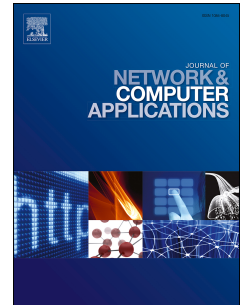


Accepted Manuscript

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PII: S1084-8045(18)30261-3

DOI: [10.1016/j.jnca.2018.08.004](https://doi.org/10.1016/j.jnca.2018.08.004)

Reference: YJNCA 2188

To appear in: *Journal of Network and Computer Applications*

Received Date: 31 March 2018

Revised Date: 18 July 2018

Accepted Date: 14 August 2018

Please cite this article as: Amarlingam, M., Mishra, P.K., Rajalakshmi, P., Channappayya, S.S., Sastry, C.S., Novel Light Weight Compressed Data Aggregation using sparse measurements for IoT networks, *Journal of Network and Computer Applications* (2018), doi: 10.1016/j.jnca.2018.08.004.

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Novel Light Weight Compressed Data Aggregation Using Sparse Measurements for IoT Networks

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Abstract

Optimal data aggregation aimed at maximizing IoT network lifetime by minimizing constrained on-board resource utilization continues to be a challenging task. The existing data aggregation methods have proven that compressed sensing is promising for data aggregation. However, they compromise either on energy efficiency or recovery fidelity and require complex on-node computations. In this paper, we propose a novel Light Weight Compressed Data Aggregation (LWCDA) algorithm that randomly divides the entire network into non-overlapping clusters for data aggregation. The random non-overlapping clustering offers two important advantages: 1) energy efficiency, as each node has to send its measurement only to its cluster head, 2) highly sparse measurement matrix, which leads to a practically implementable framework with low complexity. We analyze the properties of our measurement matrix using restricted isometry property, the associated coherence and phase transition. Through extensive simulations on practical data, we show that the measurement matrix can reconstruct data with high fidelity. Further, we demonstrate that the LWCDA algorithm reduces transmission cost significantly against baseline approaches,

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