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Survey on Energy Efficient Approach for Wireless Multimedia Sensor Network

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***Abstract*-There has been a current appearance of multimedia streaming function over sensor networks, such as multimedia surveillance storage of potentially applicable behaviour from network cameras traffic circumstances and collision avoidance. Though, wireless sensor networks have precincts in behind these video/audio stream applications. since of the need of undefined bandwidth, reduced link individuality and limited power provide. Current advance of multimedia source coding method such as Multiple Description Coding and cheap hardware, have made multimedia show over WSNs probable. In a lot of applications, not everyone video data require to be transmitted to the end-users. In this research we analysis many protocol and develop energy efficient routing providing service differentiation for multimedia data but to investigate use of multiple sinks in clustered WSN which improves the network lifetime. And reduces and balancing the energy expenditure so that the lifetime of network is maximized and extended, which is a essential objective for WMSNs because energy is constantly a scare resource in wireless sensor node.**

***Keywords*— Sensor Network , WMSN, Bandwidth, Energy Expenditure .**

I. INTRODUCTION

A WSN consists of many number of sensor nodes that have the capability to converse amongst themselves by radio antenna. These nodes are frequently diminutive in size with limited dispensation power limited memory and limited energy resource. Hence they work as one in association as a network towards achieves a frequent goal of sensing a physical parameter over a huge geographic region with better accuracy. Since they are agreeable to support a variety of real-world application the WSNs are careful as influential sensing network to the present day world. The suppleness in its utilize is as well the cause for it to be a difficult research or engineering problem. Sensor nodes are inhibited in energy provide and bandwidth. Consequently, innovative methods that eradicate energy inefficiencies that would abbreviate the lifetime of the network are extremely required. Such constraint combined with a characteristic utilization of huge number of sensor nodes pose numerous brave to intend and supervision of WSNs and require energy awareness at every layers of the network protocol stack. Especially, multimedia communications bring significant challenges for WMSNs in matching the energy processing capacities and the level at which multimedia application objectives are met, because those wireless nodes need to monitor the environment and act as a relay node to transfer data simultaneously. Routing algorithm is responsible for computing and selecting an optimized path to delivery data from the sensing nodes to the sink or transfer queries/control packets from the sink to specific sensor nodes. It is playing a more and more important role in the research area of multimedia communication algorithms and protocols for WMSNs. In essence, the WMSNs routing algorithm for multimedia communication is a QoS requirement routing algorithm. Those QoS requirements include end-to-end delay guarantee, bandwidth resource, energy consumption, loss packet ratio and the lifetime of network, etc. In wireless sensor networks field, there exist some algorithms to research the routing problem. But most of all try their best to consider the energy consumption because the energy is a scare resource to wireless sensor node. Only a few algorithms consider the QoS support at the same time. Generally, they can be classified into five types: data-centric Algorithm, hierarchical algorithm, location/position-based algorithm, network-flow algorithm and QoS-constrained algorithm. Those typical algorithms include SPIN, Directed Diffusion, LEACH, GEAR, In the paper, we design a new routing algorithm to provide QoS support for multimedia communication in WMSNs. The algorithm involves two design goals:

Firstly, providing hard/strict end-to-end delay guarantee, which is the all-important goal for real-time communication in WMSNs.

Secondly, in this survey minimizing and balancing the energy consumption so that the lifetime of network is maximized and prolonged, which is a basic goal for WMSNs because energy is always a scare resource in wireless sensor node. Moreover the lifetime of network is a fundamental condition for providing other QoS supports. At the same time, we also analyse the performance of the new algorithm and verify its correctness in theory and simulation aspects.

II. LITERATURE SURVEY

To prolong the wireless multimedia sensor networks is to maintain QoS parameters and improve the network lifetime.

Energy efficient: Energy consumption is one of the most challenging aspects in designing the WMSN. In sensing data and maintain routing table nodes loss their energy.

So energy consumption must be highly constrained.

Scalable: In WMSNs huge amounts of nodes operated normally in physical area, so performance should not degrade with network scalability.

Secure: WSNs should ensure data robustness, integrity and confidentiality

Life Time: network life time as the maximum time before any node in the network drains up its energy. Network lifetime should be very long.

End to end Delivery (Delay): The sink must be able to receive notification that a particular event has occurred in a particular region of the network within a short time period after the occurrence so that it can react appropriately. WMSN network should have stricter delay constraints.

Packet Loss: Whole data should be delivered at the destination without loss of a single packet.

Routing Protocols in Wireless Multimedia sensor Network

LEACH:[6] LEACH is a self organizing, adaptive clustering protocol. It is based on randomization distribution of energy. According to LEACH, a fixed base station and is located to far apart from the sensor nodes. Clusters are formed and within each cluster, Cluster Head (CH) is selected. Cluster head act as a local base station.

LEACH follow two steps:

Set-Up Phase: In Set-Up phase clusters are formed and cluster head is selected. Node which has high energy is selected as cluster head. Cluster Head is change in each round according to some priority and energy level.

Steady state: In this phase sensor nodes send data to the cluster head. Then cluster head send these data to the Base Station.

TEEN [7]: TEEN is also a hierarchical based routing protocol,

It is based on LEACH. It follows two assumptions: firstly BS and sensor nodes have same initial energy. Second BS can send data to all nodes directly.

In TEEN protocol two types of CHs (Cluster head) are maintained. First Level Cluster Heads are far away from the BS, and Second Level Cluster heads are near to BS.

Cluster heads sense data and send it to the neighbors by two types. First Hard Threshold, when the sense attributes are in the range of interest. Second Soft Threshold, when the attributes are not same as interest and any small change in attribute is required.

Drawback of TEEN:

Node has to wait for timeslot and reverse may also be possible that time slot available but node has no data to send.

APTEEN [8]: APTEEN is an extended version of TEEN protocol. It is developed basically for hybrid networks. It captures the periodic data collection and reacts to time critical events.

In APTEEN the cluster head is elected in each round and after that the new cluster head send some parameters:

Attributes, Threshold, Time schedule, Count time.

Each node set according to threshold and count time. And sends data according to time schedule. Bas it is hybrid network so it may be proactive network or reactive network, its depend on count time and threshold value. One drawback is Complexity, which is high for this protocol.

SPIN[8,9]: SPIN is a data centric routing protocol. It is type of adaptive protocol which use data negotiation and resource- adaptive algorithm.

This protocol assumes all nodes of network as BS. and secondly nodes have close enough have similar data.

Since all nodes pretend as BS so user can send request to any node and collect the information. All nodes share the whole information by broadcasting the information within the network. Nodes use high level name to describe the collected data called meta- data. The format of meta-data is not specified, it depends on application. meta-data solve the flooding problem and achieve the energy efficiency.

SPIN uses three types of messages:

ADV: If a node get/sense some new data and want to broadcast that data so it use ADV message to broadcast the data.

REQ: Any nodes request the data by sending the REQ message.

DATA: Data is the actual message which sends to requested node.

Advantage of SPIN is that any topological changes are come then it is localized. And another one that it is energy saving protocol.

Direct Diffusion:[10,11] It is Data Centric and application aware protocol. Data sense by sensor node is named as attribute-value pair. It works on four parameters:

Interest: Describe a task,

Data message: Data message are named using attribute – value pair**.**

Gradients: It defines the data rate and direction of event. And

Reinforcements: It selects the particular path from number of paths.

In the data centric protocols the data is collected from different nodes then eliminate redundancy, minimize number of transmission paths and saving network energy and improve the network life time. In Direct Diffusion query/ interest is diffuse/ forward towards the interested region. Then it is again forward to the network. Each sensor node receive the query set the gradient parameter toward the sensor node from which it receive the interest. This process continues until the gradients are set from source to BS. Then data is send to the BS by reverse path. Although it application specific an energy saving protocol but it is not reliable and costly.

Geographic and Energy- Aware Routing (GEAR)[9,10]

GEAR is location based routing protocol, which uses the Graphical Information system to find the location of sensor node with in the network. Location based routing protocol needs sensor location information to calculate the distance between two sensor nodes. According to GEAR protocol two costs for reaching destination are measured:

Estimate Cost: It is calculated based on residual energy and distance to destination.

Learned Cost: Learned cost is modified estimated cost and it accounts the routing around the holes in the network.

If a node does not have any closure neighbor towards the destination region, then hole occurs and learned cost is calculated according to estimated cost. If no hole exit then

learned cost is equal to estimated cost. GEAR protocol interested in only certain region rather than whole network.

GEAR protocol works in two phases:

Phase –I : In this phase the packets are forwarded towards the target region. The node which receives the packet find the closure neighbor and forward the packet. If there are more suitable nodes then hole exist in this case node is selected to forward the packet according to learning cost.

Phase – II In this phase, packets are forwarded within the region. Forwarding within the region is done by two routing:

Reverse geographic routing: If the node density is high within the region then reverse geographic routing is used.

Restricted routing: If the network is not densely deployed of sensor nodes so restricted routing is used.

According to EEQAR 2011[1]

This paper based on Cluster Hierarchy in which cell topology is used to form the clusters. Cluster hierarchy is effective to achieve the energy efficiency and meet the requirement of QoS. Another factor in wireless multimedia sensor network is reliability. To make reliable sensor design of QoS estimation model based on social network analysis by monitoring the behaviors of neighbor nodes. Sensor network are formed as clusters so that good flexibility and high communication efficiency can achieved.

System Model and problem statement:-

Network Model: - Whole network is divided into clusters and within a cluster some agent nodes are assign those are called cluster head. Cluster head collect the data from sensor nodes and send data to the sink node.

Fusion Model:- Data fusion can be used to reduce the redundant data during data collection.

Energy model:- Data fusion takes extra energy consumption.

Problem statement: - To make reliable and shortest path and make sensor network energy efficient.

QoS Trust estimation model:- WMSN is analyze based on social network.

The similarities between WMSN and Social network:-

1) Autonomous choice of object among nodes.
2) Sharing the mutual information.
3) Searching and analyzing the past mutual information, then determining whether to establish the trust relationship.
4) Transmit the trust by recommendation.
5) Not the absolute reliability and service quality, which means nodes, can endure the loss as small mistake.
6) Obligation of recommending information for other nodes.

Advantage:

- Consider Energy Efficiency of network and QoS both.
- Reliable Network.

Disadvantages:

Computation complexity is high.

According to Yanbin Weng:-[2]

This method is based on Sink Movement scheme. Sink move within the network and collect the data from sensor nodes within one or two hops. And design a simple routing protocol to save energy. it focus on hot spot problem. by using mobile sink node all the sensor nodes comes vicinity of sink node and sensor nodes send data to the sink node and increase the lifetime of the network. To control the mobility of the sink node Archimedean spiral which has constant linear velocity and angular velocity is maintained. If the distance from sensor node to sink node increases energy is consumed.

Advantage

- Mobile Sink node is used so that the life time of network can be increase and delay can decrease.

Disadvantages

- Not applicable for sensitive delay applications.

According to Bijun Li:-[3]

This method is based on (m, k)- firm based scheme to assure the QoS parameter within WMSN. The QoS parameters are calculated at the sink node. It is based on two parameter status indicator. This method mainly focused on real – time services. It uses two indicators:-

1) Local_DBP (Distance based priority):- Local transmission indicator is used to monitor the statement of delivery to the next hop and indicate network faults.
2) Stream delivery is calculated at sink, to show QoS requirements within network.

To establish the path between sensor nodes and sink node routing algorithm is used. To exchange information between nodes beacon scheme is used and shortest path find between sensor nodes to sink node.

Advantage

- Handle real time applications
- And End to end dynamic Failure.

Disadvantages

- Beacon scheme may create delay.

According to Lei shu:-[5]

This method based on Two-phase geographic greedy forwarding routing algorithm

This method mainly focuses on three issues:-

- Multipath transmission:- TPGF can find one routing path per execution and can be executed repeatedly to find more on-demand node- disjoint routing paths.
- Hole – bypassing:- TPGF provides a better solution for hole- bypassing in both 2D and 3D WSNs.
- Shortest path transmission:- TPGF find the shortest routing path for minimizing the end –to-end transmission delay.

Advantage

- Hole bypassing of dynamic nodes
- Multipath transmission
- Shortest path transmission

Disadvantages

- Energy consumed process

According to Chia –Yi Lien [4]

The proposed method focus on network lifetime in query solving problem, to solve it firstly construct the generic cost estimation model for energy consumption, then Concentrate the NP- complete problem and suggest the heuristic approach MNL. Which maximizes the number of queries answered until the first node in the network fails. Minimize the total energy consumption per data gathering query and maximize the minimum residual energy among sensors.

Advantage

- Improve Network Lifetime

Disadvantages

- Complex Approach

III. PROPOSED METHOD

The proposed method considers a Wireless Multimedia Sensor Network, which contains sensor nodes, and a fixed base station. The locations of sensor networks and base station are fixed. The proposed method considers cluster based network in which network forms in clusters and each cluster contains number of sensor nodes. Clusters have a single cluster head which collect the data from cluster and send to the base station. The proposed method apply Dijkstra Algorithm to find the shortest path and provide Energy Efficient system and improve the lifetime of network as well as will provide strict/ hard end- to- end delay with in network.

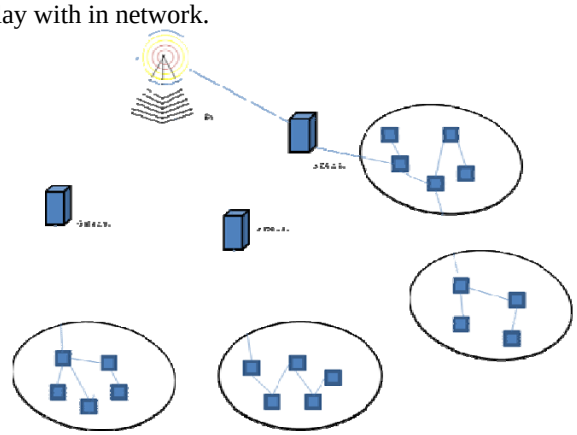

Fig. 1 WMSN Basic Model.

WMSN Basic Model

We sum up cluster-based wireless sensor network model similar to [5] with the following properties: A fixed base station (BS) and wireless sensor nodes. BS has high-energy. The wireless sensor nodes are energy constrained with a uniform initial energy allocation. The nodes are equipped with power control capabilities to vary their transmitted power (or distance).Each node senses the environment at a fixed rate and always has data to send to the BS. The topology of wireless sensor network is changed after a round or when BS has collected all the sensed data once. command language) script and so we will simulate our propose (narrative approach for exterminate energy inefficiencies that shorten the lifetime of wireless multimedia sensor networks) Wireless Sensor Networks algorithm. As a output of simulation we can obtain a text file.

IV. CONCLUSION

In this Survey Paper the proposed method in cluster based WMSN uses the Dijkstra algorithm and shortens the energy inefficiency of the multimedia network. And proposed method results will compare with other methods. This proposed method will also provide strict/hard end – to – end deliver of multimedia data in network

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