International Journal of Combined Research & Development (IJCRD)
eISSN:2321-225X;pISSN:2321-2241 Volume: 6; Issue: 7; July -2017

An Efficient Geographical Routing Scheme Based On Pair-Wise Directions On Wireless Sensor Networks

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***Abstract*— Wireless sensor network consists of a number of sensor nodes connected by wireless links and they are distributed across a geographical area. The nodes can freely move inside the network. The geographical routing is used in the existing system. In geographical routing the 360 degree scope is considered but not effectively used. In this paper, we propose a path diversity routing protocol, which is based on the path of pairwise nodes and the 360 degree scope is satisfied. Thus, path diversity routing increases the packet delivery ratio and energy efficiency.**

***Keywords*— Directional geographical routing, energy hole, quality of service (QoS), wireless multimedia sensor network (WMSN).**

I. INTRODUCTION

The Wireless multimedia sensor network (WMSN) is a kind of new-type sensor network which is based on the traditional wireless sensor network, and it includes multimedia information perceptive function Its nodes are generally provided with camera, mini-microphone, and other sensors which can collect simple environmental data. WMSNs can be widely used in various fields such as battlefield visual monitoring, environment monitoring, safety monitoring, traffic monitoring, intelligent home, and medical treatment and public healthcare. One important problem about WMSNis how to provide quality of service (QoS) and reduce end-to-end delay while meeting bandwidth requirement because the WMSN transfers multimedia such as videos and pictures [1]. Meanwhile, processing of medium information and transmission of mass data in the WMSNs need a lot of energy.Multipath route can make full use of the current network resources and provide sufficient bandwidth for multimedia as much as possible, so it becomes one of the hottest topics about WMSN to be researched [2]. Compared with traditional wireless sensor network (WSN), WMSN transmits and deals with multimedia data, which causes high bandwidth and energy consumption. Traditional routing algorithm cannot provide a good QoS of WMSN. Multipath route are paths built between source and sink nodes and distributes data equally to many paths so as to make more nodes participate and prolong lives of nodes and network. Multipath routing algorithm has a lot of advantages to face these challenges.

1) Reliablity and fault tolerance: There exists two ways to improve the reliability. The first method is to send the copy of the raw data package by different routes, make sure that if any route occurs fault can recover by the others' paths [3]–[5]. The other way is to use fault tolerance coding to add some additional information in the source of the raw data, than dispatch the data in multipath, if the objective node receives part of the data packages can recover the whole data package [6], [7].

2) Load balance and bandwidth improvement: Multipath routing strategy can support different applications and solve the network congestion problem by dispatching the network traffic equally in multipath and it can dispatch the traffic in different load strategies.

It is also important to see that, in wireless communication, bandwidth is shared between neighbor nodes and a node may interfere with geographically close nodes, thus degrading the throughput. To ensure real-time transmission efficiency for WMSN, it is, therefore, desirable to transmit data through paths that will not interfere with each other. But when data are arriving sink, it is inevitable that multipath will be gathering there and meanwhile the nodes near sink undertake retransmission of node data in the periphery area so that its energy consumption is significantly higher than in other areas [8]. The nodes that near sink area can form energy hole which makes the energy in other areas cannot be used sufficiently by 90% when the network is dead [9].

In the previous research, the researchers tend to build disjoint path and reduce interference to prolong the network life. Only making use of nodes in the partial angle scope of sink and exhausting excessive energy consumption in the area around sink, it also has serious impact on the lifetime of WMSN. To make full use of the neighbor nodes of sink and prelong the lifetime, PWDGR multipath route scheme is proposed based on directional geographical routing (DGR) [10] route scheme and the main contribution of this paper are as follows.

• We make the full use of the nodes that around sink through pair-wise node. The path angle around sink has been ignored in the previous researches and, therefore, it is unable to make full use of neighbor nodes around sink. In our program, the neighbor nodes in the 360◦ scope around sink are fully used, transmission angle of paths is selected in the 360◦ scope, and pair-wise node is selected as destination node in the 360◦ scope around sink node according to the transmission path of each path when source sends data in paths and then retransmits to sink after arriving the pair-wise node.

• The algorithm of source multipath dispatch-selection first-hop node is optimized by taking the energy consumption problem into consideration and the follow-up retransmission node changes accordingly after the first hope node changes so

that the energy consumption of the whole network keeps balance to a higher degree.

II. Related Work

Our work is related to transferring multimedia information through the scheme PWDGR. We will give a brief review of the existing work in these areas. Multiple paths are used for transferring multimedia information. Video stream is divided into sub-streams and transferring these sub-streams through multiple paths in parallel. Energy Efficient Collision Aware (EECA) node disjoint multipath routing algorithm builds multiple paths using request/reply cycles. It creates two disjoint paths from source to the destination. It results in good performance, energy saving and data transferring. Directional geographical Routing (DGR) aims to compute multiple paths for video sessions [9]. It creates different initial deviation angles to construct multiple disjoint paths. A probe message is broadcasted by source node to create direction aware path. If the deviation angle is fixed, probe message may go farther from the sink, and may arrive at network border. So after a number of hops it may point back to the sink by adjusting the deviation angle.

III.PROPOSED SYSTEM

In this project, we propose a pair-wise directional geographical routing (PWDGR) strategy to solve the energy bottleneck problem. We make the full use of the nodes that around sink through pair-wise node. The path angle around sink has been ignored in the previous researches and, therefore, it is unable to make full use of neighbor nodes around sink. In our program, the neighbor nodes in the 360◦scope around sink are fully used, transmission angle of paths is selected in the 360◦ scope, and pair-wise node is selected as destination node in the 360◦ scope around sink node according to the transmission path of each path when source sends data in paths and then retransmits to sink after arriving the pair-wise node. The algorithm of source multipath dispatch-selection first-hop node is optimized by taking the energy consumption problem into consideration and the follow-up retransmission node changes accordingly after the first hope node changes so that the energy consumption of the whole network keeps balance to a higher degree.

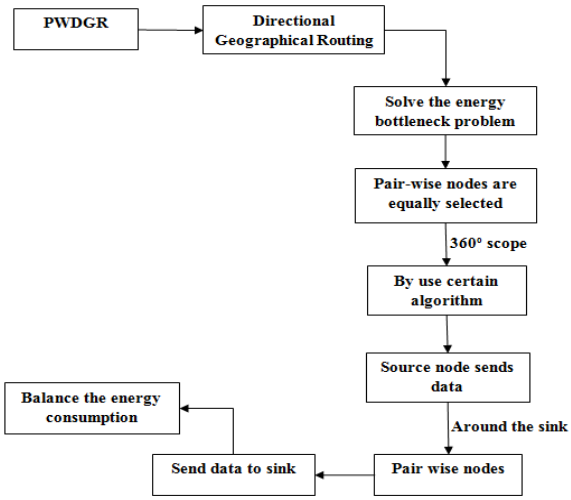

Fig.1 Block diagram of Proposed System

Advantages of Proposed System:

- Reduce the energy consumption
- Increase the network lifetime

IV. Implementation

MODULES:

- Network Model
- Energy Consumption Model
- PWDGR Route Scheme
- Performance Evaluation

Network Model

We use the same system model as DGR and video monitoring node VN is at a corner in an area, so that the reception-end node is at the other corner of the area. It is assumed that reception-end node and common sensor node are both static. The realized sensor node is a 4-layer protocol. Sensor application module is composed of a data source with fixed bit rate and its responsibility is to produce a kind of multi-medium stream with certain QoS demand. We use IEEE 802.11 DCF as low-level MAC. All the nodes have known their geographic locations by means of positioning system. Wireless launch power of the sensor node is controllable, i.e., a node may adjust its launch power according to the distance of receiver. All the nodes know the geographic locations of other nodes within its communication radius and name these other nodes as neighbors or accessible node. The sensor nodes are battery-operated except the sink. The sink is assumed to have infinite energy supply. We assume both the sink and the sensor nodes are stationary. The sink locates at one side of the area, whereas the source is specified at the other side. In the whole network, only some video monitoring nodes (VN) cover monitoring area and capacity of battery equipped for VN node is larger than that of common nodes. The responsibilities of other common nodes are transmitting data

to the sink through many hops and sink node has infinite energy.

Energy Consumption Model

Energy model in DGR is used here and energy consumption parameters are shown. Every node has the same primary energy, except source node and sink. The formula below is used to compute the node energy consumption

E = mtx • Ttx + mrecv • Trecv + moverhearing• Toverhearing + midle • Tidle.

They, respectively, indicate sending time, receiving time and overhearing time and they are acquired by quantity of sending package dividing wireless rate. For example, Ttx is the result of quantity of sending packaging dividing sending rate and Tidle is the result of total operation time of the network minus sending time, receiving time, and overhearing time.

PWDGR Route Scheme

First, we find pair-wise node around sink node as the first destination for sending according to the angle of source sending path, then send to sink node and 3-hop pair-wise node around sink. The advantage of doing this is to make full use of nodes within 360◦ scope around sink to transfer data so that energy of nodes around sink can be fully used to prolong network life. While in DGR scheme only nodes in partial scope around sink are used so that it is easy to form energy hole around sink. Second, selection algorithm of source cooperative node is optimized in order to avoid that fixed selection of nodes by path makes their energy use up too fast.

Performance Evaluation

Performance parameters in the following are taken into consideration.

Network life can be defined as the time period from the beginning to death of the first node and it weakens the network detection capacity and the network cannot do what it should do. The definition in this paper is the same as that in the documents, i.e., the network life is defined as the time when the first node dies.

End-to-end delay is defined as the average of time difference between source sending package and sink reception package. In formula, tbi is the sending time of No. I package, tei is the time when receiving No. i data package and n means total number of sending packages.

Average hop is defined as the average value of hops of source sending package and sink reception package.

Average energy of each package is defined as the average value of energy of source sending package and sink reception package

V. RESULTS

After implementing the proposed system on NS2 platform, the results obtained are as follows:

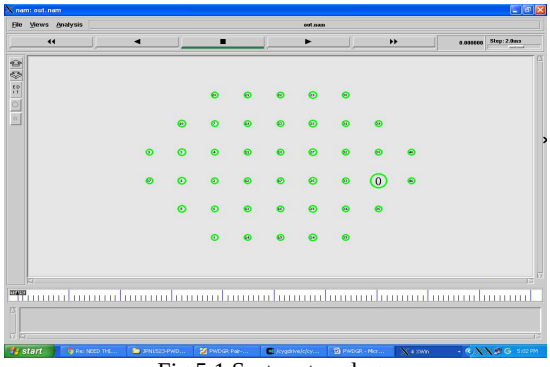

Fig 5.1 System topology

The above image shows the topology of the system. It shows the number of nodes and structure of system.

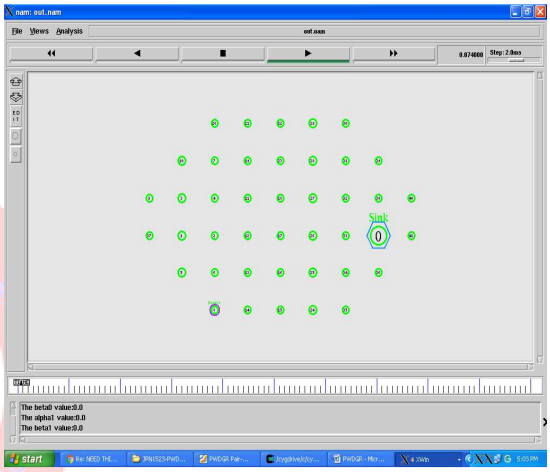

Image 2 Node configuration stage

The above image shows the corresponding nodes are identified as source node and also the sink node it is shown here.

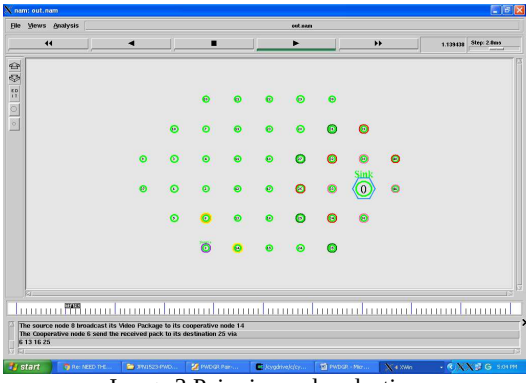

Image 3 Pairwise node selection

The above image shows the process of pair-wise node selecting scheme.

VI. CONCLUSIONS

In this work, we suggested a latest form of pair_wise directionally considered geographically based standard routing to reduce the specific energy hole specifically around

basic sink unit. Neighboring entities of the sending unit firstly transfer information to the corresponding pair_wise entity around the sink unit by making use of standard DGR technique and then specifically transmit information to the corresponding sink unit by specific GPSR technique. The neighboring entities in the basic 360◦ range around specific sink unit are completely utilized to extend the N/W lifespan, which generally has been disregarded in the former research study. Non-practical examining and simulating demonstration on the suggested technique are differentiated with standard DGR. The outcomes of simulating demonstrations stipulate that specified PWDGR routing strategy importantly extends the networking operative life by choosing in sensible way the element, and correspondingly its networking working life is going to be extended by 70% at the time the n/w specific delay generally only expands 8.1%. The specified PWDGR exhibits in superior in densely considered wirelessly specified sensing n/w. As the specific future work to be consider, we going to explore the PWDGR specifically in framework basically with moving source unit or number of sending entities.

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