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Comparative analysis of multi protocols in wireless multimedia sensor networks

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Abstract— Conventional Wireless Sensor Networks have emerged and shifted to scalar Multimedia Sensor Networks which are capable to retrieve video, audio, images. The efficient processing of information in a WMSN is of primary importance. The multimedia data depends on superiority to overhaul quality of service (QoS) parameters, like awaiting time, channel utilization, network life time throughput and distortion etc. QoS aims at optimized delivery of these parameters. In WMSNs challenging task is to guarantee resource constrained, high data rate, and soft delay limit along with reduced energy use. In this paper, we provide Survey on comparison of different protocols for WMSN like Greedy Perimeter Stateless Routing for Wireless Networks (GPSR), Real-time and Energy Aware QoS routing protocol (REAR), Temporary ordered routing Algorithm (TORA), Ant Colony Optimization (ACO) and Dynamic source routing (DSR). These different protocols with WMSN are compared in term of throughput, end-to-end delay and network life time. The paper will provide the researchers current challenges and future aspects of WMSN like delay, throughput, congestion and channel utilization.

Keywords: Wireless Multimedia Sensor Network(WMSN), Wireless Sensor Network, QOS Routing, Energy Efficiency**.**

I. Introduction

Paper is composed in four sections. section I explain the basic routing techniques, WMSN architecture and different rotting algorithms. Section II is review of literature where we studied and highlighted current research progress. In section III we have compared WMSN protocols in term of dynamic routing, data driven mode, geographical based routing, re-routing and forwarding, packet loss, service orientation, energy efficiency and other QoS parameters. In section IV we have concluded the performance metrics of these protocols.

Rapid evolution in wireless devices and new trends in wireless communication technologies have replaced the traditional framework to scalable approach for Wireless Multimedia Sensor Networks. These sensors nodes have been deployed according to the scenario like health, environment, tracking location, field monitoring, home appliances control and many others. Multi-level protocol stack is used in sensing devices for video streaming, data mining, clustering and sequencing the data attributes and filtering the records which needs timely and fast bandwidth to store and execute the process of homogenous as well as heterogeneous data values and efficiently execute the task and send it to the proper node or base station in a real-time environment.

WSN are very effective in transmission where continuous values like pressure and temperature values are needed in a controlled environment with multimedia streams like video, images and audio.

1.1 Routing Techniques

Routing protocols are characterized according to the path and method for launch of routing. Three main types are reactive, proactive or hybrid protocols. which are further divided into dynamic and static routing according to the demand and requirement needs.

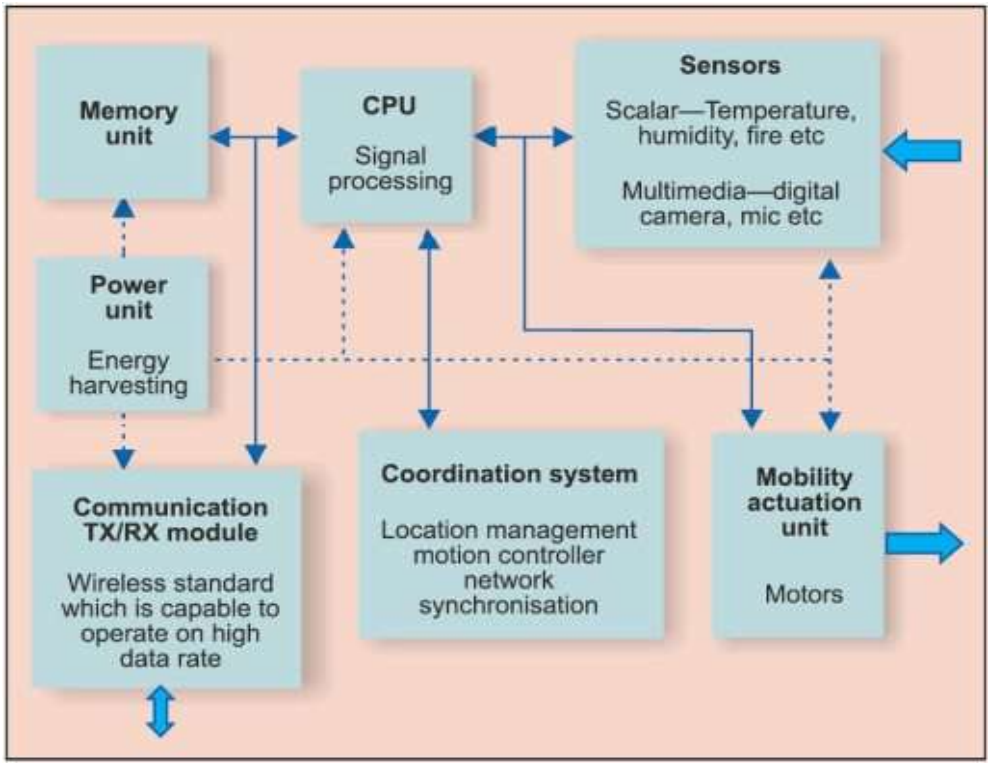

Figure.1. Multimedia Sensor Node Block Diagram

There are different routing protocols for Wireless Multimedia Sensor Network.

a)Greedy Perimeter Stateless Routing protocol
b)A Real-time and Energy Aware QoS routing protocol
c)Temporary ordered routing algorithm protocol
d)Dynamic source routing protocol

A. Greedy Perimeter Stateless Routing (GPSR)

It is an intimidating task to find the path in a wireless network from source to destination because a lot of intermediate node or mobile stations are present between the starting point and the ending point. An efficient algorithm can trace the effective routes and can fastly change the topology with the new routes. It can also break the previous path. The major goals that we want to achieve in GPSR are congestion control and bandwidth efficiency [1]. GPSR is useful in both forwarding and perimeter mode.

B. A Real-time and Energy Aware QoS routing protocol

QoS is the name given to the set of quality services which can include bandwidth, end-to-end delay, jitter and packet loss etc. These all services should be provided by the network for delivery of the packet from source to the destination. The network should not only provide quality of services but it should also ensure resource utilization at the same time. Two important perspectives of QoS in dynamic [2].

C. Temporary Ordered Routing Algorithm (TORA*)*

The Temporary Ordered Routing Algorithm (TORA) is a very flexible and distributed routing program which is also loop free. the link reversal is the foundation idea of TORA [3]. TORA is said to be operable in a very flexible mobile networking domain. It is initiated by the source. It also gives diverse routes for any required source/destination duo. The main outlines of TORA is based on the confinement of control messages to a small group of devices which are near the event of a topologic refashioning. Nodes have to maintain routing information about the adjoining nodes for executing this task. This protocol accomplishes these basic tasks: (a) Route creation, (b) Route maintenance, (c) Route erasure.

D. Dynamic Source Routing (DSR*)*

DSR is based on explicit "source routing". In this source routing all the data packets (which are sent) carry a complete and orderly list of nodes in their header which will be traversed by the packets. The main tasks of DSR are route discovery and route maintenance. The process of Route discovery basically assists the source node in obtaining the route to the destination node. Whenever the node fails to reach the destination node due to multiple issues (e.g. movement, shutdown or other issues) , the current node 's status becomes invalid. The route maintenance aims at monitoring continuous availability of current route. Whenever the routing fails, there will be initiation of a new round of route discovery [4].

When a source node initiates a new packet meant for addressing a destination node, it will place a 'source route' in the header of the packet. This "source route" provides the sequence of hops which will be traversed by the packet on its way to destination. In normal circumstances, the sender will gain a suitable source route while searching for "Route Cache" of routes learnt in the past . When no route can be obtained from cache, there will be origination of Route Discovery protocol aimed at dynamically find a new route to the destination node. In these cases , the source node and the destination node are named as the "initiator" and the "target" of the Route Discovery respectively[5].

Below figure.1 represent the basis structure of WMSN.

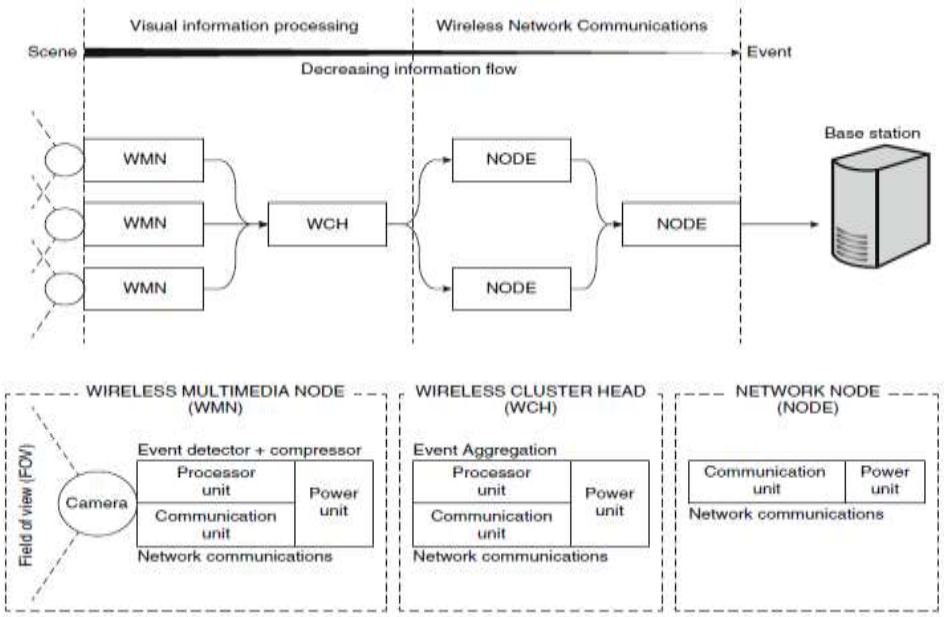

Figure .2. General Architecture of WMSN

II. Literature review

wireless sensor network (WSN) is a wireless set of connections consisting of dimensional circulated independents strategy by means of sensors to together observe corporeal and surrounding situation, like high temperature, noise, trembling, heaviness, movement or pollutants, on unlike places. In 2015, Liu [6] defined that the Wireless sensor networks (WSNs) consist of a huge quantity of inexpensive, low consumption and intellectual sensor nodes and individual or additional decline or base stations (BSs). Wireless Multimedia Sensor Networks are part of wireless Sensor Network. It has wirelessly connected devices such as images, audio/video streams. The Wireless communication is more efficient in getting the scalar services like light, temperature, etc. For sensory information such as dampness and temperature sensor networks are used. An independent device for acquiring video and audio sensory in sequence is consistent with WMSN. The promising and innovative applications of WMSN are such as, traffic enforcement control systems, physical condition checking system, industrial process control and multimedia surveillance. They have used some other features which will explain the verity that a few of the sensor node will have advanced computation capabilities and video camera. WMSNs fetch innovative challenges of security as well as innovative hope. There are differences among conventional wireless sensor networks and WMSNs. It is stated that the timely release of multimedia data is the leading apprehension in WMSN whereas Energy efficiency is the most leading attention in conventional WSNs [7]. The achievement of the reliability of information is the main concentration of WMSNs in this research. These QOS necessities include high throughput, high bandwidth ease of use and least amount deformation in the conventional image, delay-bound escape to target. multimedia data are devise of

dynamic delay aware protocol which is the miscellaneous and quantity of multimedia data that make easy differentiate processing of all traffic flow like, audio or scalar data video [8].

In 2010, author [9] presented that when Dynamic source routing is used there is no periodic routing message, such as AODV, which has reduced network bandwidth overhead, saves battery power and avoid large route updates. In contrast, DSR needs support identify link failures from the MAC layer. DSR is consisting of two mechanisms which are Route and discovery routing maintenance. They work mutually to permit nodes determine action and preserve source routing to some target in the network DSR by virtue of the unique advantages Source routing. These assets exposed the protocol to different valuable one's optimization. Both AODV and DSR do not guarantee the shortest path. In case the destination can respond individually to the routing request and the source node is for all time creating the routing demand and the original route might be the undeviating. A team [10] proposed optimized QoS metrics like delay, jitter, energy consumption. The author [11] suggested the ACO algorithm has greater impact in QoS like load balancing and addressing needs in sensor networks. Scientist [12] suggested an algorithm which focuses on game theory and multimedia networks. Authors stated [13-14] in his worked on WMSN with a geographical protocol which increase the connectivity time where GPSR [15] efficient in load balancing and queue size in a wireless network platform. A group of researchers [16-17] narrated load balancing and congestion control can be effectively managed using multipath protocol and save a lot of energy with event driven and flat schemes. The author [18-19] defined two step approaches for hole bypassing for better route selection. A team of researchers [20] presented an approach for frequency based distribution of bandwidth for packet size and reallocation of network bandwidth.

III. Comparative analysis

Table 1. explain the comparison between WMSN based routing protocols with respect to QoS parameters like data delivery model, network structure, hole bypassing, energy efficiency, methodology, congestion control mechanism, location awareness, and classification.

Table 1: Comparative Analysis of WMSN Protocols

Protocol	***Architecture***		***Data delivery model***			***s***	***passing***	***Multipath***	***ogy***			***n control***	***tion***	***Energy***	***considered***
	Flat	***cal***	***Driven***	***Driven***	***Query***				***nnel***	***ic***	***Other***		***service***	***efficiency***	
Yao et al. [11]	√		√					√			*Metadata + advanc*		√	√	*Delay*

										ed Dijxtra				
Guannan et al.[12]	√			√				√				√		√	*Reliability*
Mande and Yuanyan [13	√		√				√	√	√		*Amazing algorithm*	√	√	√	*Reliability*
Hamid et al. [14]	√		√					√					√		*Bandwidth-Delay*
MCRA[15]	√		√			√					*Flooding*		√	√	*Reliability*
Poojary and Pai [16]	√		√					√							*Reliability*
Li et al. [17]	√		√					√			*Based on direct diffusion*				*Delay*
Kai and Min [18]	√		√								*Energy prediction mechanism*			√	*Reliability*
LEAR[19]	√			√			√	√			*Based on AODV*		√	√	*Reliability*
MLAF[20]	√		√			√		√			*Based on LAF*		√	√	*Reliability-Delay*
ASAR[21]		√	√	√	√			√			*ACO*		√	√	*Delay, packet loss-ratio,*

															Bandwidth
Rahman et al.[22]	√		√								*ACO*			√	*Delay-Jitter*
ALCOLBR [23]		√	√					√			*ACO*	√			*Reliability*
Ke et al.[24]	√		√								*ACO and game theory*			√	*Delay-Bandwidth*
TPGF[25]	√		√			√	√	√		√					*Delay-reliability*
GEAMS [26]	√		√				√			√	*Baed on GPSR*			√	*Delay-reliability*

IV. Conclusion

WMSN is very different and resource constraints of multimedia parameters require maintenance of QoS. The requirements of multimedia are very difficult as well as like the resource demonstration of networks. In this paper WMSN technologies, challenges and resource utilization was discussed in term of Quality of Service. Different issues and performance measures are highlighted in our research with specific goals and methodologies in a multimedia environment of sensor data network. Different protocols work on different algorithms which ensure better energy consumption, avoid packet loss, re-route and hole passing provides excellent progress to overcome the routing problems and QoS parameters (delay, through-put, forwarding, energy efficiency and location based routing). All these aspects are back bone of Wireless Multimedia Sensor Networks platform. Firstly, we conclude that ACO protocol has efficient features which make it suitable for wireless multimedia sensor networks in an ad hoc based network. We also noticed that TPGF and GPSR are good in geographical locations where energy consumption is most important aspect in terms of uniformed bandwidth issue and packet loss limitations. we hope our effort will attract the researches to explore further hidden aspects in term of QoS which will further provide new horizons in multimedia sensors framework

V. Acknowledgement

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