Vrije Universiteit Brussel

Proposal bachelor thesis

Title: Context-Aware Software Defined Networks

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Includes preparation course: Yes / ~~No~~ (Select the correct option)

Context

Traditional communication networks are driven by routers and switches with a fixed set of inflexible and difficult to manage network protocols. The foundations for these protocols were designed decades ago when only limited hardware resources were available per network node. Due to the inflexibility of traditional network protocols, it is nearly impossible to ensure consistency- or QoS-related properties of the resulting network configurations. Programmable or software defined networks (SDN) provide a limited but promising solution for these problems by allowing a network controller to reprogram the routers and switches on the fly. Current solutions for software defined networking do not take into account the context of the users of the network. However, there are many situations where the context of the user could steer the communication protocol. For example, the location of the users communicating with each other on a campus could be used in order to provide a more efficient routing protocol.

Proposal bachelor thesis

In this bachelor thesis the student will *extend* an existing language and *adapt* it for software defined networking. The student will be given enough time to first become familiar with the AmbientTalk language and the concepts of software defined networking during the preparatory course.
The extensions to the AmbientTalk language will allow the programmer to easily deploy context-aware routing protocols. This includes the configuration, steering and deployment of routing protocols. Once deployed these context-aware routing protocols will adapt according to the context of the connected users.

The extensions to the AmbientTalk language will be validated by the implementation of a concrete use case which can be deployed on the SOFT/VUB network. One example could be a context-aware file sharing application. The way files are shared between the users should be adapted according to the current bandwidth, the location of the users and the number of users which are currently connected.

Preparatory course bachelor thesis

In order to be able to start with this bachelor thesis it is necessary to study two important concepts. The first concept that needs to be explored is software defined networking [1]. The student needs to write a report of the current set of programming languages for software defined networking and compare them with each other. The second field that must be studied is the field of context-aware and Ambient-Oriented Programming at a practical level [2,3]. For the later, the student can make use the AmbientTalk programming language to experiment with TOTAM and context-aware tuples. Moreover, exercises and course material is available to get the student familiar with this technology. Experience with the AmbientTalk programming language is thus a plus but not strictly needed.

[1] http://en.wikipedia.org/wiki/Software-defined_networking
[2] http://soft.vub.ac.be/amop/
[3] http://soft.vub.ac.be/amop/research/tuples