol builds a Destination Oriented Directed Acyclic Graph (DODAG) rooted at a special node, known as the border router, which acts as the gateway with Internet. The global connectivity of each smart object is therefore directly dependent of the border router status. Whenever it fails (e.g. breakdown, lack of connectivity, overload, etc.) the whole set of smart objects is disconnected from the Internet, terminating all ongoing communications.

Subject

RPL is designed to operate either as a single DODAG with a single root, as multiple uncoordinated DODAGs with independent roots or as a single DODAG with a virtual root that coordinates multiple border routers. However, the cooperation between multiple RPL networks is not yet defined by the IETF. In this work, we will investigate how two (or more) RPL networks can interact together to increase overall performance (energy savings, packet delivery ratio, delay, fault tolerance, etc.). The results of this work will be evaluated through experimental validations using [FIT IoT Lab](#).

Job details

Position type: Master Internship (6 months)

Salary: around 520 euros per month

Position open date: January 2018 (approximately)

Location: [iCube Lab](#), [Network Research Group](#), [University of Strasbourg](#), Strasbourg, France

Applicants must be master students in computer engineering or computer science before they can take on the position. A strong background in Computer Networks, Mathematics, Communication theory/systems and programming is a plus. Proficiency in the English language (spoken and written) is required. Applicants should be highly motivated, have initiative and responsibility, be able to work independently and have interest in scientific research. Applications must include a detailed CV and the transcripts of undergraduate and honors/master degrees. Please send your application before the 28th of October 2017 to:

- Pr. Thomas Noël (noel@unistra.fr)
- Dr. Julien Montavont (montavont@unistra.fr)

REFERENCE

- **Support of multiple sinks via a virtual root for the RPL routing protocol**, D. Carels and al., in *EURASIP Journal on Wireless Communications and Networking*, June 2014
- **Cooperative interaction among multiple RPL instances in wireless sensor networks**, M. Barcelo and al., in *Elsevier Computer Communications*, vol. 81, may 2016
- **RPL Border Router Redundancy in the Internet of Things**, Q-D. Nguyen and al., in proceedings of the *15th International Conference on Ad-Hoc Networks and Wireless (ADHOC-NOW'16)*, Lille France, July 2016