# M2M Energy Efficiency Routing Protocol MLCMS by Using 6LoWPAN Based on IoE

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*Abstract*—**The Internet-of-Everything (IoE) describes the bringing together of people, processes, data, and things to make networked connections more valuable than ever before. Moreover, machine-to-machine (M2M) is considered an essential part of IoE. This paper promotes the wireless M2M network routing protocol, which is a Multilevel Clustering Multiple Sink (MLCMS) with IPv6 protocol over Low Wireless Personal Area Networks (6LoWPAN), to enhance the lifetime of a network through a special network structure. The sensor field is divided into quarters with different levels of cluster heads (CHs), which are selected in a useful way, and two beneficial location sinks. The performance of MLCMS protocols are evaluated and compared with the Modified Low-Energy Adaptive Clustering Hierarchy (MODLEACH) protocol. The former performs 75% better than the latter regarding energy usage and the stability of the system. Next, 6LoWPAN for the proposed model is constructed and its impact on the performance of MLCMS by NS3 simulation evaluated. This increases the lifetime of the system by 12% more than using MLCMS without 6LoWPAN and it improves the flexibility of the proposed model.**

***Keywords— IoE; IoT; WSN; MLCMS; M2M; MODLEACH; 6LoWPAN .***

## I. INTRODUCTION

The IoE encompasses both M2M and Internet-of-things (IoT) technologies, with the IoE being increasingly used to achieve many things for a range of people and responders. It is projected that the IoE will continue to evolve over the next ten years and beyond, but it is already an effective tool in automated M2M communications[1][2]. M2M networks enabling networked nodes (sensors or actuators) to exchange information have been intensively studied lately. Recent technological developments including M2M, smart grids and smart environment applications, are having a marked impact on the development of Wireless Sensor Network (WSN). Moreover, most appliances have been equipped with the capabilities for sensing people's daily needs. However, the efficient use of the limited energy resources of WSN nodes is crucial to these technological advances, regarding which topology control methods are being employed to extend battery lifetime [3]. Networking of these nodes has benefited a number of areas in life, including environment monitoring, intruder detection and tracking targets. Also, M2M topology permits machines to communicate with each other without human intervention and can play an important role in sensor network systems [4]. In particular, owing to their flexibility, wireless M2M sensor networks have become utilized whenever a fixed infrastructure is unfeasible. The chief aim of topology control in wireless M2M networks is to diminish energy consumption, and hence prolong network lifetime [5].

Because energy efficiency is crucial when designing M2M WSN protocols, the sensor nodes need to function in a self-governing manner with small batteries for several months or even years. Owing to the replacement of batteries for a large number of devices being virtually impossible in distant or unfavorable environments, energy is the most essential resource in WSNs [6]. Hence, keeping energy consumption to a minimum is a primary focus for researchers, and this topic has been thoroughly investigated. Energy efficient transmission protocols for M2M WSN are categorized into routing and clustering types. Clustering in M2M WSN refers to arranging the nodes into groups according to the needs of the network. Every group has a leader called the cluster head (CH) and the rest are just normal nodes. This type of protocol substantially reduces energy consumption by aggregating multiple sensed data that are transmitted to the sink node [7]. The clusters could be configured to become more energy-efficient by size and/or cluster count. However, without this being associated with the position of the sink, this will lead to the network's topology having clusters with unbalanced residual energy, and the life of the network will be short.

In fact, the sink placement becomes an important criterion for the network designer to increase the network lifetime and system performance. In a WSN, multiple sinks in proper locations can strongly decrease the amount of energy use and the message transfer delay in communication. Moreover, a multiple-sink WSN has much less tendency for sink node isolation [9]. With large-scale M2M single sink WSNs, heavy traffic load for packet transmission interacts with nodes in close proximity to the sink, which becomes blocked. Nodes not only gather data within their sensing range, but they also send data to those nodes remote from the sink, which leads to unequal power consumption among them along with unequal connectivity across the network. Further, as time is of the essence during such matters as disaster management, it is preferable that most sensor nodes be near to the sink [10].

Another issue, apart from energy consumption efficiency, is the demand for more IPs as M2M is separated from the IoT and needs to communicate a huge number of things. This issue can be addressed by using 6LoWPAN.

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