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EERDC:Energy Efficient Routing using Dynamic Cluster approach

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Density of nodes deployed in Wireless Sensr Network (WSN) is based on application requirements. The redundant data collection in dense network results in more energy consumption. The Data Routing In-Network Aggregation ($DRINA$) is one of the recent algorithm proposed to shrink the energy consumption in densed network environment by minimizing the number of communications from source to sink. Here the Data transmission is carried out by using data aggregation in cluster based environment using shortest path method. But due to inefficient cluster head selection technique, it is unable to mange cluster head failures and avoids the energy drain in sensor nodes along the common static path that leads network partition. In order to overcome these problems we proposed an algorithm known as Energy Efficient Routing using Dynamic Cluster approach ($EERDC$), that includes efficient cluster head selection technique and dynamic route selection for the reliable data transmission. In our approach the cluster head selection technique involves an efficient method of cluster head selection. Our algorithm minimizes the overhead in communication, consumption of energy and increases the network lifetime when compare to earlier $state\_of\_art$ works.

Keywords : Clustering, Data Aggregation, Dynamic Routing, Energy Efficiency, Wireless Sensor Network.

1. INTRODUCTION

A wireless sensor network is special category of AdHoc network with huge number of tiny nodes, which have the capabilities of self organization, physical parameters sensing and one to one communication. These nodes have limited energy, processing capability which collaboratively sense physical and environmental parameters like temperature, sound, pressure, vibration, pollutants etc [1][2]. WSNs are used in various applications like habitat monitoring, health monitoring, target tracking, military and in many other applications.

In dense sensor networks the communication overhead and energy consumption is high due to large redundant data collection and transmission towards the sink. Energy conservation is one of the critical challenges in WSN to increase lifetime of the network. Most of the previous works used Data aggregation technique that is used to increase energy conservation by reducing communication overhead [3,4].

Low Energy Adaptive Clustering Hierarchy ($LEACH$) [5] is a prevalent energy conservation mechanisms that dynamically forms the cluster and assign the cluster head that directly sends the aggregated data to sink. This technique avoids energy consumption of individual nodes in a cluster. But it leads the energy drain at the cluster head soon and requires frequent replacement of cluster heads. The LEACH replaces the cluster head randomly without taking the account of energy status of the nodes

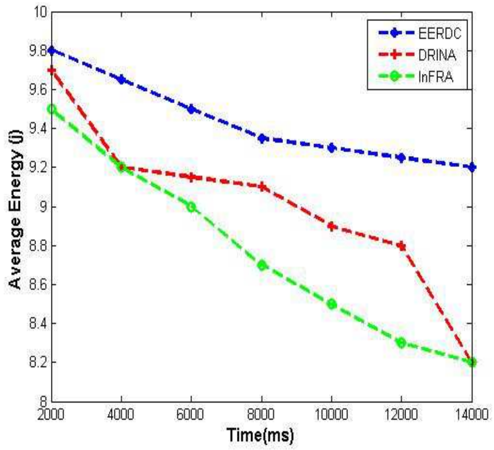

Figure 5. Network Lifetime

transmission. Thus the packet delivery rate is comparatively higher and increasing linearly throughout the simulation (2000ms to 14000ms). It is observed that the Packet Delivery Rate increased by 18% in comparison with DRINA and InFRA. Figure 7 illustrates the

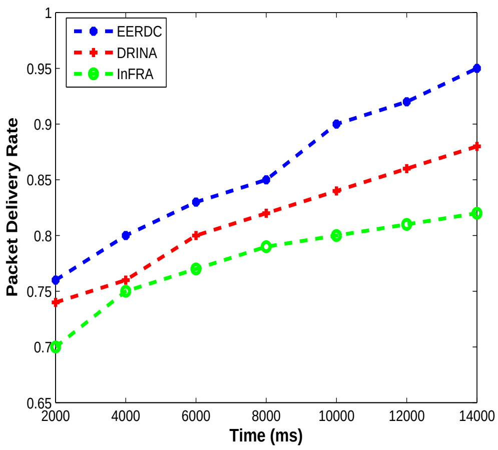

Figure 6. Packet Delivery Rate

Network Throughput of the EERDC, DRINA and InFRA. It is clearly observed that the EERDC exhibits the higher Network Throughput when compare to earlier protocols. This is mainly due to an efficient optimal path mechanism that includes fewer number of nodes that greatly reduces the transmission time. Hence EERDC results 20% high throughput when compare to the protocols DRINA and InFRA. Table 4 shows the comparison values of Net-

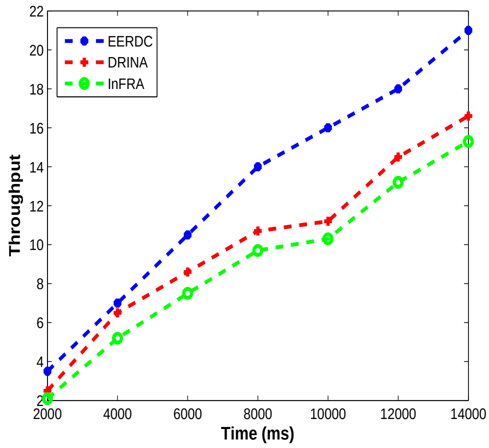

Figure 7. Throughput

work Overhead. The EERDC Network Overhead is shown in Figure 8. The optimum number of messages is used to construct dynamic shortest path in EERDC, this results 10% minimum overhead compared to DRINA and InFRA protocols.

Table 4
Time Overhead

Network Size	*Time Overhead*		
	EERDC	*DRINA*	*InFRA*
50	250	350	500
100	750	800	1000
150	800	950	1400
200	1100	1250	1900
250	1400	1500	2000
300	1600	1650	2100
350	1700	1800	2500

7. Conclusions

In this work, we devised an Energy efficient routing mechanism using dynamic cluster head

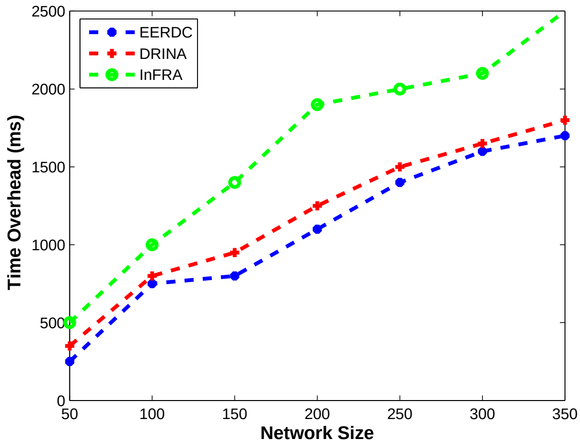

Figure 8. Time Overhead

approach. Efficient cluster head and Dynamic shortest path is introduced to improve energy conservation and network lifetime. The EE-DRC algorithm utilizes minimum number of messages to build optimal Dynamic Shortest path that supports reliable information transmission. the obtained results shows that EE-DRC outperforms the DRINA and InFRA regarding Network Lifetime, Throughput, packet delivery rate and latency. Further this work can be extended to very large and mobile wireless sensor networks.

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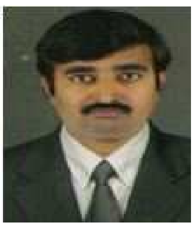

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