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Enhancing Qos in wireless Multimedia sensor Networks through Multi-Path Routing

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Abstract

Different QoS metrics are taken into consideration by a number of QoS routing techniques as a result of the variety of Internet application quality-of-service requirements. On the other hand, correctness cannot be guaranteed by simply adjusting existing multi-path routing techniques to maintain multiple QoS metrics. Improve the Qos Using Multipath Routing Protocol for Wireless Multimedia Sensor Network is proposed as a solution to this issue. Due to signal intrusion, which causes packet drop and communication failures, most wireless transactions have link losers. As a result, wireless multimedia applications will benefit greatly from concurrent routing alongside multi-path, which will significantly improve the capacity to handle these failures. Through the multimedia transaction that takes place between two nodes, multi-path communication helps to provide the substantial bandwidth that is required. Even though a single route could provide connectivity, multi-path transmission also balances traffic load, which can help the network last longer. Ant Colony Optimization uses the route preference option to select the multi-path in this strategy. Node residual energy, bandwidth, and next-hop accessibility are used to evaluate this route preference possibility. An indicator is used to compare the load on the next route in order to evenly distribute the data traffic across the sender-to-receiver connections. The simulation results show that reduces the network's average delay and route load function.

Keywords: Multi-path routing • Load balancing • Fault tolerance • Network capacity • Energy efficiency

Introduction

WSN has made huge strides in a number of areas recently. The availability of microchips and tiny sensor cameras is primarily to blame for the advancement. These devices effectively communicate and retain multimedia information from the surrounding environment. Due to its application program in a number of areas, WMSN is also the topic of conversation at the moment. In a variety of multimedia-based video observation applications, sensors are able to achieve an adequate bandwidth while reducing energy consumption. Multi-path routing is a viable option for reducing communication load and increasing channel utilization rate at the same time. In WMSNs, sensor nodes are dispersed and primarily restricted by transaction range and battery life. In WMSNs, the single path routing method results in extreme energy consumption and path failure. However, multi-path routing offers a number of functional advantages, including improved dependability, increased efficiency, reduced overhead, increased reasonable traffic load, reduced energy consumption, decreased latency, and collected network bandwidth. By providing load balancing capabilities, multi-path routing generally enhances network function. By reducing network traffic and latency, this routing helps to simultaneously communicate information. In addition, it was used to accept node failures to improve data dependability. In the Ad Hoc on Demand Multipath Distance Vector routing strategy, the Fitness Function method is utilized to maximize energy utilization. In multi-path routing, this fitness function is used to determine the best route from the sender to the receiver. The energy efficiency of the network is enhanced by this strategy. However, this cannot improve network QoS parameters like throughput, throughput, delay minimization, and routing load. Improve the Qos Using Multipath Routing Protocol for WMSN is proposed as a solution to these issues. Ant Colony Optimization is used in this strategy to select one of several paths based on the route preference option. Node residual energy, bandwidth, and next-hop accessibility are used to evaluate this route preference possibility. An indicator is used to compare the load on the next route in order to evenly distribute the data traffic across the sender-to-receiver connections. As a result, this strategy enhances the WMSN's QoS parameters [1].

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Description

Wireless Multimedia Sensor Networks have emerged as a powerful technology for collecting and transmitting multimedia data in various applications, including surveillance, environmental monitoring, and healthcare. However, ensuring high Quality of Service in WMSNs remains a significant challenge due to the limited resources and dynamic nature of the wireless medium. To address this challenge, researchers have focused on developing efficient routing protocols that can enhance the QoS of WMSNs. One such promising approach is the utilization of multi-path routing. This article explores the concept of enhancing QoS in WMSNs through multi-path routing protocols. Understanding QoS in WMSNs: Quality of Service in WMSNs refers to the level of performance that the network can provide to meet the requirements of different multimedia applications. It encompasses various metrics such as packet loss, delay, throughput, and reliability. However, achieving high QoS in WMSNs is challenging due to factors like limited energy, bandwidth constraints, and unreliable wireless links [2].

Multi-Path Routing: Multi-path routing involves the utilization of multiple paths between source and destination nodes in order to improve network performance. By distributing the traffic across multiple paths, multi-path routing reduces congestion, enhances reliability, and improves overall QoS in WMSNs. Traditional single-path routing protocols often suffer from link failures and congestion, leading to degraded QoS. Multi-path routing mitigates these issues by enabling efficient load balancing and fault tolerance. Advantages of WMSN Multi-Path Routing are Like; Managing the load: Traffic can be spread out over multiple routes with multi-path routing, balancing the load on the network. It prevents congestion and enhances the overall performance of the network by preventing data traffic from being concentrated on a single path. Tolerance for

Faults: Link failures and node mobility pose risks to WMSNs, which can cause packet loss and communication disruptions. By providing redundant paths through multi-path routing, the network can reroute packets in the event of link failures. This ensures reliable data transmission and enhances fault tolerance [3].

Increased Capacity of the Network: Multi-path routing makes better use of the resources that are already in the network and increases the capacity of the network. It can handle more data traffic and support the transmission of multimedia content that requires more bandwidth by utilizing multiple paths simultaneously. Delay from beginning to end: Real-time multimedia applications can be significantly impacted by packet transmission delays in WMSNs. By allowing packets to be transmitted concurrently over multiple paths, multi-path routing reduces end-to-end delay and minimizes queuing and processing delays [4].

Energy conservation: Due to the limited power resources of sensor nodes, energy consumption is a major concern in WMSNs. By balancing the energy consumption across multiple paths and reducing the energy load on individual nodes, multi-path routing can help improve energy efficiency. While multi-path routing offers several benefits for enhancing QoS in WMSNs, there are certain challenges that need to be addressed. These include path selection, load balancing algorithms, synchronization, routing overhead, and security considerations. Researchers are actively working on developing efficient algorithms and protocols to overcome these challenges and optimize the performance of multi-path routing in WMSNs [5,6].

Conclusion

Enhancing QoS in Wireless Multimedia Sensor Networks is crucial for the successful deployment of multimedia applications. Multi-path routing protocols provide an effective solution to improve QoS by leveraging multiple paths for data transmission. Through load balancing, fault tolerance, increased network capacity, reduced end-to-end delay, and energy efficiency, multi-path routing addresses the challenges associated with QoS in WMSNs. Continued research and development in this field will pave the way for more robust and reliable WMSNs, enabling the seamless transmission of multimedia data in various domains.

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Conflict of Interest

None.

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