emmon

ARTEMIS
Project title: EMMON

EMbedded MONitoring

Emmon Network Architecture

Hierarchical WSN for Large Scale

- The EMMON wireless sensor network uses a fixed, hierarchical, network topology.
- The lowest tier (0) of the network is composed of sensor nodes. Those are grouped in clusters which are managed by a cluster head (tier 1). Cluster heads are attached are grouped together in a patch, which is managed by a gateway (tier 2). The top tier (3) of the network is composed of a Command and Control (C&C) server, to which Command and control clients (laptops) can connected.
- EMMON provides a data service, abstracting away from sensor nodes. This abstraction is used throughout the network layer: the C&C provides a data-centeric, geographical interface, which is mirrored at the middleware level and the communication to the sensor nodes is based on geographic routing.
- EMMON's geographic routing is based on the notion of served area: the area for which a node can have information. Served areas are computed recursively from the sensor node to the C&C server, hence providing the complete area covered by the sensor network.
- Upward traffic (from the sensor nodes to the C&C) propagates sensor readings through parent devices using a converge cast. The middleware intercepts these packets on every node and performs aggregation (if and as specified by the client), hence significantly reducing the amount of traffic in the network.
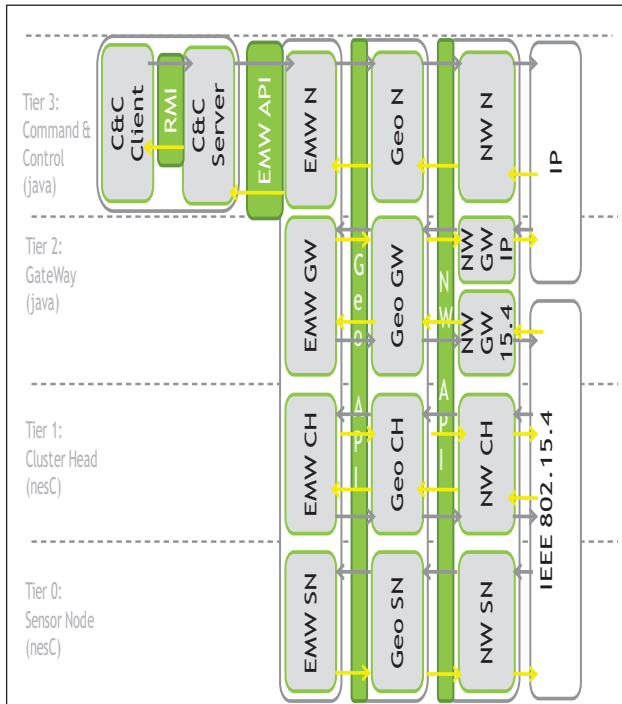
- Every tier is composed of devices with different sets of capabilities in terms of energy reserves, memory storage, processing power and communication interfaces. These lead to different maximum transmission unit and transport layer guarantees. By pairing very resource-constrained nodes with more powerful devices, the EMMON architecture exploits the abilities of each type of device.
- Operation requests (downward flow) and sensor readings (upwards flow) travel through all the layers up to middleware at every tier of the network. On the downward flow, this allows the middleware to store operation identifiers and aggregation parameters specified for the query. On the upward flow, the middleware uses this information to perform temporal and spatial aggregation of the data (sensor readings) travelling upward towards the command & control server.