Accepted Manuscript

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PII: S0167-739X(17)32017-4
DOI: https://doi.org/10.1016/j.future.2018.04.091
Reference: FUTURE 4169

To appear in: *Future Generation Computer Systems*

Received date : 8 September 2017
Revised date : 3 March 2018
Accepted date : 29 April 2018

Please cite this article as: H. Farman, B. Jan, H. Javed, N. Ahmad, J. Iqbal, M. Arshad, S. Ali, Multi-criteria based zone head selection in Internet of Things based wireless sensor networks, *Future Generation Computer Systems* (2018), https://doi.org/10.1016/j.future.2018.04.091

Multi-criteria based Zone Head Selection in Internet of Things based Wireless Sensor Networks

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ABSTRACT

The past few years have seen dramatic development and a great interest in efficient service delivery and better resource utilization in the Internet of Things (IoT) based constrained Wireless Sensor Network (WSN). The IoT is mainly dependent on optimal deployment of energy aware WSN and efficient communication architecture for data transfer among heterogeneous devices. In addition, energy efficient clustering techniques for WSN node deployment and routing have achieved great involvement for prolonging network lifetime. In clustering technique, where the network is partitioned into different segments (clusters or zones) and proper attention must be given to the cluster head (CH) selection procedure for maximizing node reachability inside the cluster and efficient communication to the base station. In this paper, we have proposed multi-criteria based cluster head/zone head selection scheme in Internet of Things based WSN by considering distinct parameters affecting node energy and network lifetime. These parameters; energy level, distance from neighboring nodes, distance from center of the zone, number of times a node has been zone head and whether a node is merged or not, have direct impact on overall performance of WSN. The relative impact of each parameter in CH/ZH selection is computed using the Analytical Network Process (ANP) which is widely used multi-criteria decision tool. Simulation results of the proposed scheme show relatively better performance than existing energy efficient clustering techniques. The obtained results have been analyzed by varying the number of parameters in ZH selection and their impact on network stability and lifetime.

Keywords: Wireless sensor network, energy efficiency, network stability, zone/cluster head selection, Internet of Things.