

# 6LoWPAN Neighbor Discovery Mechanisms

## *Project Proposal*

Supervisor: Prof. Joel Rodrigues

## 1 Objectives

It is foreseeable that any object in the near future will have an Internet connection – this is the Internet of Things vision [1]. All these objects will be able to exchange and process information mainly over low-power wireless connections. These objects, also called sensor nodes, are equipped with a small microprocessor, a small power radio transceiver, a small capacity battery and a set of transducers that can be used to acquire physical information of the surrounding environment. A wireless sensor network (WSN) consists of a set of sensor devices that collaborate with each other to realize a common task [2]. Many different dedicated protocols are used to provide communication between nodes. Moreover, the proposed protocols are not compatible with IP protocol, so to connect the WNS networks to the Internet is necessary to use complex gateway systems. There is a strong trend of convergence towards an Internet based solution and the 6LoWPAN maybe the convergence solution to achieve the Internet of Things vision.

The neighbor discovery protocol is used to discover the neighbors' and to maintain the reachability information, to perform address resolution, neighbor unreachable detection and duplicated address detection [3]. There are significant challenges to use the current neighbor discovery specification within LoWPANs. First, neighbor discovery uses link-local multicast for sending address resolution solicitations, router advertisements and duplicated address detection messages and, currently, LoWPAN does not support multicast communications due to energy conservation. Second, IPv6 neighbor discovery was not designed for non-transitive wireless links. Third, some problems are experienced when the neighbor discovery protocol runs in large multi-hop LoWPAN networks [2]. Finally, the neighbor discovery protocol is too verbose and may generate an overhead in the number of transmitted messages. A new neighbor discovery protocol with several optimizations is under discussion in 6LoWPAN IETF working group to address the LoWPAN network constrains [3]. This project has two main objectives: Evaluate the available 6LoWPAN neighbor discovery mechanisms and implement the best-fitted mechanism in TinyOS or Contiki operating system.

## 2 Tasks

**T1** Review the state of the art on existing protocols that can be used in neighbor discovery procedures

**T2** Implement the best-fitted neighbor discovery mechanisms in TinyOS or Contiki operating systems

**T3** Performance assessment of the neighbor discovery implementation. Real hardware will be used in the performance evaluation

**T4** Documentation and project report

## 3 Work Plan

**T1** 1.0 mês

**T2** 2.0 mês

**T3** 1.5 mês

**T4** 0.5 mês

## 4 Technical Requirements

Programming languages and networking. Interests for learning new technologies.

## 5 Academic Requirements

Programming languages and networking.

## 6 Difficulty Level

Difficult.

## 7 Expected Results

- 1 WSN testbed with neighbor discovery service available.
- 1 projet report.

## 8 Contacts

Prof. Joel Rodrigues ([joeljr@ieee.org](mailto:joeljr@ieee.org) ou [joel@ubi.pt](mailto:joel@ubi.pt))