



## Master Thesis:

### “Dynamic Information Aggregation”

This document describes the subject and the general time schedule of the master thesis of Thibaut Britz in the summer term 2007. Adaptations or changes can be agreed upon by the advisers.

## Subject

The aggregation of information is a fundamental operation in distributed computing. For example, in sensor networks, large numbers of nodes make measurements of the humidity, temperature, etc., at their location, and typically send this data back to a source. Often it is not necessary that the source knows all the individual data, but only an aggregated form thereof, e.g., the *sum* or the *minimum*. By aggregating the data intelligently on intermediate nodes, much transmission energy can be saved.

So far, information aggregation has mainly been studied in static environments. However, in practice, the values at the nodes change over time, and also connections may come up and go down over time. For example, consider a peer-to-peer game where peers move around quickly in the virtual space, and where the data observed in a given environment is subject to frequent changes.

In his thesis, Thibaut investigates algorithms which allow to aggregate information in dynamic environments. We start with a simple model proposed for aggregating in ACKs in static environments, and try to extend this model to incorporate information aggregation aspects of dynamic data. Thibaut will try to find online algorithms which yield a provable competitive ratio against an offline adversary. Depending on his interests, we will then look at more sophisticated aspects such as interference or transmission errors, or non-tree and dynamic topologies.

## Time Schedule

- a) Start with the model proposed by Khanna et al. : How can it be extended for an information aggregation optimization problem? [1W]
- b) Starting with first examples, finding simple results. [2W]
- c) Depending on your findings, you will now aim at solving the problem more generally. We may also extend the model to incorporate aspects such as interference or additional, non-tree links. In this main part of the thesis, we may also have to investigate some conjectures by simulation. [15W]

d) Writing of report and paper.

[3W]

## Thibaut's Duties

- a) One meeting with an adviser per week.
- b) Two presentations, the first after about two months, the second at the end.
- c) Starting with January, Thibaut will have to write a short summary on his progress during each month ("Monthly Report").
- d) Finally, Thibaut has to write two documents:
  - A report (30 to 50 pages, English or German), presenting his work and results. This report should also include a critical review of the work.
  - A research paper (10 pages, English) which summarizes his results in a scientific, compact form. Depending on the findings, we aim at writing (and submitting) a real research paper during Raphael's diploma thesis.

## General

- Independent working is expected
- A possibility to work in the ETZ is provided. It is also possible to work at home.

## Contacts/Advisers

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