



Performance Analysis of Data Centric Protocols Using Wireless Sensor Networks

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Abstract: *The use of wireless sensor networks in data centric protocols is attractive due to their characteristics of self-organization, high sensing fidelity, low cost, and potential for rapid deployment. Although the AODV and DSDV routing protocols and other routing protocols have been designed for wireless sensor networks, and not all are suitable for Data centric protocols. In this paper, we propose the data centric protocols are used for AODV and DSDV routing protocols, which evaluate reduces the packet losing, energy efficiency and decreases redundancy problems in the location based routing protocols Simulation results show improved network generated packets as well as reduced routing packet loss.*

Keywords: *Data centric protocols, AODV, DSDV.*

I. INTRODUCTION

In data-centric routing, the sink queries the Sensor field for the specific information it is interested in and the nodes respond with only the information requested. The WSNs consist of small size, low-power, and low-cost devices that integrated with limited computation, sensing, and radio communication capabilities. Wireless sensor networks (WSNs) are composed of many homogeneous [8] or heterogeneous sensor nodes with limited resources. A sensor node is comprised of three components: a sensor, a processor and a wireless communication device. A sensor of nodes detect a change in surroundings, a processor processes sensing data collected from neighbor nodes or own environmental information, and a wireless communication device is capable to send and receive sensing data.

Proactive or Table Driven Protocols Each node maintains one or more tables containing routing information to every other node in the network. This information about the network is gathered proactively [14]. In other words, each node attempts to update his routing tables after a given time period in order to ensure consistent Routes from each node to every other node in the network [2]. There are miscellaneous strategies what are stored in these routing tables, e.g. the complete route to a desired destination or just the next hop in the route as in DSDV

Reactive or On-Demand Protocols Routing information is acquainted only when it is actually needed. Therefore, an application looking for a route to an arbitrary node initiates a route discovery procedure. In this case the network is flooded with an appropriate route discovery message [11]. Depending on the respective protocol either the destination node or any node knowing a stable route to the destination can answer with a route reply message. This message is returned to the node that had initiated the route discovery. The information acquainted with a route discovery is usually cached in a route table [3], similar to the route tables in proactive protocols. This cache is purged when a route error occurs, when the route expires or when the route is not needed anymore. Examples for this routing concept are AODV.

II. REQUIREMENTS OF ROUTING PROTOCOLS

A. DSDV

The Destination-Sequenced Distance Vector (DSDV) [4] routing protocol uses routing tables listing all possible destinations within the network and the number of hops to each destination. Every node maintains such a routing table. The routing table entries in all nodes for a specific destination specify a virtual destination-based tree to send packets to that destination. In other words, each node maintains a routing table listing the "next hop" for all reachable destinations. To avoid routing loops DSDV each route is tagged with an even monotonically growing sequence number advertised by the destination node. A route is considered more favorable if it has a greater sequence number. If the sequence numbers of two routes are equal, the route with the lower metric, i.e. the route with fewer hops, is preferred. To maintain the consistency of route tables in a dynamically varying topology, each node periodically transmits updates once in every 30 - 90 seconds or when significant new information is available[10]. More precisely, when the routing table has changed largely. As a consequence, DSDV is shown to have a very high routing overhead compared to other reactive routing protocols, such as AODV or DSR.

B. AODV

The Ad Hoc On-Demand Distance-Vector (AODV) [5] routing protocol is specially designed for ad hoc wireless networks. It provides quick and efficient route establishment with minimal control overhead and minimal route latency. AODV is an improvement of DSDV with the goal to minimize the number of required system-wide broadcasts.

DSDV issues broadcasts to announce every change in the overall connectivity of the ad hoc network. Since AODV is a pure reactive routing protocol and thus, nodes that are not on a selected path do not maintain routing

Information or participate in route table exchanges, it is no longer required that topology changes initiate system-wide broadcasts. When a node determines that it needs a route to a destination node and does not have one available, it initiates a route discovery procedure by broadcasting a RREQ packet. A node receiving such a packet may answer it either if it is the destination node or if it has a valid route to the destination, by replying a RREP packet. Any node forwarding a reply updates it's own route table with a pointer to the destination. As long as the route is used, it will be continuously maintained. Unused routes time out after a certain period and are consequently discarded. This reduces the effect of stale routes as well as the need for route maintenance for unused routes. AODV supports unicast as well as multicast routes that are set up in a similar manner.

III. EVALUATION OF ROUTE REQUEST:

We can view the number of retransmissions of RREQs as knowledge, which the sensor nodes can learn because the source node will retransmit RREQ when the source node does not receive the RREP. Retransmission of the RREQ implies that the current location of source is improper and should be modified. So, we can view successful transmission as receiving an RREP when flooding RREQ in the current location. In a similar way, we can view unsuccessful transmission as not receiving an RREP when flooding RREQ in the current location. The self-learning of the sensor node occurs as it counts the number of successful and unsuccessful transmissions and calculates the probability of successful transmission for different locations. The sensor node chooses the location that corresponds to the highest probability of receiving an RREP. In Figure1, consider node S that needs to find a route to D. If no valid path to D exists in the routing table of S, S initiates route discovery to find one. Before route discovery, S can establish an location between S and D. the transmission range of every node is assumed to be the same. Where it is assumed that the coordinates of X0, S and D are (X_0, Y_0, Z_0) , (X_s, Y_s, Z_s) and (X_d, Y_d, Z_d) , respectively. The distance between X_0 and the line S,D. The condition for determining whether X_0 is located in the location.

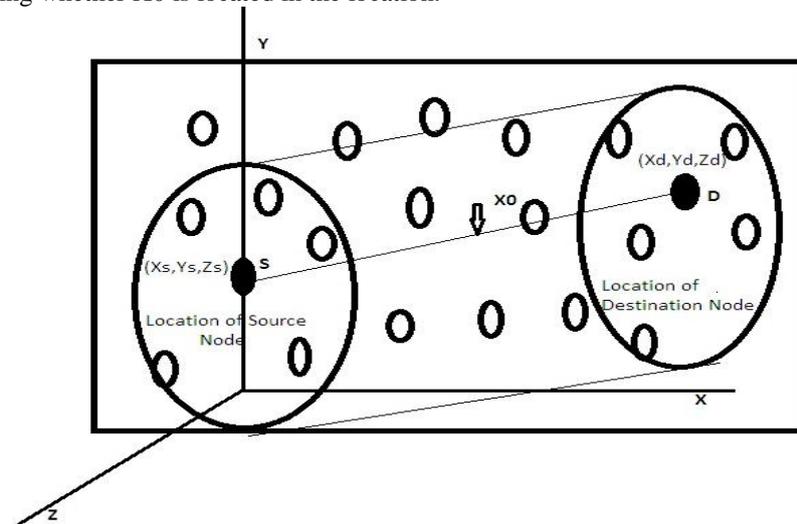


Fig 1: Evaluation of route request for location based data centric protocols

Every evaluation of first degree represents a plane and Two evaluation of the first degree are satisfied by the coordinates of any point on the line of intersection of the plane which they represent and therefore two evaluations together represent that line.

Thus

$$A_1x+B_1y+c_1z+D_1=0$$

$$A_2x+B_2y+c_2z+D_2=0$$

Represent a straight-line

If S (x_s, y_s, z_s) and D (x_d, y_d, z_d)

Then the evaluation of S and D are

$$\frac{x-x_s}{x_d-x_s} = \frac{y-y_s}{y_d-y_s} = \frac{z-z_s}{z_d-z_s}$$

May be written x,y

$$X=Ay+B \dots \dots \dots 1$$

$$A=(x_d-x_s/y_d-y_s), B=(x_s y_d-x_d y_s/y_d-y_s)$$

$$Y=Cz+D \dots \dots \dots 2$$

$$C=(y_d-y_s/z_d-z_s), D=(y_s z_d-y_d z_s/z_d-z_s)$$

$$Z=Ex+F \dots \dots \dots 3$$

$$E=(z_d-z_s/x_d-x_s), F=(z_s x_d-x_d x_s/x_d-x_s)$$

Evaluation of equation 1,2,3

$$A1=1, B1=(x_d-x_s/y_d-y_s+1), C1=y_d-y_s/z_d-z_s, D1=-B1y_s-x_s-c1z_s \dots \dots \dots I$$

$$A2=1, B2=-1, C2=(y_d-y_s/z_d-z_s)-x_d-x_s/z_d-z_d, D2=-C2z_d-x_s-y_s \dots \dots \dots II$$

IV. EVALUATION OF DATA CENTRIC PROTOCOLS AVERAGE VALUE OF GENERATED PACKETS

A. Energy Efficiency

Energy efficient issue in data centric protocols I find out the energy conceptions of this six protocols using AODV and DSDV .so I evaluation of average value of generated packets with each every protocol of data centric protocols using AODV and DSDV and find total energy saving and increases of network lifetime.

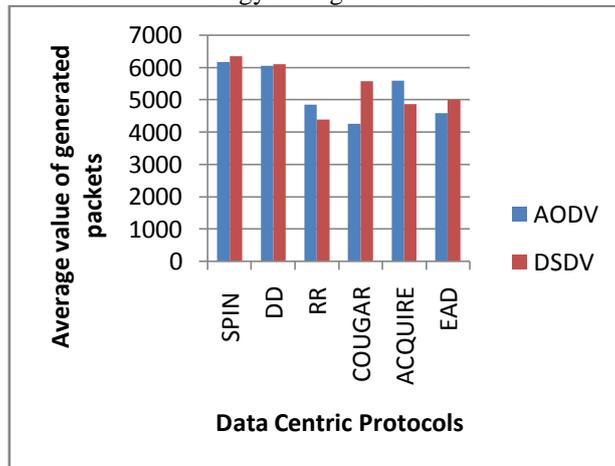


Fig 2: Energy Efficiency of AODV & DSDV Routing Protocols

B. Data Aggregation

Data aggregation occurs when a node aggregates sensor data from multiple different Nodes to include in a single message packet. so I evaluation of average value of generated packets with each every protocol of data centric protocols using AODV and DSDV and find out minimize the total number of nodes.

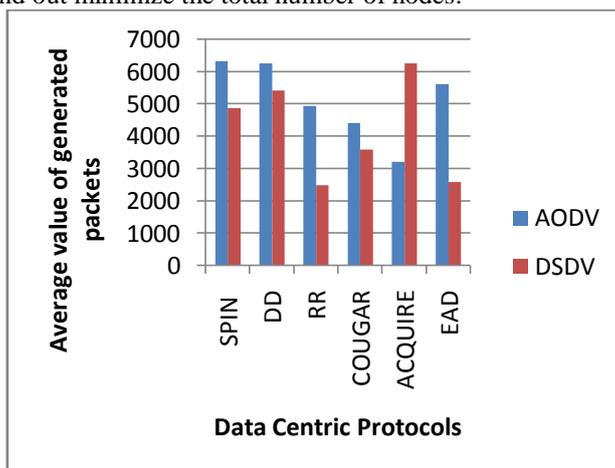


Fig 3: Data Aggregation of AODV & DSDV Routing Protocols

C. Reduce Packet loss

A packet is dropped in two cases: the buffer is full when the packet needs to be buffered and the time that the packet has been buffered exceeds the limit. Evaluation of average value of generated packets with each every protocol of data centric protocols using AODV and DSDV and find reduce packet loss and increases of packet forwarding.

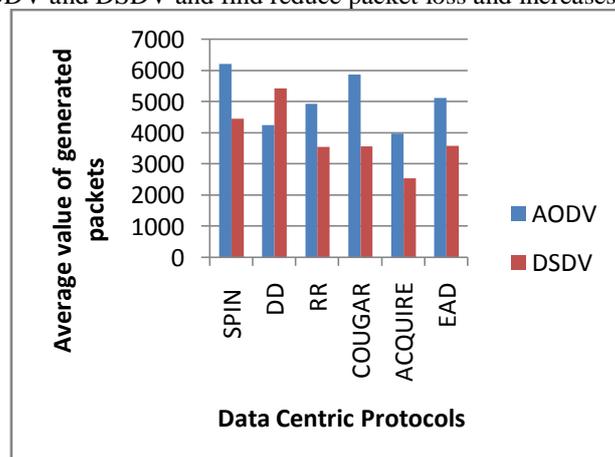


Fig 4: Reduce Packet loss of AODV & DSDV Routing Protocols

D. Throughput

Throughput issue in data centric protocols I find out the packet forwarding of this six protocols using AODV and DSDV .so I evaluation of average value of generated packets with each every protocol of data centric protocols using AODV and DSDV and find maximum amount of packets to destination.

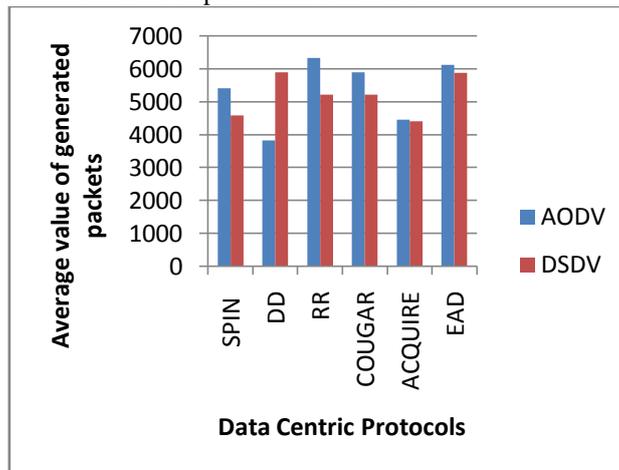


Fig 5: Throughput of AODV & DSDV Routing Protocols

E. Latency

Delay issue in data centric protocols I find out the time delay issues of this six protocols using AODV and DSDV .so I evaluation of average value of generated packets with each every protocol of data centric protocols using AODV and DSDV and find maximum amount of packets to destination for latency of packets .

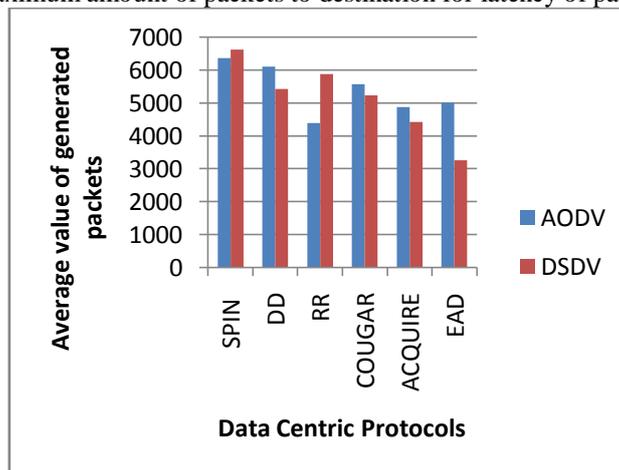


Fig 6: Latency of AODV & DSDV Routing Protocols

F. Reduce Redundancy

Redundancy issue in data centric protocols I find out the duplication issues of this six protocols using AODV and DSDV .so I evaluation of average value of generated packets with each every protocol of data centric protocols using AODV and DSDV.i found eliminates duplicate messages that come from the same node, which reduces the total number of messages in the system.

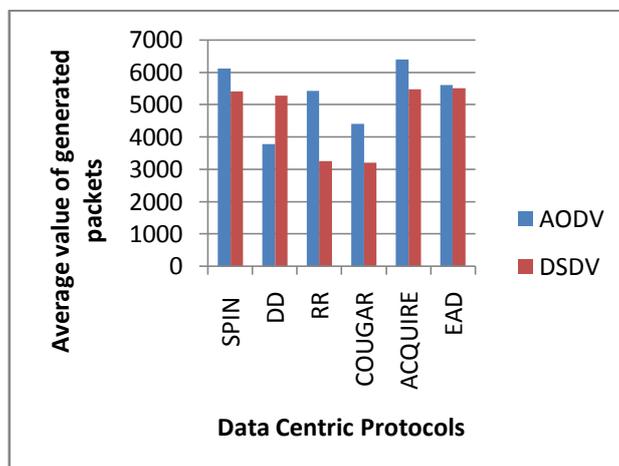


Fig 7: Reduce Redundancy of AODV & DSDV Routing Protocols

V. AVERAGE VALUE OF DROPPED PACKETS

A. Energy Efficiency

Energy efficient issue in data centric protocols I find out the energy conceptions of this six protocols using AODV and DSDV .so I evaluation of Average value of dropped packets with each every protocol of data centric protocols using AODV and DSDV and find total energy saving and increases of network lifetime.

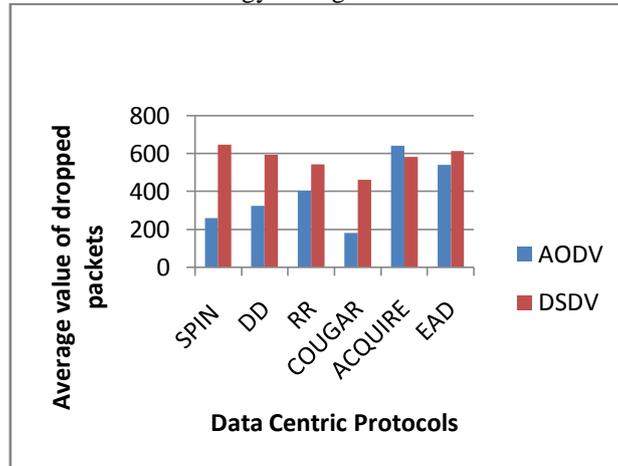


Fig 8: Energy Efficiency of AODV & DSDV Routing Protocols

B. Data Aggregation

Data aggregation occurs when a node aggregates sensor data from multiple different Nodes to include in a single message packet. so I evaluation of Average value of dropped packets with each every protocol of data centric protocols using AODV and DSDV and find out minimize the total number of nodes

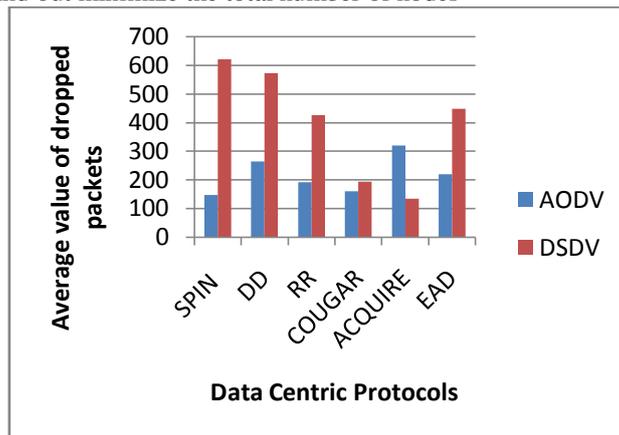


Fig 9: Data Aggregation of AODV & DSDV Routing Protocols

C. Reduce Packet loss

A packet is dropped in two cases: the buffer is full when the packet needs to be buffered and the time that the packet has been buffered exceeds the limit. Evaluation of Average value of dropped packets with each every protocol of data centric protocols using AODV and DSDV and find reduce packet loss and increases of packet forwarding.

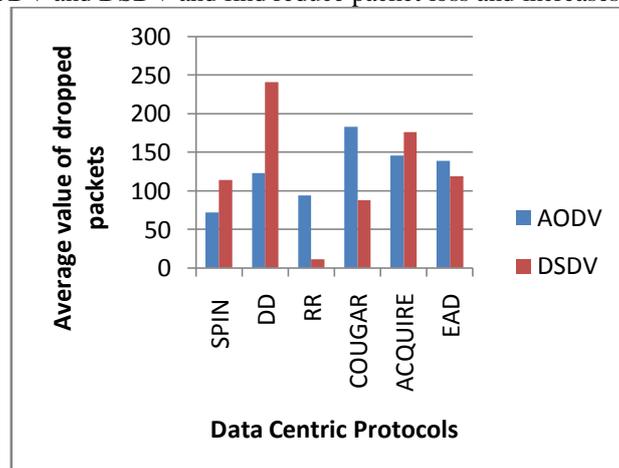


Fig 10: Reduce Packet loss of AODV & DSDV Routing Protocols

D. Throughput

Throughput issue in data centric protocols I find out the packet forwarding of this six protocols using AODV and DSDV .so I evaluation of Average value of dropped packets with each every protocol of data centric protocols using AODV and DSDV and find maximum amount of packets to destination.

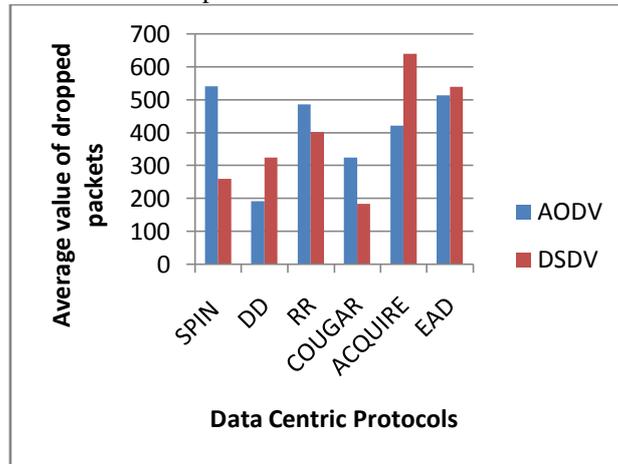


Fig 11: Throughput of AODV & DSDV Routing Protocols

E. Latency

Delay issue in data centric protocols I find out the time delay issues of this six protocols using AODV and DSDV .so I evaluation of Average value of dropped packets with each every protocol of data centric protocols using AODV and DSDV and find maximum amount of packets to destination for latency of packets .

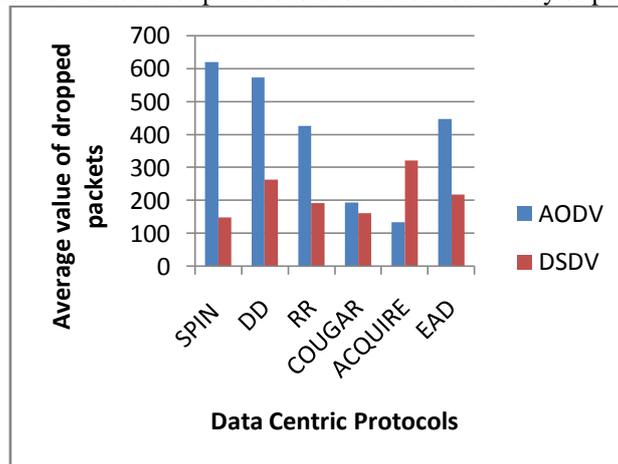


Fig 12: Latency of AODV & DSDV Routing Protocols

F. Reduce Redundancy

Redundancy issue in data centric protocols I find out the duplication issues of this six protocols using AODV and DSDV .so I evaluation of Average value of dropped packets with each every protocol of data centric protocols using AODV and DSDV . I found eliminates duplicate messages that come from the same node, which reduces the total number of messages in the system.

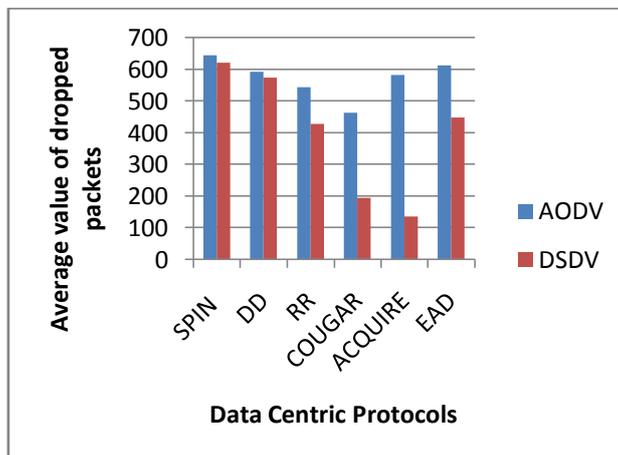


Fig 13: Reduce Redundancy of AODV & DSDV Routing Protocols

VI. CONCLUSION

This paper does the realistic comparison of two routing protocols DSDV, AODV. It makes use of location information for the sensor nodes to confine route discovery flooding to a cylindrical request zone instead of searching blindly for a route in the whole network. The significant observation is, simulation results agree with expected results based on theoretical analysis. This reduces the routing overhead and results in fewer broadcast storm problems. Location based routing algorithm, which can automatically adjust the size of request zone using self-learning to increase the probability of successful route discovery.

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