Survey on Wireless Multimedia Sensor Network Protocols
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Abstract—Wireless Multimedia Sensor Network (WMSN) is a new and emerging network of wirelessly connected devices, which consist of video, audio streams, scalar sensor data and others. The goal of these networks is optimized delivery of multimedia data based on quality of service (Qos) parameters, such as delay, channel utilization, network life time throughput and distortion etc. Multimedia network are communicated each packet has strict play out deadlines, thus late arriving packets and lots of packets are equally. This challenging task to guarantee soft delay deadlines along with energy minimization, resource constrained, high data rate in WMSNs. In this paper, we provide survey on different WMSN protocols like Real-time and Energy Aware Qos routing protocol (REAR), Greedy Perimeter Stateless Routing for Wireless Networks (GPSR), Direct Diffusion for Wireless Sensor Network (DD), Channel utilization and delay aware routing protocol for Wireless multimedia sensor network (CUDAR). This different protocols with WMSN are compared in terms of throughput, end-to-end delay, network life time.

Key words: Wireless Multimedia Sensor Network, Wireless Sensor Network, Qos Routing, Energy Efficiency

I. INTRODUCTION

Wireless Multimedia Sensor Networks are part of wireless Sensor Network. It is wirelessly connected devices such as images and/or video streams. Wireless communication is gradually changing the paradigms from the existing scalar services like light, temperature, etc. Sensor networks are used to sensory information such as humidity and temperature, WMSN interconnected to autonomous devices for capturing and processing video and audio sensory information. WMSN will new and emerging applications such as multimedia surveillance, traffic enforcement and control systems, health care delivery, health monitoring system, and industrial process control. They have some over features which will stem the fact that some of the sensor node will have used video cameras and higher computation capabilities. The WMSNs bring new security of challenges as well as new opportunities. There are differences between WMSNs and traditional wireless sensor networks. Energy efficiency is the most dominant consideration in traditional WSNs, whereas timely delivery of multimedia data is the prime concern in WMSN [1]. The focus of in this research WMSNs is towards achieving fidelity of information. Firstly, multimedia sensors provide high bitrates data which is in orders of magnitude greater than scalar sensor’s data; this renders existing protocols of WSNs (designed for scalar information) inefficient.
The main characteristics of WMSN that new research in this field can be outlined as follows [9].
- Resource Constraints. Embedded sensing devices are used as a resources like battery, memory, processing capability, and achievable data rate.
- Application related QoS Requirements. Additionally, for data-delivery modes typical of scalar sensor networks, multimedia data used snapshot and streaming multimedia content. Snapshot-type multimedia data contain event triggered observations obtained in a short time period (e.g., a still image). As a Streaming multimedia data content is generated over longer time periods and requires sustained information delivery and needs to be delivered in real time. High Bandwidth Demand Multimedia contents, video streams, requires data rates that are orders of magnitude higher than that supported by commercial sensors and transmission techniques used for high data rate and low power consumption need to be leveraged.
- Variable Channel Capacity. Channel Capacity and delay attend on each link are location dependent, vary continuously, and may be burst in nature, so making quality of service (Qos) provisioning challenging task.
- Cross-Layer Coupling of Functionalities. as a result of the shared nature of the wireless communication channel, there is a strict interdependence though functions handle by all layers of the communication protocol stack. This has to be explicitly considered when designing communication protocols aimed at Qos provision on resource constrained devices.

In the next section there are different routing protocols for Wireless Multimedia Sensor Network which are described in this section.

II. LITERATURE SURVEY

There are different routing protocols for Wireless Multimedia Sensor Network.
1) A Real-time and Energy Aware QoS routing protocol for WMSN
2) Greedy Perimeter Stateless Routing for Wireless Networks
3) Direct diffusion for wireless sensor network
4) Channel utilization and delay aware routing protocol for Wireless multimedia sensor network

A. A Real-time and Energy Aware QoS routing protocol for WMSN:

REAR protocol main objective is to find an optimal path to the gateway as an energy consumption and error rate while meeting the end-to-end delay requirements. End-to-end delay requirements are related only with the real time data [1]. In this case we have both real time and non-real-time traffic co inside in the network, which makes the more complex problem. We not only should find paths that meet the requirements for real-time traffic, but they need to maximum throughput for non-real time traffic as well. This is because most of the crucial applications like battlefield surveillance have to receive for instance acoustic data regularly in order not to miss targets. It is important to prevent the real-time traffic from consuming the volume of network bandwidth and leave non-real-time data starving and thus incurring large REAR use different routing Algorithm:

1) Dijkstra Algorithm

Multipath routing QoS decision to choose a transmission path in which meets delay requirement and energy efficiency among all the routes. The advanced Dijkstra algorithm and a cost function are used to REAR make Qos routing decision, the core step of the standard Dijkstra algorithm is to select a link with the low weight among marked nodes. The steps of algorithm are as follow [4].

1) Simplification: based on the Qos Requirements of the packets, delete that links with insufficient bandwidth among the candidate links.
2) Classify nodes into source node set Ds and two-hop neighbor nodes Dn. The initial set of Ds only contains S.
3) Generate set Dn1 and set Dn2 from Dn. Nodes in Dn1 are neighbor nodes of Ds’ temporary routing table. Nodes in Dn2 are neighbor nodes of Dn1’ temporary used this routing table.
4) Calculated this value path consist of nodes in Ds: Dn1 and Dn2, and sort the result.
5) Compute the nodes on the smallest overall evaluation value link to Dn1 and Dn2, and mark the nodes as source nodes S.
6) Repeat steps 3 and 5.
7) If the smallest overall evaluation value contains the destination node E, then stop the algorithm. If there are a few paths with the same overall evaluation value, the path with the smallest amount of hop

2) Control Transmission Delay:

Wireless Multimedia Sensor Network has various types of data packets, essentially real-time event packet, simple data packet and periodic beacon packet etc. delay of multi-hop routing not only depends on the transmission distance, but also release on relay nodes’ processing delay and queue delay.

B. Greedy Perimeter Stateless Routing for Wireless Networks (GPSR):

In this protocol used in greedy forwarding wireless networks contain of numerous mobile location, this routing problem of finding paths from a traffic source to a traffic destination after all a series about intermediate forwarding nodes is principally challenging. When nodes change, the topology of the network can change immediately. This networks require a responsive routing algorithm that finds valid routes quickly as the topology changes and old routes break. Earlier the limited capacity of the network channel demands efficient routing algorithms and protocols like do not drive the network into a congested state as they learn new routes. The force between these two goals, receptivity and bandwidth efficiency, is the element of the mobile routing problem. Greedy Perimeter Stateless Routing, it is a responsive and efficient routing protocol for mobile, wireless networks. Unrelated established routing algorithms before it, that use graph-theoretic notions of shortest paths and transitive reach ability to find routes, GPSR feet the correspondence between geographic position and connectivity in a wireless network, by using this positions of nodes to generate packet forwarding decisions. It uses greedy forwarding to forward packets to nodes that are constantly progressively closer to the destination. Current regions of the network where such a greedy path does not exist (i.e., the only path requires that one turn temporarily
farther away from destination), GPSR retrieve by forwarding in perimeter mode, in this packet traverses successively closer faces of a planar sub graph of the full radio network connectivity graph, until reaching a node closer to the destination. [3].

C. Direct Diffusion for Wireless Sensor Network (DD)

Directed diffusion WSN protocol is data-centric in that all communication is for named data. Entire nodes in a directed diffusion based network are application aware. Here, enables diffusion to achieve energy savings by selecting empirically great paths and by caching and processing data in-network (e.g., data aggregation). We explore and evaluate the use about directed diffusion for a plain remote-surveillance sensor network analytically and experimentally. Our evaluation makes that directed diffusion can achieve significant energy savings and can outperform idealized traditional device (e.g., omniscient multicast) under the checked scenarios [5]. Index Terms--Data aggregation, data-centric routing and distributed sensing, in-network processing for wireless sensor networks.

![Fig. 3: Direct Diffusion (a) Interest (b) Gradient (c) Reinforcement [7].](image)

Directed diffusion finds routes from multiple sources to single destination that allows in-network consolidation of redundant data. It is a query-based routing; it consists of different elements. Data is named using attribute-value pairs. A sensing task is disseminated throughout the sensor network as an interest for named data. This dissemination sets up gradients within the network designed to “draw” events (i.e., data matching the interest). Events start flowing towards the originators of interests along multiple paths. The sensor network reinforces one, or a small number of these paths [5].

D. Channel Utilization and Delay Aware Routing Protocol for Wireless Multimedia Sensor Network (CUDAR)

CUDAR is based on a cross-layer approach, which provides soft end-to-end delay guarantees along with efficient utilization of resources. CUDAR enables cross-layer information exchange between network and MAC layers to choose potential forwarding nodes while not diverging too far from the shortest possible path between source and destination. Low power device networks such as WMSNs have conflicting requirements such as energy conservation and low end-to-end delay [1]. Therefore, in order to reduce the standing cost of energy wastage due to Route maintenance by proactive routing protocols, CUDAR protocol is reactive routing protocol which means it that propagated request upstream and initial path discovery Phase when event occur. CUDAR work on two operations like weight calculation and path selection. This two operation are used in CUDAR with example.

![Fig. 4: Path Selection of Node A [1].](image)

When node A wants to send a message to node B and node C If there is no route, A initiates a RREQ message with the following components:

- Source ID,broadcast ID,number of hops traveled
- Previous node ‘s weight
- previous node ‘s id

RREQ packet received from node A, Node B and node C simply replace their own weight in the RREG packet so that Establish a reverse path with node A Node F receive request to node B at the time t1. Node F receive request to node C at the time t2, where x2>x1.Node F receive duplicate packet so that Compare the weights of the node B and C. Node C weight is highest than node B since node F set up reverse route with Node C that Does not broadcast duplicate packet again [1][2].

### Table 1: Comparative Analysis of WMSN Protocols

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### III. COMPARATIVE ANALYSIS

We discussed different routing protocols on Wireless Multimedia Sensor Networks (WMSNs), and outlined the main research challenges. Protocols for the development of WMSNs were surveyed, and open research issues discussed in detail. WMSN is very challenging as it requires maintenance of Qos parameters of multimedia content as well as resource constraints of WSNs. WMSNs as compared to WSNs and suitability of cross layer design to meet both the Qos guarantees and resource constraints in WMSNs.

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