Abstract

Unlike conventional wireless sensor networks that require the persistent connectivity of the network, a delay tolerant wireless sensor network (DTWSN) is a novel network paradigm that can provide communication services in the scenario when the persistent network connectivity is not available. Such scenarios can be found in which the sensors are relatively sparsely deployed or the sensors are moving along relatively long trails. As the connections among sensors do not exist all the time, some intermediate sensors can use the store-carry-and-forward communication mechanism to delivery the data whenever the connection is not available. The DTWSNs can be characterized by the features of node mobility, sparse connectivity, delay tolerability, and constrained resources.

In this project, we consider the scenario when the sensors are attached to human beings or animals. The positions of these sensors are determined by the hosts. As the hosts are commonly moving in groups, the group feature can make impact upon a DTWSN in many aspects. In this project, we will focus on the design of a DTWSN when the group feature is introduced. We propose to investigate several key issues for a DTWSN, including the data delivery and the data storage, with the consideration of the group feature. Specifically, we will study how to distibutedly partition the network into groups using effective metrics, how to decide the group communication strategies that benefit the data delivery, and how to provide efficient data storage by coordinately using the buffers of all group members. Moreover, we will implement and evaluate the group-based DTWSN under different moving models.

The project's possible outcomes are distributed grouping management schemes that support dynamic network partitions, novel group communication strategies that use both the replication and forwarding mechanisms to maximize the pre-packet utilization, and cooperative storage mechanisms that enable the integral buffer usage for the cached messages. All these outcomes will make important contributions to a DTWSN. Implementation and evaluation of the proposed algorithms can benefit the design of practical systems. At the same time, this project can contribute to the educational aspects that it provides research topics for doctoral graduates related to the wireless sensor network area.