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A Design and Implementation of an Energy-Efficient Routing System for Wireless Multimedia Sensor Networks

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ABSTRACT: Increasing technological advancements in wireless networks, low-cost and easily deployable sensor nodes as well as miniaturized hardware permits the existence of Wireless Multimedia Sensor Networks(WMSNs), a distributed Ad-hoc network enabling multimedia data transmissions such as audio files, streaming videos, and pictures in addition to scalar data. Recently, a huge number of applications like battlefield monitoring, wildlife monitoring, forest fire detection, environmental monitoring, and location-based multimedia surveillance are supported by this network. Unlike Wireless Sensor Networks (WSNs), the routing process of WMSNS experiences more difficulties as they intend to transmit high-volume multimedia data in real-time and non-real-time scenarios

KEYWORDS: - Wireless Sensor Networks, Quality of Service (QoS), energy efficiency, multi-hop routing algorithms network lifetime

I.INTRODUCTION

Recent advancements in wireless communication technology and development of low cost, miniaturized sensor devices make possible in existence of Wireless Multimedia Sensor Networks (WMSNs). This exciting new technology with the potential for improving the sensing ability on environments, aggregate and fuse the sensed data and store them for instantaneous process in supporting numerous attractive applications in the domain of WMSNs. Some of the most important applications include multimedia surveillance, environmental monitoring, visual target tracking, bionic utilities monitoring, location-based multimedia services, health care applications and home automation applications.

II. RELATED WORKS

In real world problems, the protocol designed for one particular scenario will not suitable for another circumstance, however there are several existing routing approaches, presenting a routing protocol with efficient energy utilization and high reliability constraints is still required for multimedia communication in several real time scenarios

III.EXISTING METHOD

The fundamental unit of WMSN is a battery powered sensor node. The energy of this node plays an important role in routing protocol design, because it directly affects the lifetime of the network.

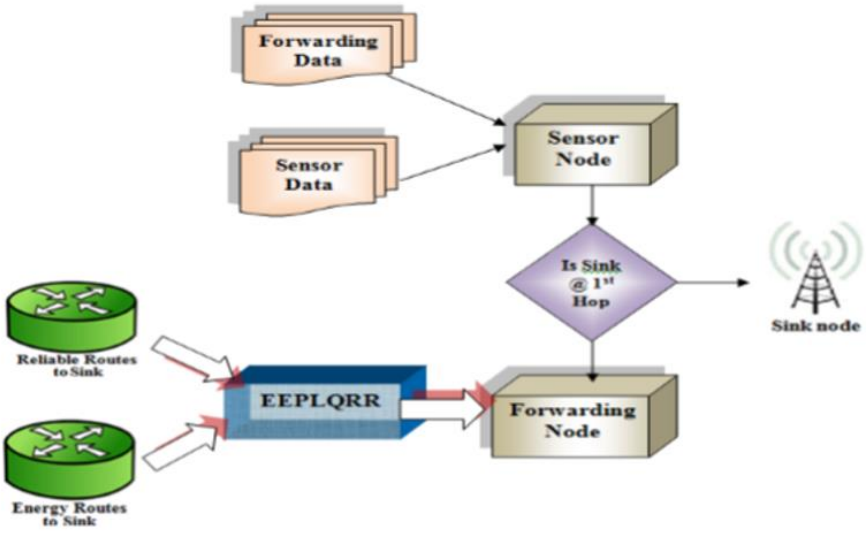
IV.PROPOSED SYSTEM

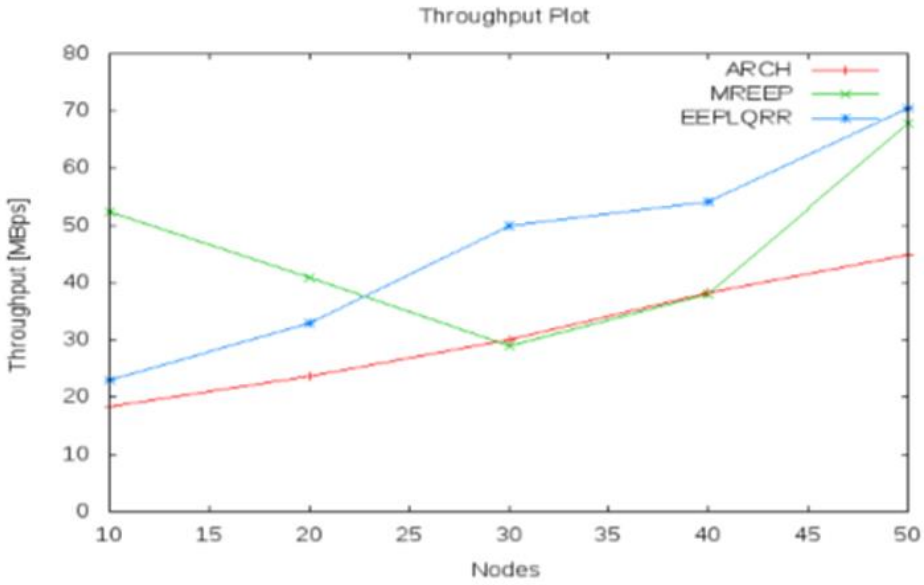
The proposed work brings solution to both intra-cluster and inter- cluster routing scenarios of WMSNs. The system makes use of link quality analysis for selecting the energy efficient reliable next hop path for multimedia transmission with reduced routing overhead.

V.BLOCK DIAGRAM

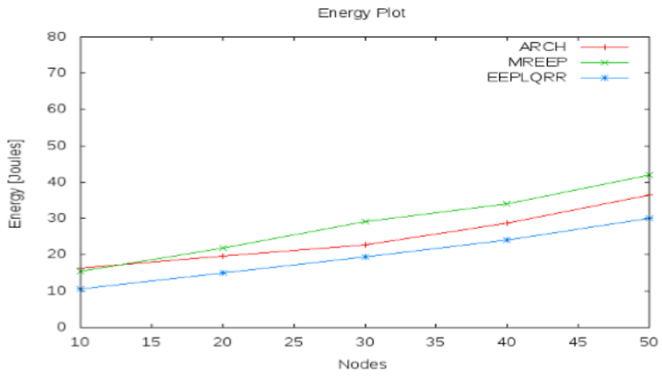
. The block diagram of this system typically consists of several key components. At its core, sensor nodes collect data from the environment. This data is then routed through a network, which may include cluster heads or base stations. The hybrid metaheuristic optimization technique comes into play during data transmission and routing. It

optimizes the routing paths, cluster formation, and energy management strategies. This technique often combines various metaheuristic algorithms such as genetic algorithms, particle swarm optimization, and simulated annealing. The outcome is an efficient, energy-aware network, which prolongs the lifetime of WSNs by reducing energy consumption and improving data reliability. This, in turn, facilitates the seamless and extended operation of wireless sensor networks in various applications, such as environmental monitoring, healthcare, and industrial automation.



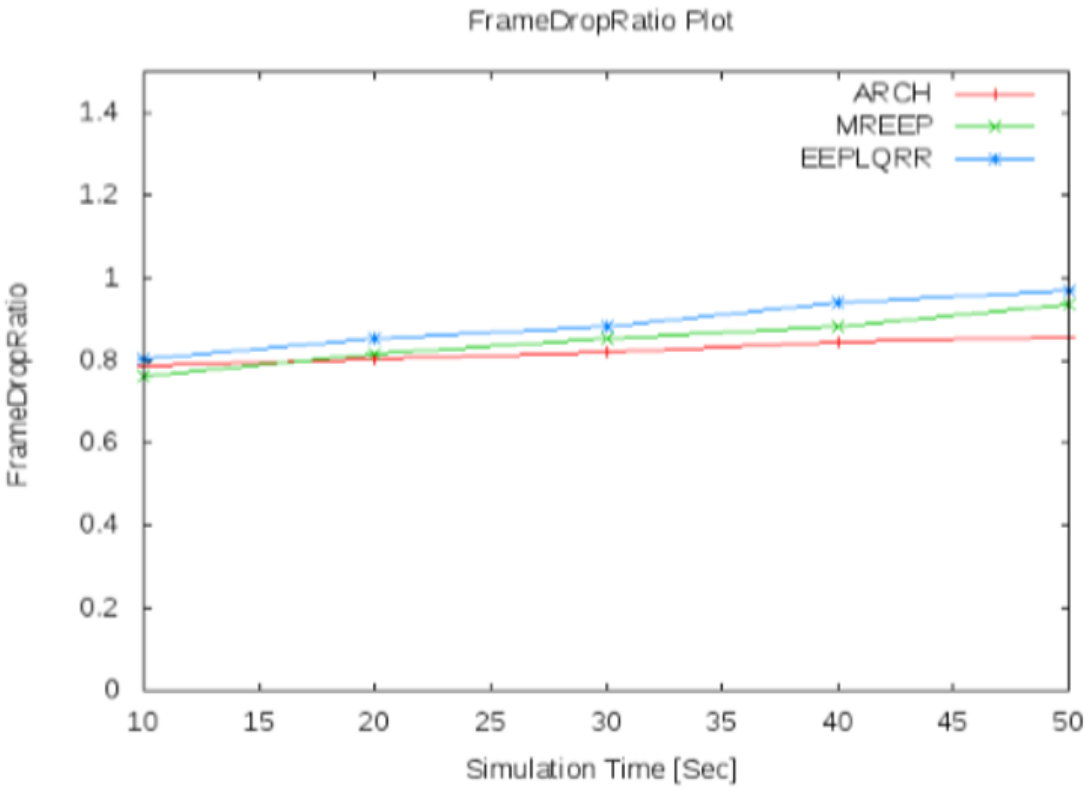


Nodes Vs Throughput



Nodes Vs Energy

VI. EXPERIMENTAL RESULTS



Simulation Time Vs Frame Drop Ratio

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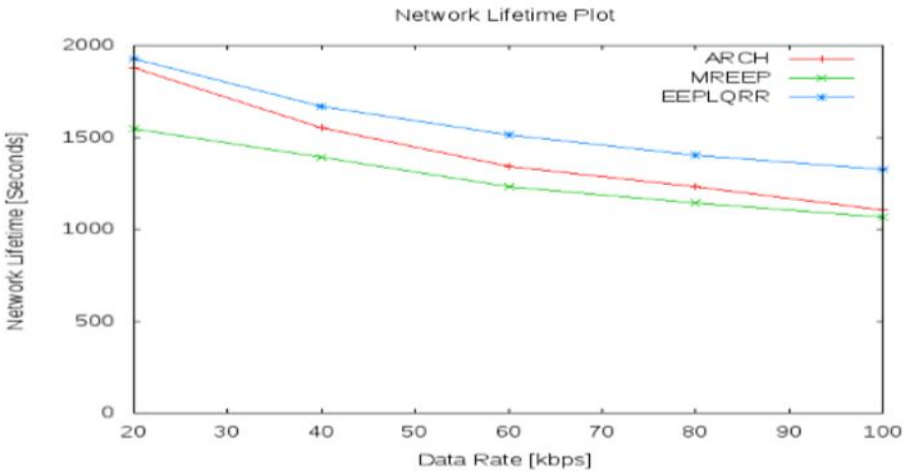

Data Rate Vs Network Lifetime

VII. FUTURE SCOPE

This exciting new technology with the potential for improving the sensing ability on environments, aggregate and fuse the sensed data and store them for instantaneous process in supporting numerous attractive applications in the domain of WMSNs. Some of the most important applications include multimedia surveillance, environmental monitoring, visual target tracking, bionic utilities monitoring, location-based multimedia services, health care applications and home automation applications

VIII. CONCLUSION

Simulation parameters used in the proposed method's experimental analysis are presented in this section. The simulation experiments (MATLAB 2022) was used in the simulation experiments, which is a well-known and reliable simulation tool for analyzing network routing and communication.The default values for the simulation parameters. The dimension of the network extends to an area of 100 m × 100 m, and the coordinates of the base station are [50.50]. There are different numbers of rounds in which the simulation results are evaluated. The period of a single simulation round is set to 1000.

Additionally, the number of agriculture sensors is set to 100, respectively. All of the agricultural sensors, i.e., temperature sensors, light sensors, soil moisture sensors, location sensors, airflow sensors, etc. are scattered randomly. Packet size (k) and payload size are set to 64 bits and 256 bytes

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