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Traffic and Energy Aware Routing for Multi Heterogeneous Wireless Sensor Networks

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ABSTRACT

Energy-Efficiency of routing algorithm is crucial for improving the lifetime of battery constrained Wireless Sensor Networks (WSNs). Consideration of nodes heterogeneity in routing is essential for achieving optimal resource utilization. Sensor nodes with random initial energies and random disparities in data generation rate (traffic) to model a realistic clustering based WSN suited for heterogeneous sensing applications. An energy model for the scenario and proposes a Traffic and Energy Aware Routing (TEAR) scheme to improve the stability period. The simulation results indicate that TEAR outperforms other clustering based routing algorithms under the scenario.

Keywords: Wireless sensor networks ,Routing, Clustering algorithms ,Stability analysis, Energy dissipation, Telecommunication traffic, Radio transmitters.

1. Introduction

Wireless Sensor Network (WSN) technology is an important building block of IoT sphere. Consideration of heterogeneity (e.g., energy, link and computational heterogeneities) can improve the performance of WSN routing algorithms in terms of network lifetime, stability, reliability, network delay, etc. The energy heterogeneity in WSN routing is pursued widely.

1.1. Purpose

The energy-efficiency of routing algorithm is crucial for improving the lifetime of battery constrained Wireless Sensor Networks (WSNs). The consideration of nodes heterogeneity in routing is essential for achieving optimal resource utilization. This project considers sensor nodes with random initial energies and random disparities in data generation rate (traffic) to model a realistic clustering based WSN suited for heterogeneous sensing applications. The project presents an energy model for the scenario and proposes a Traffic and Energy Aware Routing (TEAR) scheme to improve the stability period. The simulation results indicate that TEAR outperforms other clustering based routing algorithms under the scenario

1.2. Scope

Internet of Things (IoT) envisions interoperability of heterogeneous devices to support diverse applications, and the Wireless Sensor Network (WSN) technology is an important building block of IoT sphere. Consideration of heterogeneity (e.g., energy, link and computational heterogeneities) can improve the performance of WSN routing algorithms in terms of network lifetime, stability, reliability, network delay, etc. The energy heterogeneity in WSN routing is pursued widely.

2. Related Work

Many researchers have paid attention to the location privacy since Ozturk first proposed his concept [12]. Recently, location privacy has been widely researched in industrial wireless sensor networks [13], vehicular ad-hoc networks [14], cloud computing [15], social network [16] and so on. Location privacy covers the source location privacy and the sink location privacy. In this paper, we focus on the source location privacy protection. Manjula et al. used virtual sources to protect the source location privacy [17].

3. Existing Work

In the existing system, Kim addressed the downward routing reliability problem in RPL and designed an asymmetric transmission power based network where the root directly transmits. Allows odes with different MOPs to communicate gracefully in a single network while preserving the high bi-directional. existing system, many energy consumption algorithms have been proposed to optimize and improve original RPL routing protocol

Disadvantages

1) Energy Efficiency is very less.
2) No proper Cluster head selection.

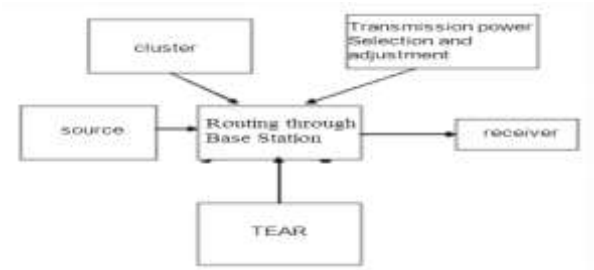
4. Proposed Work

System in WSN routing algorithms for energy heterogeneous scenarios, Stable Election Protocol (SEP) considers two-level energy heterogeneity in Low-Energy Adaptive Clustering Hierarchy (TEAR) like cluster-head (CH) role rotation environment. SEP proposes weighted election probabilities based on the initial energies of the nodes to give energy-rich nodes more chances of becoming CHs.

Advantages

1) More energy efficiency on node**.**
2) Cluster head selection based on TEAR Protocol.

System architecture



5. Source Module

The service provider will browse the data file and then send to the particular receivers. Service provider will send their data file to router and router will connect to clusters, in a cluster highest energy sensor node will be activated and send to particular receiver (A, B, C…). And if any attacker will change the energy of the particular sensor node, then service provider will reassign the energy for sensor node.

6. Router Module

The Router manages a multiple clusters (cluster1, cluster2, cluster3, and cluster4) to provide data storage service.Implement TEAR for efficient traffic analysis In cluster n-number of nodes (n1, n2, n3, n4…) are present, and in a cluster the sensor node which have more energy considered as a cluster head and it will communicate first.

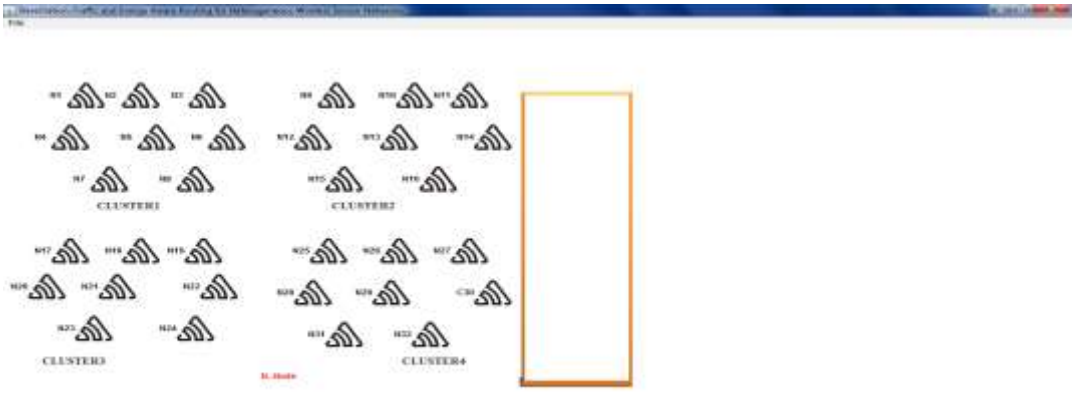
7. Cluster Module

In cluster n-number nodes are present and the clusters are communicates with every clusters (cluster1, cluster2, cluster3 and cluster4).In a cluster the sensor node which have more energy considered as a cluster head. The service provider will assign the energy for each & every node.

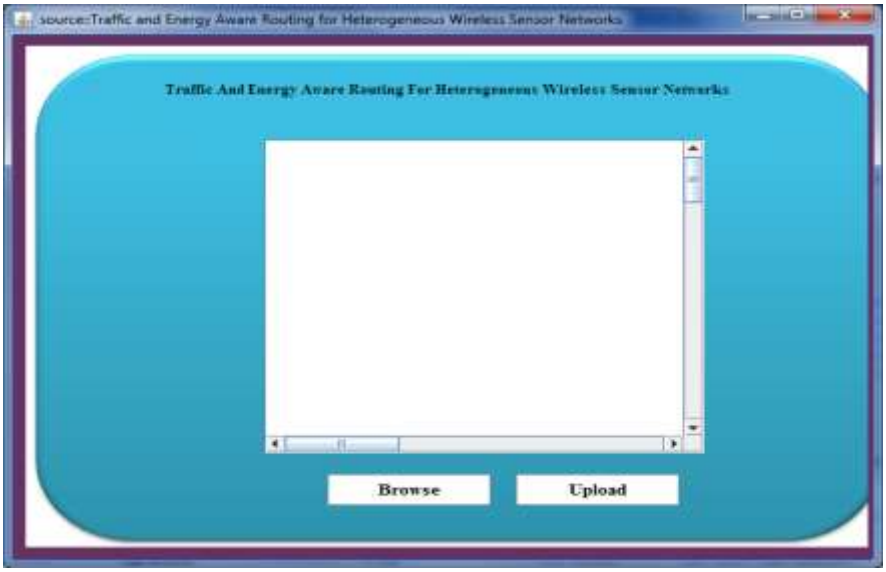
8. Receiver Module

In this module, the receiver can receive the data file from the service provider via router. The receivers receive the file by without changing the File Contents. Users may receive particular data files within the network only.

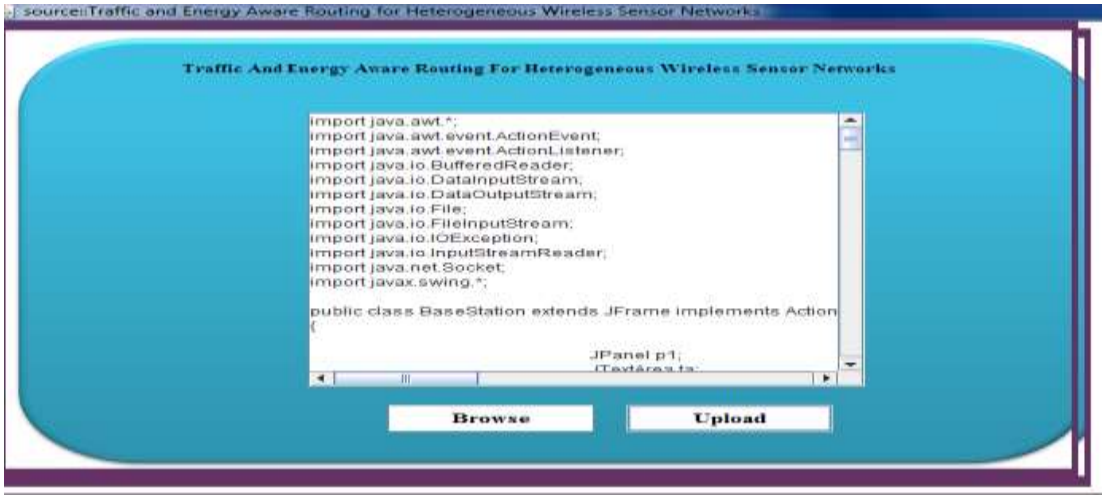
9. Implementations



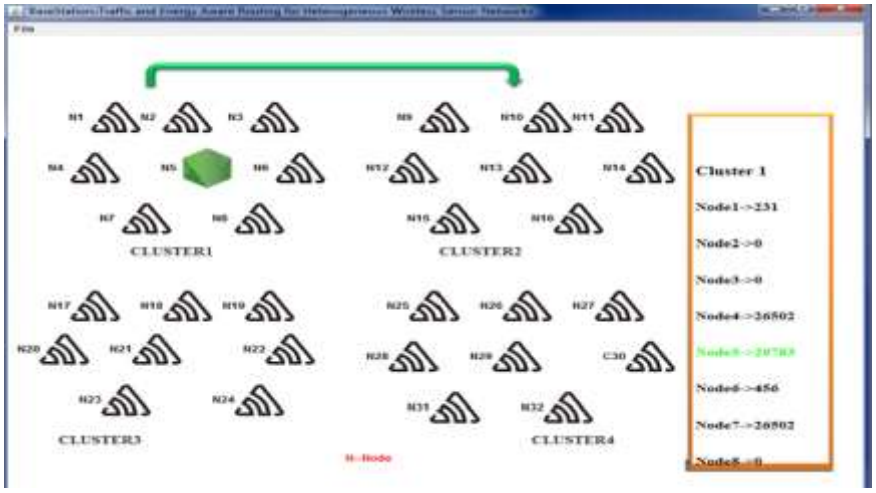
Screen 1: Base Station Window



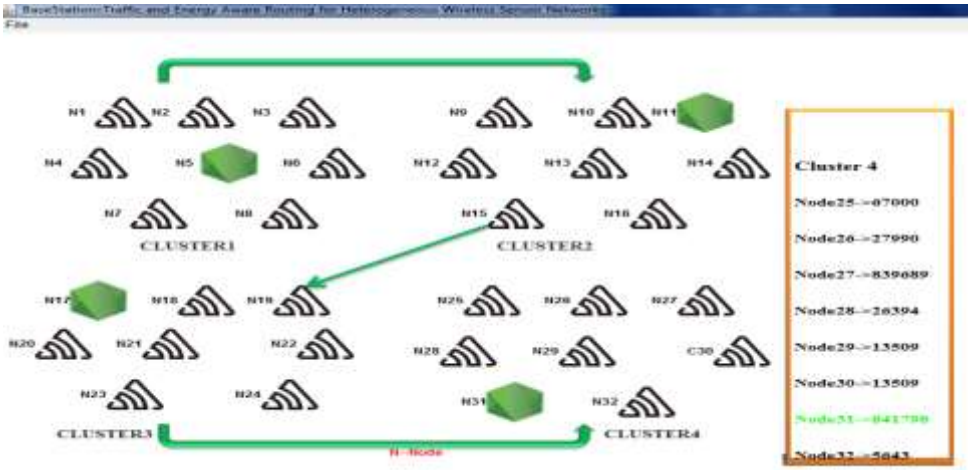
Screen 2: Source Window



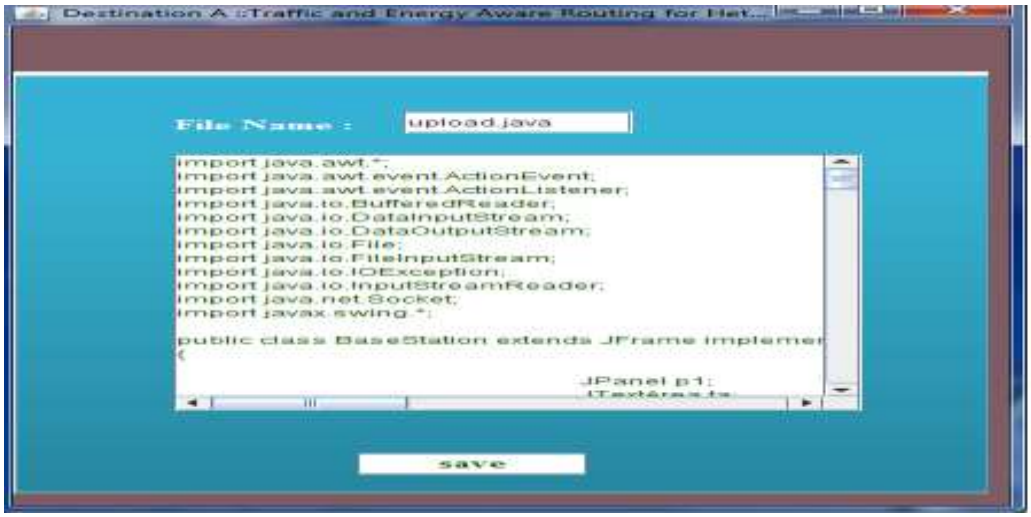
Screen 3: Source Window With Opened File



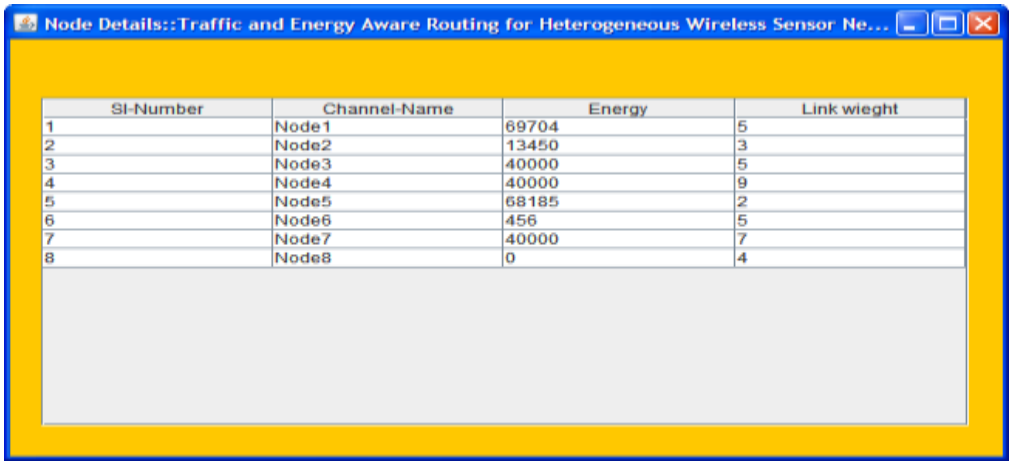
Screen 4: Base Station Showing Cluster 1 Station



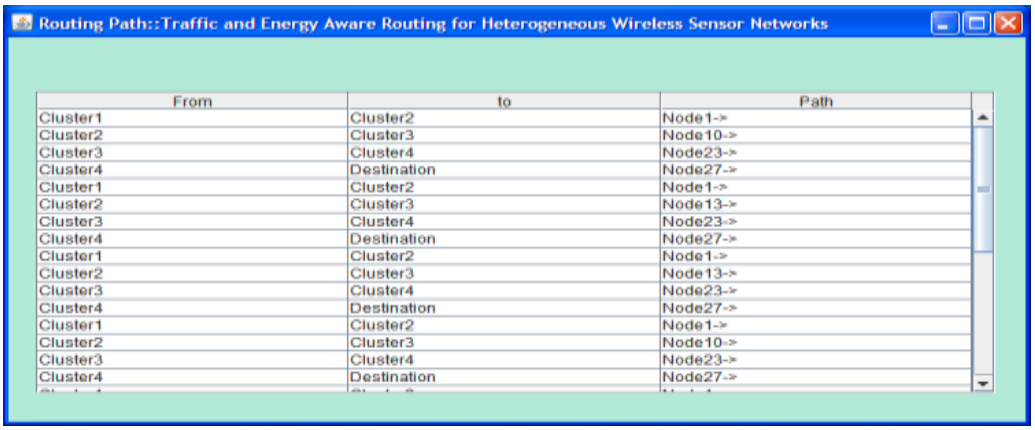
Screen 5: Base Station Showing All Clusters Route



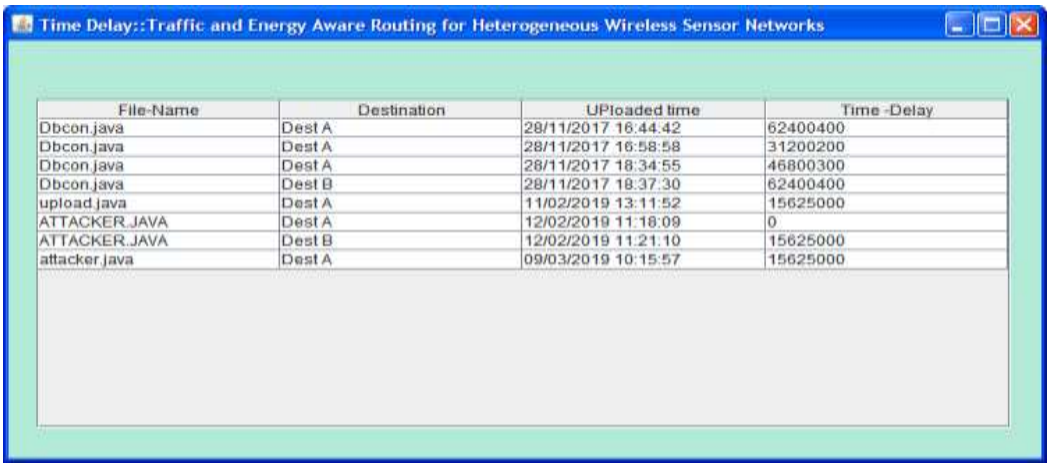
Screen 6: Destination With Received Data



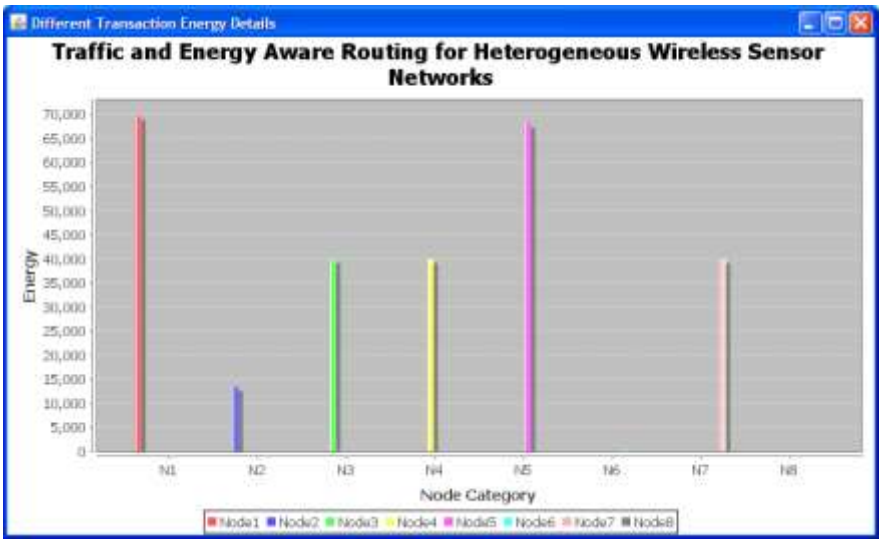
Screen 7: Node Details with Energy and Link Weight



Screen 8: Routing Path in Various Clusters



Screen 9: Time Delay of Various Routes



Screen 10: Traffic and Energy Aware Routing with Energy Delay

10. Conclusion

Consideration of multi-heterogeneity in WSN routing algorithms can help in achieving optimal resource utilization in realistic scenarios. This paper considers WSN nodes with random levels of energy and traffic heterogeneities. It devises a traffic and energy aware routing (TEAR) technique with an improved CH selection method, which considers node's traffic along with its initial energy and residual energy. TEAR performs better, in terms of stability period, over legacy algorithms (LEACH, SEP and DEEC) in the multi heterogeneous scenario.

11. Future Work

Further, the multi-heterogeneity concept (especially the traffic heterogeneity consideration) could be helpful in developing more effective routing algorithms for realistic WSNs and Internet of Things applications with heterogeneous sensing requirements.As future work, new routing algorithms are needed in order to handle topology changes in such energy constraint environment and also to implement security and improve the quality of service.

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