Multi Mobile Agent Deployment on Wireless Sensor Networks

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Objective: Multiple mobile agents provides us with a flexible, robust and distributed solution for data collection in sensor networks. However, how those agents are deployed has to be smartly planned and suited to the characteristics of wireless sensor networks and their applications. Concretely, we need to decide which simultaneous itineraries the agents follow such that the sensed information is collected within a time bound and the energy spent is minimized. Thus, our goal is to achieve this flexible, robust and distributed data collection in an efficient and meaningful way.

Challenges: Bringing the inherent advantages of multiple mobile agents into wireless sensor networks is indeed a challenging task. Wire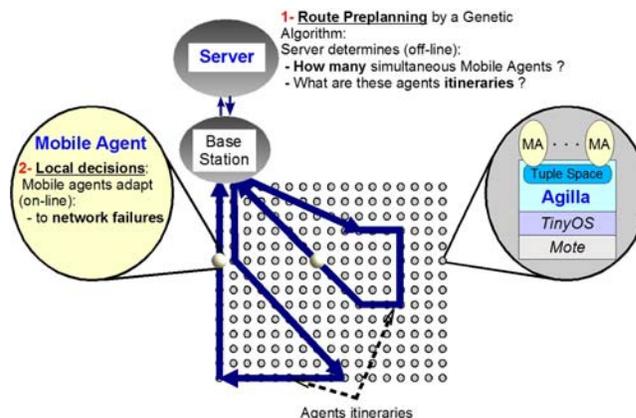less sensor networks are inherently large, resource constrained and faulty. In addition, sensor applications are time-sensitive. Thus, data collection on wireless sensor networks has to be time and energy aware. Therefore, making the best use of every nodes energy and guaranteeing a maximum delay on this collection are primary issues when deploying multiple mobile agents on wireless sensor networks.

Approaches: We designed and implemented a two-step algorithm for achieving this data collection:
First, the itineraries are planned on a powerful computer by a genetic algorithm. Agents are then generated with their individual itineraries embedded into them and remotely injected into the wireless sensor network. Second, these agents will dynamically adapt their itineraries to overcome network changes and failures they might encounter while following their planned itineraries.
In addition, we suited our solution to generate Agilla mobile agents. Being currently developed at the Washington University in St. Louis, Agilla is a novel middleware that brings the benefits of mobile agents and Linda-like tuplespaces into the realm of sensor networks,.

Furthermore, we are currently working on expanding our scenario to include larger networks and multiple mobile Base Stations. Simultaneously, we are also running simulations and experiments the conclusions of which are to be retrospectively inputed on our on-going formal analysis of the problem and its optimal solution.

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