Title	センサネットワークにおける受信信号強度を用いた低遅延・高信頼型ルーティングアルゴリズムの構築
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Construction of a Routing Algorithm for Sensor Network with Low Signal Delay and High Reliability using Received Signal Strength

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Recently, with significant improvement of wireless communication and semiconductor technology, there's been an increase of research into ubiquitous computing propounded by Mark Weiser. Ubiquitous is a Latin word meaning omnipresent and ubiquitous computing represents an environmental condition that computers are built into everywhere and everything. These computers operating cooperatively with respect to one another, user can relish their function without impression of operating them. Sensing is indispensable for ubiquitous computing which needs interactions with real environment. Thus, sensor network composed of these sensors is one of the most important technologies to realize ubiquitous computing.

A sensor network consists of sensor, observer, and phenomenon.

・Sensor: The device that implements the physical sensing of environmental phenomena and reporting of measurements. Typically, it consists of five components- sensing hardware, memory, battery, embedded processor, and trans-receiver.

・Observer: The end user interested in obtaining information disseminated by the sensor network about the phenomenon. Multiple observers may exist in a sensor network.

• Phenomenon: The entity of interest to the observer that is being sensed and potentially analyzed by the sensor network. Multiple phenomena may be under observation concurrently in the same network.

Where a sensor node establishing a sensor network discovers any phenomenon, this information is sent to a data collection node called observer by using wireless multi-hop communication. Collecting information by only significant node like DCN in sensor network is the greatest difference with ad-hoc network in which all nodes might become destination of a packet. Moreover, nodes constructing a sensor network have less information processing capacity and less communication band than ones of ad-hoc network. And generally node density of a sensor network is high.

Routing protocol of the sensor network having these characteristic is expected to be a proactive-type protocol. In this protocol type, the route to an objective node is established before a node requests a communication. Therefore, to prevent control packet communication used for establishing routes from interrupting data packet communication, in this paper, operation of the routing algorithm is divided into two phases, notification phase and communication phase.

In notification phase, each node sends a notification signal only once to tell neighboring nodes its own existence. This signal consists of three information [my own ID number, hop count to the DCN, distance to the DCN] and sends from the DCN at the beginning of this phase. The nodes that there are around the DCN receive the notification signal from the DCN and estimate the distance to the DCN using received signal strength (RSS). The timing of sending my own notification signal is decided according to RSS. The nodes that couldnft receive the notification signal directly from the DCN decide the distance to the DCN using notification signal from other nodes. In this phase, each node establishes two kinds of routes, Long hop route and Short hop route, to the DCN, using notification signal from neighboring nodes and their RSS. In communication phase, each node sends information that was provided from mounted its own sensor to the DCN using hop-by-hop route. Each node has two kinds of routes, long hop route and short hop route, and usually uses long hop route which can communicate with the number of few hops to reduce signal delay. However, If communication is impossible, node can change into short hop route to

acqire high signal strength. To compare the performance of proposed RSS routing algorithm, I also made another routing algorithm, noRSS, which do not use RSS to establish routes to the DCN and performed a simulation. In this simulation, each node sends data packets according to constant bit rate and an area by which signal strength become half is installed as variable factor of signal strength. This simulation showed that RSS routing algorithm realizes low signal delay and high data packet attainment using both long hop and short hop route in such a conditions.