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PHASE DETECTION WITH ADAPTIVE ROUTING AND QOS AWARE CHECKPOINT ARRANGEMENT ON WIRELESS MULTIMEDIA SENSOR NETWORK

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ABSTRACT

Wireless Multimedia Sensor Networks (WMSN) is a blooming field due to the development of CMOS cameras and microphones which are the wirelessly interconnected devices that are able to retrieve multimedia content such as video and audio streams, still images and scalar sensor data from the environment . As of today, almost all deployed wireless sensor networks measure scalar physical phenomena like temperature, pressure, humidity. The node of Multimedia sensor network that equipped with cameras, microphones, and other sensors producing multimedia content , or location of objects.

Routing in Wireless Multimedia Sensor Network is an Important issue since the WMSN nodes that sense the data need to be communicated to the base station, to take necessary decision. The key issues in the design of routing protocol in the WMSN are energy consideration, Adaptive routing, multimedia consistency, tight QoS expectations, and high bandwidth demands. Although many routing protocols have been proposed for the WMSNs, the design of a more efficient protocol in terms energy awareness, video packet scheduling and QoS in terms of checkpoint arrangement is still remain a challenge. This work involves the design of the routing protocol in wireless multimedia sensor networks which is power aware, reliable and has low latency in delivering the data from source node or sink node that is sensing the data to the destination node The proposed new architecture called ASARC:ACTUATION SENSOR

ADAPTIVE ROUTING WITH CHECK POINT ASARC provides selection of paths for communication between any two nodes such as sense or relay node.This feature prolongs the lifetime of the network. Also from the data
security and Qos point of view, ASARC is immune to any specific attacks.

***Keywords*— ASARC,WSN, WSMN, Multipath discovery, Energy-aware routing ,Check point**

I. INTRODUCTION

Many applications needs mechanisms to deliver multimedia content with a certain level of quality of service(QOS) .Managing real-time data requires both energy efficiency and QoS assurance in order to ensure efficient usage of sensor resources and correctness of the collected information .

Transmission of imaging data requires both energy and QoS aware routing in order to ensure efficient usage of the sensors and effective access to the gathered measurement

QoS routing problem model with multiple QoS constraints mainly embodied in audio and video quality, network delay, network coverage, service duration and power consumption. The common characters between WMSNs and WSNs are self-organizing, multi-hop routing, large scope, limited resource, energy consume sensitivity.WMSNs have the following particular requirements:

(1)Great energy(2) To condensate coding of images, disposal of videos and information.(3)Strict real-time performance and great network throughput to adapt different application requirements, and minimize the energy consume on the premise of QoS is satisfied.

Due to the performance of real-time and guarantee for WMSNs, the QoS guarantee encounters new challenges analyzed the QoS requirements from the following two aspects

(i)Application specific QoS, coverage of networks, measurement errors and the best activity node number all can be taken as the QoS parameters.

(ii)Network QoS, aiming at network, it must make the best of network resources to transmission sense data with QoS constraints.

Data of QoS requirements are Data of real-time, loss tolerance of multimedia flow, data of non-real-time, loss of tolerance of multimedia stream. High reliable data flow.

II. RELATED WORK

In paper [1] t Ian F. Akyildiz , Tommaso Melodia and Kaushik R. Chowdhury proposes an overwhelming majority of the studies in WMSNs such us Algorithms, protocols, and hardware for the development of WMSNs, and open research issues related to processing and compression of multimedia data for increased network lifetime and Quality of Service (QoS) provisioning which is required for multimedia data and issues at the application, transport, network, link, and physical layers of the communication stack, along with possible cross-layer synergies and optimizations

In paper[2] the author proposes the MPDT (Multipath Data Transfer) is an algorithm used in Wireless Multimedia Sensor Network. The algorithm distributes the work among the nodes uniformly. This is helpful in prolonging the life of the Wireless Multimedia Sensor Network. So observed that the packet drop reduces as the number of paths selected for the data transmission is increased. The algorithm ensures that data transmitted is reliable, end delay can be considered and not manipulated by an attack.

In paper[3] the author analyzes the QoS parameters of WMSNs, presents data package type and *Compare and analysis of routing protocols* and *Challenges for QoS routing of WMSNs* then has a research on QoS routing algorithms for WMSNs, and introduces some typical algorithms

In paper[4] the author Andrew Newell and Kemal Akkaya proposed a distributed camera actuation algorithm which turns on the least number of camera sensors during an event such that the amount of redundant multimedia data can be decreased while still the adequate coverage can be achieved. The camera sensors exchange their Field of view(foV)s with their neighbors before they decide to be actuated. If the portion of the event area covered by a particular camera sensor has not already been covered by other camera sensors and the size of such area is significant enough, the camera is actuated. The algorithm is completely distributed and requires only 1-hop communication for the nodes

In paper[5] the author Zolt´an Vincze, Rolland Vida, Attila Vid´ac says a mathematical model to determine the sink locations that minimize the average communication distances. Based on the results of the model, proposed two sink deploying algorithms. The algorithm uses global information about the locations of the sensor nodes in the network, while during the operation of 1hop the sinks know only the location of the neighboring sensors.. Thus, 1hop deploys multiple sinks efficiently and it uses local information, therefore it has no scalability problems

In paper[6] the author Huiyu Zhou, Murtaza Taj, , and Andrea Cavallaro, *proposes* a particle filter-based tracking algorithm that integrates measurements from heterogeneous sensors and demonstrated it on audio and video signals. In order to reduce the effects of reverberations and noise, he used a Riccati Kalman filter that automatically updates the audio measurements

In paper[7] the author Paul J. Darby, Student Member, IEEE, and Nian-Feng Tzeng, Fellow, IEEE implications for resource scheduling, checkpoint interval control, and application QoS level negotiation. It fills a novel niche component of the everdeveloping field of MoG

middleware, by proposing and demonstrating how QoS-aware functionality can be practically and efficiently added.

In Paper[8] the authors Dionisis Kandris_, Michail Tsagkaropoulos, Ilias Politis, Anthony Tzes and Stavros Kotsopoulos propose the combined use of an energy aware hierarchical routing protocol with an intelligent video
packet scheduling algorithm. The adopted routing protocol selects the most energy efficient routing paths, manages the network load according to the energy residues of the nodes and prevents redundant data transmissions

In paper[8] the authors Dionisis Kandris_, Michail Tsagkaropoulos, Ilias Politis, Anthony Tzes and Stavros Kotsopoulos proposes a technique in wireless multimedia communications. Both these techniques are combined in a proposed scheme which firstly, utilizes nodes with the highest residual energy and low power-cost paths, in order to perform the routing and secondly, predicts the distortion of video packets and selects to either drop them or transmit them according to the current channel bandwidth limitations. The simulation results prove the efficiency of the proposed combined scheme in terms of power consumption and received video distortion (PSNR).

III..OVERVIEW OF PROPOSED SYSTEM

During the survey of routing protocols, it is observed that routing protocols for Multimedia sensor networks are found to be concentrating on communication between the nodes using single path. It is necessary to develop an algorithm for Wireless Multimedia Sensor Network to flexibly perform the communication with minimum energy consumption, Qos and restricted execution time. Multimedia sensor network is deployed densely by wireless multimedia sensor

node(MWSN) and wireless sensor node(WSN). Each MSN is aware of its own location by using location technique or GPS

There are two different types of sensor nodes: MSN for sensing data, sink nodes for receiving, storing, and processing data from MSN. In this algorithm source node senses the multimedia data with phase detection and auto focusing technique and communicates the sensed data to the destination node Via sink with Qos checkpoint routing

By using actuation algorithm to maximize the event coverage with least amount of redundancy by effective use of Multimedia Sensor Node .Once an event is detected with Multimedia sensors, the sensors in the vicinity can be actuated to capture an image or video of the event until the event ends. Such video data can then be used for scientific observations. .There are 4 phases to support Qos checkpoint routing algorithm

A. **Actuation algorithm for sensors with phase detection and Auto focus**

Actuating the sensors on demand basis by how many and which camera sensors to be actuated. To get an adequate coverage of the event, it is better to actuate all the camera sensors within the vicinity of the event. However, this may introduce a lot of coverage overlaps among the camera sensors' field-of-view which eventually causes some of the camera sensors to produce and transmit redundant multimedia data. Processing and transmitting such redundant data over possibly multiple hops to the base-station will unnecessarily increase the energy consumption of the whole network. Therefore, a mechanism is needed to determine which camera sensors to be actuated in order to minimize the amount of redundant multimedia data while still providing the necessary coverage for the events.

In addition, such an actuation mechanism should be run onsite in-order to speed up the decision While maximizing the image/video coverage is important not to miss any part of the

occurring events, such coverage should be provided with the least number of WMSN so that the overlaps among them can be reduced. At the same time battery power of other sensors in the vicinity is saved. Otherwise, such overlaps will cause multiples of the camera sensors to transmit the same (i.e., redundant) multimedia data to the sink.. Given the high energy cost of processing and transmitting multimedia data, multimedia data elimination is crucial in order to improve the lifetime of the network.

Tracking of object by Phase detection method involves estimation of arrival, angle of signal, video detection, filtering, smoothing, fusion and joint state estimation and auto focus of objects. Views are merged together and reconstructed into a 3D convert into 3D image .

B. Adaptive Routing Path

The route discovery includes the transmission to source, or sink node discovery and Next Hop Discovery message Routing in Distributed network environment of sensor node.This can be established by Two Stages

B1. Distributive cluster arrangement

In the cluster of node, each node may be either in sense mode or in relay mode. In sense mode it senses the data and in relay mode it acts merely as a relay route. The mode of the node is decided by the energy, angle of position in the vicinity to act as sink or relay. For security purposes only that particular node knows if it is in the relay or sense mode. In relay hop it is identified by its ID

B2. Path Discovery message

1) Multipath Discovery message transmission

MWSN transmits MPD (Multipath Discovery) to all next hop neighbors in the grid; Gn is the set of all one hop neighbors. The node can directly communicate with the nodes that are listed in this set without using relay nodes.

2) On receiving the MPD message the node or sink responses with its ID no by Node ID (NID) or Sink ID(SID)

3) Priority given to Sink ID(SID) for next hop from the source

Since in a multi-hop WSN a sensor spends most of its energy for relaying data packets it is important to shorten the distance a packet has to travel until reaching the sink. These distances can be reduced seriously by deploying multiple sinks instead of one. In that case every sensor communicates with the closest sink. In order to achieve the shortest distances the sinks have to be deployed in a coordinated way.

4) Next Hop Discovery: Upon receiving Multipath sink discovery (MPSD) message, the sink node sends Next Hop Discovery message (NHD), if and only if the number of paths already established through the node is less than the threshold* and the residual energy of node is more than the minimum energy, otherwise sends NACK (Negative Acknowledgement) message. The relay node forwards NHD message to its neighbor. This process is continued till the NHD reaches destination. After receiving NHD if destination node is ready for reception of data, it transmits the Ok message to node that has sent NHD message.

5) After receiving OK message: Upon receiving OK

message, the message is forwarded by all relay nodes to their NHD/ MPD sender. When the source node receives the

OK message it adds the message sender node ID to Mh set

which contains the nodes which are used as next hop nodes in the multipath transmission

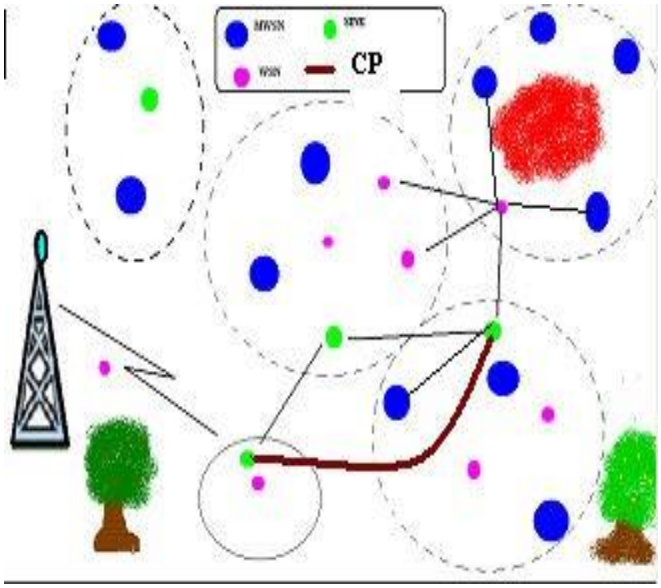

Fig.1 Proposed Architecture of ASARC

B3.Data dissemination

After the path selection, data transmission phase select a node or sink to transmit the data in established paths. These ***m*** nodes are selected based on the residual energy in the nodes .The data is encoded into to source coding to ensure the reliability of data. The encoding is based on the Reed Solomon (RS) encoding. RS encoding is used because the complexity of code generation is

less, hence the energy consumption is less which is primary concern while developing the algorithm for WMSN. The encoded data is transmitted through the established routes At the receiving end, the process of encoding is repeated to check the authenticity of the data, before passing to the upper layer.

C. Video Packet scheduling

Each frame is coded into a number of video packets according to the size. Each video packet in the video stream is characterized by its importance in the overall video distortion.

Sensor node decides which video packets will be optimally dropped in order to reduce its current transmission rate. The

Packets to be dropped are selected according to their impact to the overall video distortion. A combination of one or more video packets may be omitted prior to the video transmission

by the video sensor node. Dropping video packet imposes a distortion that affects not only the current frame but all the correlated frames The intelligence of the packet scheduling algorithm is that utilizes the distortion prediction model, which considers the correlation among the reference frames, thus it selects the optimum pattern of packets/frames to drop in each transmission window. In each transmission window the sender calculates all the possible combinations of packets to drop and the respective distortion imposed by each combination. This process is neither time nor power consuming as the transmission window is generally small nor the mathematical calculations are not of high complexity. Therefore, the proposed packet scheduler allows the video sensor node to determine in the current transmission window several combinations of packets to drop, suitable for different ranges of transmission rates that will be possible imposed by the network at the next transmission window.

D. Check Point arrangement in Sensor Cluster

Due to intermittent wireless link loss, scenarios call for robust check pointing and recovery to support execution, minimizing execution rewind, and recovery rollback delay penalties. SoG scheduler to make decisions, selectively submitting job portions to hosts having superior check pointing arrangements in order to ensure successful completion by 1) providing highly reliable check pointing, increasing the probability of successful recovery, minimizing rollback delay, and 2) providing performance prediction to the scheduler, enabling the client's specified maximum delay tolerance to be better negotiated and matched with SoG resource capabilities

Check pointing saves intermediate data and machine states periodically to reliable storage during the course of data transformation. And secondly, predicts the distortion of video packets and selects to either drop them or transmit them

CONCLUSION

The paper presented ASARC, a hybrid scheme for Efficient video communications over WMSNs that comprises

Actuation sensor, adaptive routing protocol based on algorithm which ensures that only the nodes with the highest residual power and the paths with the lowest power costs, are

used during the routing. Moreover, the proposed scheme Utilizes an intelligent video packet scheduling algorithm which selectively drops non significant packets prior to their

Transmission, hence it reduces the video transmission rate. This selection is based on an analytical distortion Prediction model. The quality of the image is compared by arranging check point between the cluster until it reaches to the destination

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