

Using Bluetooth-based Smart Tags for Data Dissemination

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Data dissemination can be defined as the proactive distribution of relevant data to large numbers of users. The objective is to deliver *the right data, to the right people at the right time*. In the context of sensor networks, data dissemination is a natural basis for monitoring applications.

We consider systems where a large number of mobile smart-tags disseminate data from fixed sensor nodes to fixed display units as they move around. Let us consider for instance a national park where weather stations are located at camping places all over the park; electronic display boards are placed along the roads taken by the hikers. The park is big enough, so that it is not a viable solution to cover it completely with wireless ethernet or to equip each weather station or each display board with long range radio. An interesting solution consists in (a) equipping sensor nodes and display units with short-range radios and (b) equipping hikers with radio enabled smart tags, so that they can disseminate data as they move around. As a hiker walks by a weather station, his smart tag collects the latest measurements; he later transmits them to the display boards along the path he is following. A second hiker crossing this path gets her smart-tag updated and further disseminates data along her path. Note that in this scenario, data dissemination is achieved via a sequence of point-to-point updates between fixed and mobile devices. We believe that this form of data dissemination is relevant when monitoring large, hostile areas populated by individuals that can be equipped with smart-tags.

Active smart-tags are common place in our daily lives. They are generally used for security (IDs for building entrance) or for tracking (shoetags used in running competitions). These

smart-tags contain a limited amount of memory and are capable of exchanging data via radio communication. Our implementation uses BlueTag development kits, i.e. alpha versions of Bluetooth based active smart-tags produced by a danish start-up [Paga]. Bluetooth is an interesting networking technology because of its support for device discovery. Even if we do not focus on energy consumption, we consider that smart-tags should not broadcast data continuously; they should rather transmit data efficiently as soon as they are in the vicinity of a static node.

In [BLB02], we describe an epidemic algorithm for propagating updates between a static node and a smart-tag – this algorithm accounts for memory limitation on smart-tags. We also propose a model for smart-tag based data dissemination that we simulate in order to study delay and coverage for our update propagation algorithm. We finally describe an implementation using bluetooth-based smart-tags that allows us to study the performance of the bluetooth device discovery mechanism and the performance of our update propagation algorithm.

This work is part of the Manatee project at University of Copenhagen where we study bluetooth-based monitoring applications [Pagb].

References

[BLB02] Allan Beaufour, Martin Leopold, and Philippe Bonnet. Smart-tag based data dissemination. In *Proceedings of the first ACM Workshop on Wireless Sensor Networks Applications*, September 2002.

[Paga] BlueTags Home Page. <http://www.bluetags.com>.

[Pagb] Manatee Project Home Page.
<http://www.distlab.dk/manatee>.