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Bandwidth Control Sectoring Technique Protocol for Data Dissemination in Wireless Sensor Networks

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ABSTRACT

The present chapter relates to a system for data collection in wireless sensor networks. The object is to provide an improved Quality of Services using bandwidth control sectoring technique for WSNs. To reduce the power consumption through system. The nodes are randomly deployed in the network. There are sectors formed according to the equal number of sector heads. There is one sink node, which collects data from sector heads. Common nodes are deployed randomly to transmit data packets to the respective level 1 node within a sector. Thus, bandwidth will be controlled, and congestion in the network is reduced. Bandwidth control sectoring technique (BCST) achieves the various quality parameters of Network. QoS like period of time (delay), power resource efficiency, delivery ratio, loss ration including throughput. This chapter shows the best protocol for data dissemination in wireless sensor networks. This is designed for achieving maximum QoS of wireless sensor networks.

Keywords: Bandwidth Control Sectoring Technique, BCST, Congestion Control, Sector head, Quality of Services, QoS, Wireless Sensor Networks, WSN

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1. INTRODUCTION

Wireless sensor networks[1] can be specified to track geological and physiological factors such as temperature, noise, friction, strain, activity, etc. as self-organized and resources-less sensing devices to pass that data across a network to an end nodes or wireless device, in which the information is gathered and processed in the unit [4][12]. A sink or base station serves as a user-to-sensor connection. By entering probes and acquiring responses again from sink, one could recover the relevant data from either the network [13]. There seem to be typically several or groups of cells in a wireless sensor network. Utilizing wireless signals, the IoT devices can interact with the root station.[5][6] With signaling and computer equipment, communications equipment and power components, a wireless sensor node is configured. Constricted space, speed of information processing and processing capacity are the actual mobile devices in a wireless sensor network (WSN) which have constraints. After the node again for sensor They are liable for self-organizing an adequate system framework after the sensor nodes are configured in the network, mostly with multi-hop coordination with them [7][8]. Wireless sensor devices answer to requests given to execute particular actions from a root station [9]. Global Navigation Method and local positioning methods can be utilized to gain place and pos-related knowledge [10][11].

2. LITERATURE SURVEY

In research paper, in effect to enhance power consumption, the researcher outlined a new strategy for adapting the Minimal Power Efficient Clustering Hierarchy (OLEACH) to improve original LEACH and LEACH-C by actively sorting clusters relying on the residual energy of the nodes. In the this new method detectors node-heads evaluating the quantity of electricity staying after every round. The new cluster - based routing protocol is based on energy efficient, as the level of energy percentile for the chosen is specified in progress and consequently prevents its performance and non - stop cooperation task. In place to ensure optimal functioning of the overall system, the latest cluster - based routing system is based on a sustainable value limit, eliminating the formation of a leader of the group. The technique for effective energy clustering for WSNs was being presented. Informative tests of the local network of wearable sensors indicate that our approach is good for increasing network period and also has the likely to improve the service life of the whole network. From our perspective, O-LEACH can run on both active and passive systems. We have assessed O-LEACH only on real networks in this article. This approach also can be checked on large structures. The test results show that

compared to the initial Leeching and Leeching-C, the new scheme gains greater stability and enhances device longevity and resilience [1]. Dynamic traffic control technique is introduced by author Bharadwaj. This technique is implemented by using WSN. Sensors are used to discover the traffic congestion for dynamically manage the traffic. Dynamic traffic control has overcome the disadvantages of static traffic control. The major disadvantage of static traffic control is sometimes it may block the emergency vehicles like i.e. ambulance because of traffic congestion. In this technique, Traffic Control Unit, Monitor Unit, and Roadside Unit are used to efficiently control the traffic congestion. RFID reader is used to reading the unique RFID code for an emergency vehicle as well as it sends to the monitor unit. Sensors, proximity switch, and RFID tags are used by monitor unit to count the normal vehicles and emergency vehicles. Count information of the vehicle is sent to the traffic control unit. After receiving count information of vehicles, the signals are changed dynamically. Author has compared the results of static traffic control technique and dynamic traffic control technique. Results are taken for time used by vehicles from source to different destination as well as time is calculated by using speed and distance. Dynamic traffic control technique works for all situations. Reduces the traffic delay and saves the throughput time of travel are the advantages of the dynamic traffic control technique [2].

The author Weiqi Chen has proposed joint QoS provisioning and congestion control technique for the multi-hop wireless network. This technique is implemented by combining two techniques. One is Differentiated Queuing service and second is semi-TCP. Advantages of these techniques are provided per-packet granular QOS as well as systematic hop by hop congestion control. Using Joint technique two parameters getting by authors. These are flexible and adaptive for the dynamic multi-hop wireless network. In the joint technique, DQS is used for QoS in the logic layer and semi TCP is used for congestion control issue in the transport and MAC layer. Author has solved the different issues of the existing system. Those issues are delay estimation, overdue packet handling issue, ACK mechanism, and cross-layer design. Using joint technique author has improved the performance of total throughput and reduces the total latency in the (multi-hop) i.e. multiple hops (levels) wireless network. The results are taken for data transfer-ratio and average end-to-end delay parameter. Using joint technique author has achieved different advantages. Those are handled overdue packets, transfer ratio and decreased total-latency for the multi-hop wireless-network [3].

3. PROPOSED SYSTEM

In Figure 1 it is seen that nodes are randomly deployed in the network. There are sectors formed according to the equal number of sector heads. Due to less capacity of the communication channel and less availability of bandwidth for packet transmission, congestion over the network increases which directly affects the QoS parameters like de- lay, throughput, energy efficiency, packet delivery ratio, reliability. In the proposed system sectoring technique will reduce bandwidth problem and traffic congestion problem. There is one sink node which collects data from sector heads. Common nodes which are deployed randomly transmit data packets to respective level 1 nodes within a sector. Sector heads are nothing but level 1 node. In this way bandwidth will be controlled and congestion in network will be reduced.

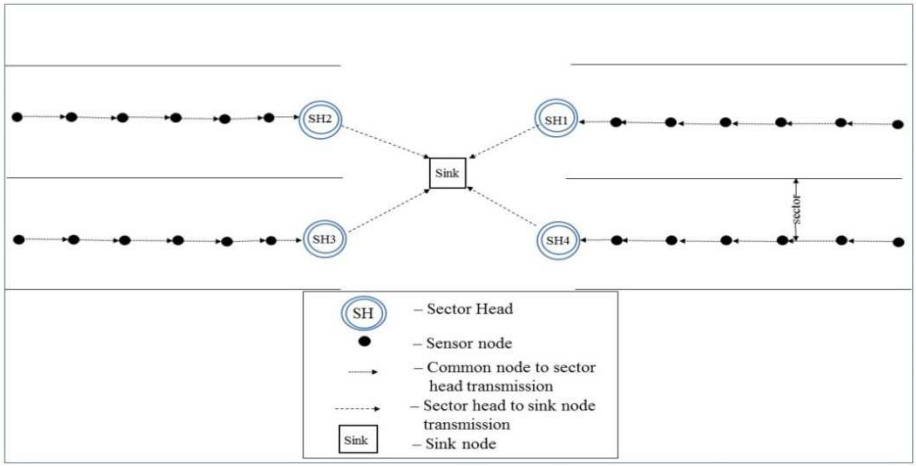

Fig. 1. Physical View (System Architecture)

BCST Algorithm:

Step 1 - START

Step 2 - Initialization of scenario.

Step 3 - Initialization of sink node equal to zero. Step 4 - Set hop count (level) to all nodes.

Step 5 - Determine the nodes which are one hop away from sink node i.e Find out level

one nodes.

Step 6 - Assign level one nodes as sector head.

Step 7 - Formation of sectors depending on the total number of sector heads.

Step 8 - Common nodes within a sector transmit the data packets to their sector head.

Step 9 - Sector heads transmit the collected information to sink node.

Step 10 - STOP

Firstly, initialization of scenario will be done and initialization of sink node = 0 will be carried out. Set hop count to all nodes to determine the levels of nodes in the network. That this next step is to figure out which points were a step ahead from the end nodes. Determine those nods as level 1 nodes. Level 1 node are near to sink node so next step is to determine level 1 nodes as sector head (SH). Due to less capacity of the communication channel and less availability of bandwidth for packet transmission, congestion over the network increases. In this case formation of sectors will control bandwidth. Form sectors equal to the total number of level 1 nodes i.e. sector head. After formation of sectors data transmission will be carried out. Data transmission is done within sector. Common nodes within a sector transmit data packets to sector head. Sink node collects data packets from level 1 nodes i.e. sector head. In this way bandwidth will be controlled and congestion in network will be reduced.

4. RESULT ANALYSIS

In this scenario total no of 30 nodes are deployed in sector form in 1000m* 1000m area for simulation. One node is assigned as data collector node i.e. sink node. Remaining 29 nodes are working as a source node. Rate of data transmission is changing from 10 to 50 packets per sec. i.e. Transmitting data transmission limit to the end nodes. Protocols like C.S.M.A ,TD.M.A and 802.15.4(Zigbee). included for performance analysis and these results are comparing with proposed MAC BCST. The routing algorithm for A.O.D.V is being included for searching short distance path for data transmission.50 bytes packet size is fixed for this scenario along with 30 nodes.

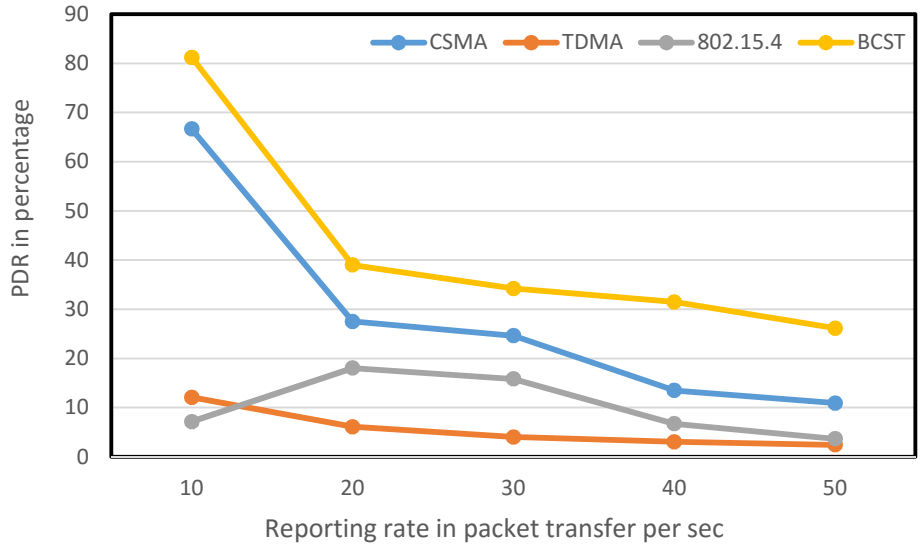

Fig. 2. Average PDR for RR

Above graph shown Average PDR (Packet Delivery Ratio) for reporting rate. Relative to modern technique, the Bandwidth Control Sectoring Protocol (BSCT) is substantially better. In case of heavy traffic like 50 packet transfer per sec it can increase the reporting rate of node but in case of less traffic like 10 packet transfer per sec it can act as a normal MAC with constant reporting rate. In normal packet delivery gives 20% better result as compare to carrier sensor multiple access protocol (CSMA) protocol, 70% as compare to Tim div multiple access system (T.D.M.A) &75% as compare to 802.15.4 protocol. Similar to CSMA, TDMA and 802.15.4, the distribution of big packets is 15 to 25 percentage points higher. as result shown the BCST protocol a maximum number of packets will be delivered and minimum number no of packet will be drop.

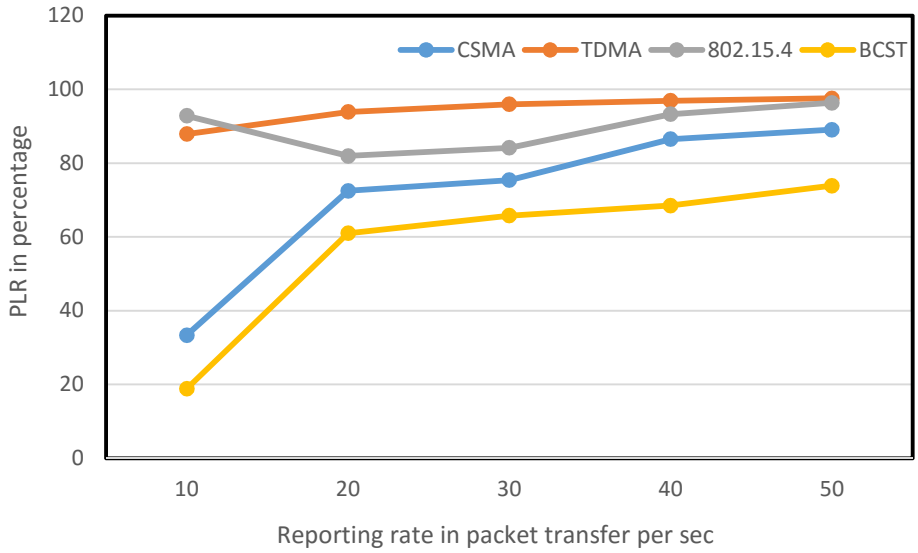

Fig. 3. Average PLR for RR

Above graph shows average PLR (Packet Loss Ratio) for Reporting rate. The packet loss ratio represents the ratio of the number of lost packets to the total number of sent packets from sensor node to base station. Congestion is one of the main factors of packet loss. In normal reporting rate CSMA protocol drops 70% packets, TDMA and 802.15.4 protocol drops 90% packets and as compare to other protocols with BCST only 20% packet drops. The transmission number is 50. Similar to certain other
methods, the BCST protocol gives 20 percent good efficiency. Tables of the PLR shows the TDMA and 802.15.4 protocols have more packet loss and CSMA and BCST has a less packet loss.

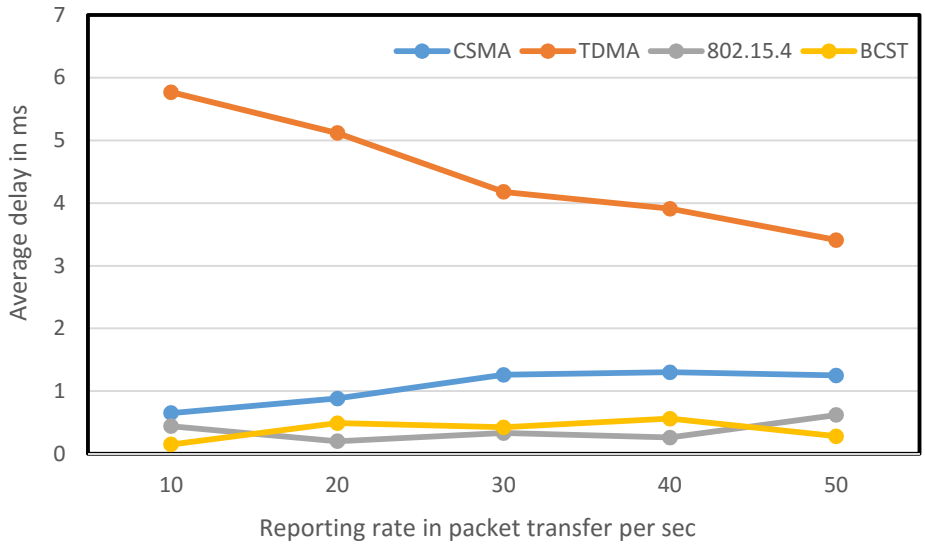

Fig. 4. Average Delay for RR

The figure described represents the typical first-to- end interval throughout the reporting count. End-to-End delay means time takes by the packet to travels to reach from source to destination node. Number of packets transfer using TDMA protocol takes more time than the other protocols. CSMA also takes more time. The number of packets transfer via BCST protocols takes less time as compare to other protocols to reach destination. The other protocol like 802.15.4 also takes less time but the number of packets is increase delay is also increases but in case of BCST protocols number of packets increase delay time will be decrease.

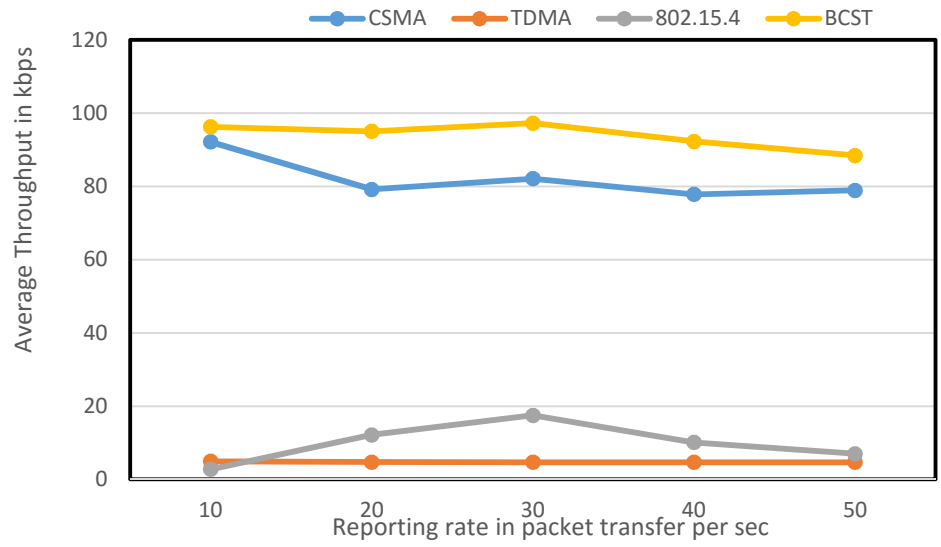

Fig. 5. Average Throughput for RR

Above graph shows Average throughput for reporting time. The BCST protocol gives better results when it is compared to CSMA. The Control overhead in BCST protocol is also less when it is matched with BCST protocol shown in table. The similar methods same like T.D.M.A and 802.15.4 as compare to BCST has less throughput. When nodes send 10 packets per sec using BCST and CSMA protocol has 90 to 95% throughput but in case of sending 50 packets BCST protocol has 90% throughput and in CSMA protocol has 70% reporting rate. In TDMA and 802.15.4 protocol have lowest throughput i.e. 0 to 20.

5. CONCLUSION

A BCST – bandwidth control sectoring protocol is a novel protocol designed for congestion control and achieving QoS parameters of wireless networks. Compared to conventional tech like C.S.M.A, T.D.M.A and 802.15.4, the said protocols perform greatly good outcomes. BCST protocol gives almost 17-20% better result for PDR, 15-20% better result for PLR, 5 to 10% better result for delay and 20 to22% increased outcome case of system throughput as compare to second best protocol CSMA. BCST is almost 40 to 50% great as similar to T.D.M.A and 802.15.4 for all QoS parameters. Sectoring technique in BCST helps to reduce heavy traffic, congestion and improve system performance. We will use the modified M.A.C method in proposed development that will blend C.S.M.A and BCST protocol for stronger system performance.

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