Reliability in Large Wireless Sensor Networks

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Abstract
With the availability of low-cost sensor nodes there have been many standards developed to integrate and network these nodes to form a reliable network allowing many different types of hardware vendors to coexist. Most of these solutions however have aimed at industry-specific interoperability but not the size of the sensor network and the large amount of data which is collected in course of its lifetime. In this paper we use well studied data compression algorithms which optimize on bringing down the data redundancy which is related to correlated sensor readings and using a probability model to efficiently compress data at the cluster heads. As in the case of sensor networks the data reliability goes down as the network resource depletes and these types of networks lacks any central synchronization making it even more a global problem to compare different reading at the central coordinator. The complexity of calibrating each sensor and using an adaptable measured threshold to correct the reading from sensors is a severe drain in terms of network resources and energy consumption. In this paper we separate the task of comparative global analysis to a central coordinator and use a reference PMax which is a normalized probability of individual source which reflects the current lifetime reliability of the sensors calculated at the cluster heads which then is compared with the current global reliability index based on all the PMax of cluster heads. As this implementation does not need any synchronization at the local nodes it uses compress once and stamp locally without any threshold such as application specific calibration values (30oC) and the summarization can be application independent making it more a sensor network reliability index and using it independent of the actual measured values.