DELAY MITIGATION BY OLSR (Optimized Link State Routing) AND K-LEACH CLUSTERING

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ABSTRACT

Wireless network is a new standard specifically designed for real-time and reliable communication between sensors and sink devices for industrial process monitoring and control applications. End-to-end communication delay analysis for Wireless networks is required to determine the schedulability of real-time data flows from sensors to sink for the purpose of acceptance test or workload adjustment in response to network dynamics. In this paper, we consider a network model based on Wireless, and map the scheduling of real-time periodic data flows in the network to real-time multiprocessor scheduling. We then exploit the response time analysis for multiprocessor scheduling and propose a novel method for the delay analysis that establishes an upper bound of the end-to-end communication delay of each real-time flow in the network. Simulation studies based on both random topologies and real network topologies of anode physical wireless sensor network test demonstrate that our analysis provides safe and reasonably tight upper bounds of the end-to-end delays of real-time flows, and hence enables effective schedulability tests for Wireless networks. K-LEACH protocol is proposed to reduce average energy consumption of network and enhance the network lifetime which ensures high availability of sensor nodes and so high reliability of data transmission to sink node which ultimately makes the entire network reliable.

Keywords: AODV, Congestion, delay, OLSR, K-Leach.

I. INTRODUCTION

Sensor nodes in WSN are battery based, low-power, and low-cost devices with minimum sensing, data processing, transmission range, memory, and communication capabilities. WSNs operate in a difficult real-time, real world noisy environment. In such conditions the several challenges occur for WSNs design due to the fickleness of wireless communication medium and the real-time requirements of control applications. So the, WSNs not only share wireless communication challenges with observe on sensor-to-sensor communication, but also introduce their own unique challenges.

In day to day life, most principles and protocols for WSNs lack the support of real-time requirements and sensitivity to delays. This limits the effectiveness and applicability of these principles in WSNs and hence, large scale deployments are hard or inefficient. In this research, the qualities of service parameters of network paths are also added to develop trust in the connections to protect from various attacks. Moreover, a relative analysis of delay, congestion, packet losses, transit time between source and destination is illustrated in AODV and OLSR with the Implementation of K-Leach Clustering. In simulation time, packet drop-outs and link failures for packets are examined and analyzed for the results. The rest paper consist the related work in section 2, the proposed system in section 3, the results in section 4 and the conclusion in section 5.

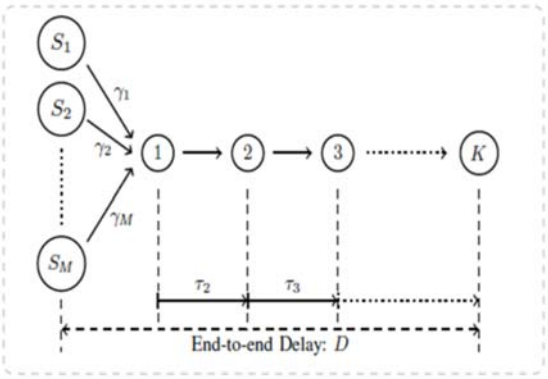

Fig 1: End- to- End Delay

II. LITURATURE SURVEY

Amit kumar et al. proposed that routing creates routes only when source is required. When the source node wants to communic ate with the destination the route is being checked. If the destination node is detected then the route is used, in case if route is not detected then route discovery is initiated. In this DSR it does not maintain the routing table. But on the other hand in AODV the routing table is maintained, in such a case when the data is send from source to destination it checks the routing table if there is no entry in the table then first it has to be initiated. Then a route request is broadcast for the next packet. It contains IP address of source and destination. [1]

Amit thakre et al. proposed that breakthrough in the wireless cellular systems use the Mobile AD-Hoc networks to provide robust and reliable routing services. This concept was applicable unless the misbehavior of selfish node was discovered. Any adhoc network consist of nodes that moves randomly and form dynamic topologies. Due to the existence of selfish nodes misbehaviors may exist in MANETS. These selfish nodes may severely affect the performance of network. So for avoiding the problem of selfish nodes also for improving the performance of mobile Ad-Hoc networks (MANETS), the two reactive protocols i.e. AODV and DSR are implemented.[2]

M. sakthi ganesh et al. proposed a method of buffering while transmission of packets by nodes. This leads delay in receiving packets. These delays are minimized by allocating buffer to the intermediate nodes. All nodes contain time sensitive data these time sensitive data is hold by the buffer when there is failure of link. After the detection of the new route the data is transmitted to the new route. When the sender wants to send time sensitive data to destination and if frequent link failures occurs for it then (TRREQ) temporary route request is generated and broadcasting is done to neighboring nodes.[3]

Mohammed BOUHORMA et al. stated comparison of AODV and DSR routing protocols. In DSR the route discovery and and route maintenance are the two major protocols. The most important variation in DSR and other protocols is that the routing information is contained in the packet header. DSR is suitable for small to medium sized networks. AODV finds a route to the destination, the source broadcasts a route request packet. This broadcasting propagates message through the net work til it reach to intermediate node that has recent route information until it reaches the destination. When the route request packet is forwarded by intermediate nodes it records in its own tables. Using the information is reply path is formed. Whenever a link failure occurs, the source is notified and a route discovery can be requested again if needed.[4]

P.R. Jasmine Jeni et al. has mentioned difference between AOSD and LLFR.

The routing in MANET is challenging task, especially when the network size is large. Wireless networks are highly responsible to suffer from route breaks due to many reasons such as signal interference, data collision, node mobility etc., The Local Link Failure Recovery Algorithm (LLFR) is deployed in each nodes in the network (i) performs local route recovery minimize the loss of packet data caused while link failures in ad hoc (ii) Improves QoS parameters like the packet delivery ratio, average end to end delay and throughput.[5]

Abdelwadood Mesleh et al. has made a comparison result of e-AODV and e-DSR. while transmission of a data packet, a route request packet, a route reply packet or a link failure notification message, the energy of the nodes are dropped. The energy linked with each node is reduced and is used to update the local energy of the node and also update the total energy in the route request packets in the route discovery process. The e-DSR has multiple routes in its route cache as e-AODV has a single route in its route table. e- AODV uses beacons for monitoring the routes but e-DSR doesnot use it. But the process of route discovery in both is global and both use maximum route energy for transmitting data packets.[6]

Georgios Skourletopoulos et al. proposed about the Mobile Ad hoc Networks (MANETs) that has wireless mobile systems, that are and widely used in a variety of applications. Nodes failures and absence of centralized coordinators are also important task in network configurations. The routing protocols that are exploited in MANETs are categorised as proactive and reactive. A comparison study among reactive protocols, AODV and DSR is made. The comparison is conducted towards investigating the exploitation of such routing protocols in MANETs, in terms of their performance to the number of the nodes in the network.[7]

Kumar Prateek et al. had mentioned a comparision of three protocols in a wireless network. The three protocols in which DSDV is proactive, AODV and DSR are reactive. Both reactive protocols performed well in high mobility scenarios than proactive protocol. Both AODV and DSR use reactive approach to route discovery, but with different mechanism. DSR uses source routing and route cache. On other hand AODV uses routing tables, sequence number to maintain route.[8]

III. PROPOSED WORK

In wireless sensor networks the routing protocols has been proved to be an effective method to improve the detection of routing path to send the data from source to destination. To use this effectiveness we tried to present a comparison between AODV and OLSR. In the existing system the problem of end-to-end delay analysis for periodic real time flows from sensors to actuators in a network that is modeled based on WirelessHART. Now we propose the OLSR routing protocol technique and also the K-LEACH clustering algorithm is used to avoid the congestion, reduce end to end delay, and to consume less energy in network.

Our implementation the main focus is done on AODV and OLSR routing protocols. As compared to the AODV the OLSR routing protocol find the more optimized link to communicate between source to destination. K-LEACH algorithm is used for clustering with OLSR to reduce the delay in communication also to consume less energy in network.

1) What is WSN

Wireless sensor networks provide new applications for environment monitoring, and military surveillance applications. A wireless sensor network consists of sensor nodes deployed over a geographical area for monitoring physical phenomena like temperature, humidity, vibrations, seismic events, and so on. Typically, a sensor node is a tiny device that includes three basic components: a sensing subsystem for data acquisition from the physical surrounding environment, a processing subsystem for local data processing and storage, and a wireless communication subsystem for data transmission. In addition, a power source supplies the energy needed by the device to perform the programmed task. This power source often consists of a battery with a limited energy budget. In addition, it could be impossible or inconvenient to recharge the battery, because nodes may be deployed in a hostile or unpractical environment. The sensor network should have a lifetime long enough to fulfill the application requirements.

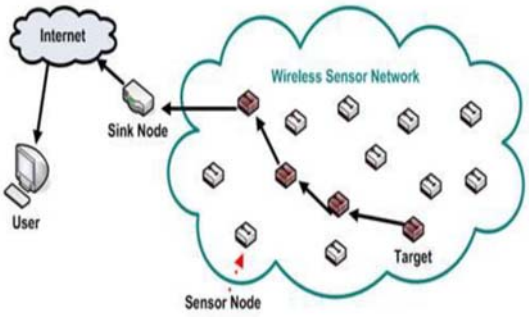

Fig 2: Architecture of wireless Sensor network

2) FLOWCHART

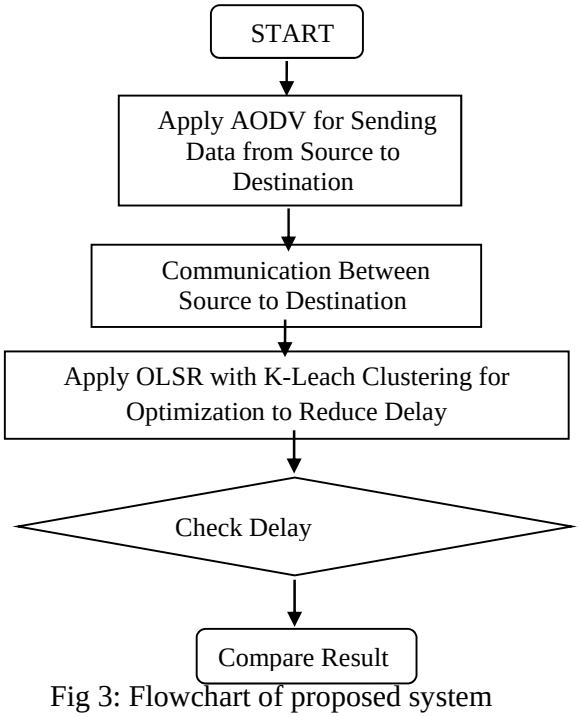

Fig 3: Flowchart of proposed system

3) Introduction to AODV

AODV is a reactive protocol, i.e., so the routes are created and maintained only when they are needed. The routing table stores the information about the next hop to the destination and a sequence number which is received from the destination and indicating the freshness of the received information. Also the information about the active neighbours is received throughout the discovery of the destination host.

4) Introduction to OLSR

Optimized Link State Protocol (OLSR) is a proactive routing protocol, so the routes are always immediately available when needed. OLSR is an optimization version of a pure link state protocol. So the topological changes cause the flooding of the topological information to all available hosts in the network. To reduce the possible overhead in the network protocol uses Multipoint Relays (MPR). OLSR uses two kinds of the control messages: Hello and Topology Control (TC). Hello messages are used for finding the information about the link status and the host's neighbours.

ALGORITHM:

1. Broadcast with RREQ<source_addr,broadcast_id>
2. If RREP received by neighbor update routing table and set reverse path with time out information.
3. Maintains active link session. Periodic RREQ send and check if (LLACKS) fail
4. If(LLACKS fail == true)
5. Link failure
6. If link failure,
7. Source node restarts route discovery cause to excess generation of hello packets. Hence Congestion.
   (OLSR)
8. Broadcast with hello packets and bi-directional link maintenance
9. Each node selects its own set of MPR.
10. MPR change with bi-directional link fail or new node added.
11. TC is send to check topology
12. If (destination (TC) == dest addr)
13. Stop forwarding and check link failure
14. If (link failure)
15. Local recovery start by current node on local site.

5) Introduction to K-Leach Algorithm

In this algorithm idea is to select cluster in such a way that their intra distance is minimum which ensures that less communication energy is consumed and WSN can run more rounds. K-means is one of the simplest unsupervised learning algorithms that solve the well-known clustering problem.

1) Place K points into the space represented by the objects that are being clustered. These points represent initial group centroids.
2) Assign each object to the group that has the closest centroid.
3) When all objects have been assigned, recalculate the positions of the K centroids.
4) Repeat Steps 2 and 3 until the centroids no longer move. This produces a separation of the objects into groups from which the metric to be minimized can be calculated. The distance between the data points is calculated using Euclidean distance as follows. The Euclidean distance between two points or tuples,

X={x11,x12,x13.....x1n},Y={y11,y12.y13..y1n}

$$Dis(x,y) = \sqrt{\sum_{j=1}^{n}(Xij - Yij)}$$

6) Snapshots

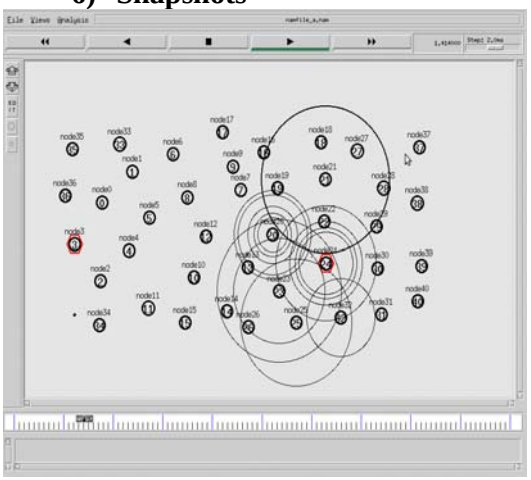

Fig 4 : Communication in Network by AODV protocol

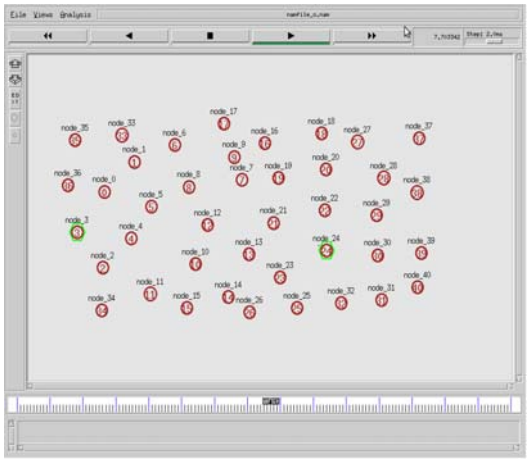

Fig 5 : Communication in Network by AODV protocol

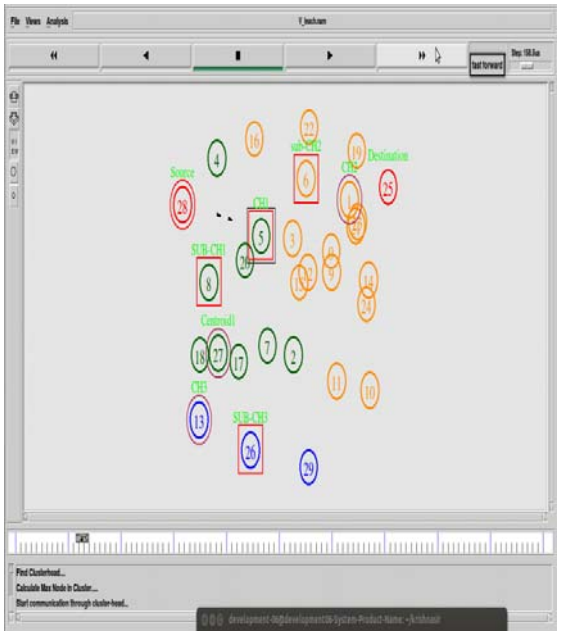

Fig 6 : Communication in Network by OLSR with K- Leach Clustering

IV. SIMULATION AND RESULTS

The comparison that we had proposed is between AODV and OLSR. These both protocols are used to discover the shortest path when the data is sent from source to destination. As a result the OLSR with K-Leach gives the optimized routing path in short duration than AODV that reduces the delay in transmission of packets. The results are based on packet delivery ratio, energy and delay.

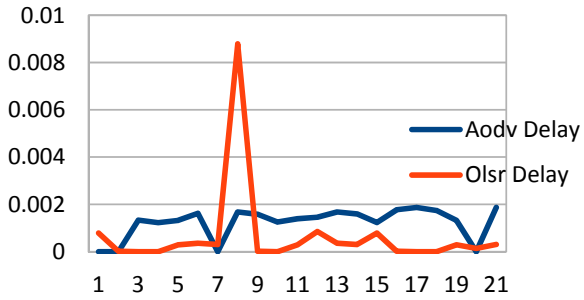

Fig 7: compare delay

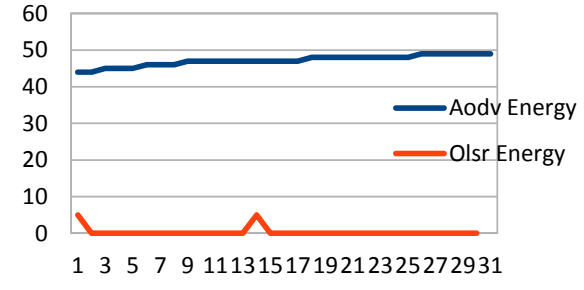

Fig 8: compare energy

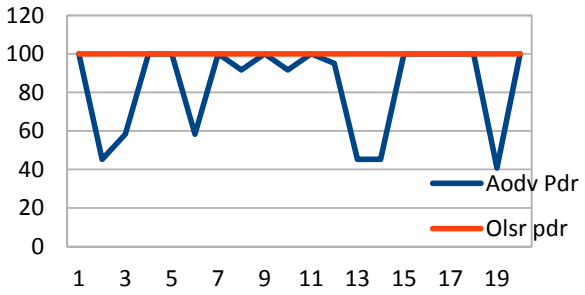

Fig 9: compare pdr

V. CONCLUSION

In this paper an effort has been made to examine the need of routing protocol in wireless sensor network. We are proposing an effective and optimized routing path by using OLSR (optimized link state routing protocol) to solve the stated problem, especially for large WSNs consisting of thousands or millions of nodes. OLSR is more optimized and correct than AODV (ad hoc on-demand distance vector). The comparison of AODV and OLSR is shown, by which we find the optimized route to send the data from source to destination. Also the lifetime of the network is maximized. Computer simulation will be performed in the NS2 environment. We introduced K-LEACH algorithm for clustering with the OLSR routing protocol due to which the minimum nodes will be participated and the route optimized route will be discovered in shortest time.

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