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Evaluation of Reactive Routing Protocols for Wireless Sensor Networks

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Abstract ***:- This paper evaluates the performance of prominent on demand routing protocols, which are Ad Hoc On–Demand Distance vector Routing(AODV),Dynamic Source Routing(DSR)for wireless sensor networks and to improve the QOS and increase the life time of the network and lower the power consumption of sensor node in the wireless sensor network, AODV & DSR routing protocols are used based on minimal route cost is presented and Network Simulator (NS2) is used to simulate the Throughput, end-to-end delay.***

Key words: **AODV, DSR, Sensor networks, Ns-2.**

I. INTRODUCTION

Wireless sensor networks are composed of independent sensor nodes deployed in an area Working Collectively in order to monitor different environmental and physical conditions such as motion, Temperature, pressure, vibration sound or pollutants [1]. The main reason in the advancement of wireless sensor network was military applications in battlefields in the beginning but now the application area is extended to other fields including industrial monitoring. Controlling of traffic and health monitoring Different constraints such as size and cost results in constraints of energy, bandwidth, memory and computational speed of sensor nodes [2].

II. NS-2 OVERVIEW

The ns-2 simulation environment [10] offer great flexibility in investigating the characteristics of sensor networks because it already contains flexible models for energy constrained wireless ad hoc networks. The wireless model also includes support for node movements and energy constraints.

III. ROUTING PROTOCOLS IN WSN

Hierarchical Protocols: The hierarchical routing protocols: LEACH, PEGASIS, Hierarchical-PEG ASIS, TEEN, APTEEN, Energy-aware routing for cluster-based sensor networks, Self-organizing protocol [3].

IV. AODV ROUTING PROTOCOL

There are two types of routing protocols which are reactive and proactive. In reactive routing Protocols the routes are created only when source wants to send data to destination whereas Proactive routing protocols are table driven. Being a reactive routing protocol AODV [7] uses Traditional routing tables, one entry per destination and sequence numbers are used to determine whether routing information is up-to-date and to prevent routing loops. Route- Request, Route- Reply, Route- Error, Hello messages are control messages to improve the quality of service of WSN.

V. DYNAMIC ROUTING PROTOCOL

DSR protocol is divided into two mechanisms which show the basic operation of DSR. The two mechanisms are: Route Discovery, Route Maintenance. When a node S wants to send a packet to destination D, the route to destination D is obtained by route discovery mechanism. In this mechanism the source node S broadcasts a ROUTE REQUEST packet which in a controlled manner is flooded through the network and answered in the form of ROUTE REPLY packet by the destination node or from the node which has the route to destination. The routes are kept in Route Cache, which to the same destination can store multiple routes. The nodes check their route cache for a route that could answer the request before repropagation of ROUTE REQUEST. The routes that are not currently used for communication the nodes do not expend effort on obtaining or maintaining them i.e. the route discovery is initiated only on-demand [4].The other mechanism is the route maintenance by which source node S detects if the topology of the network has changed so that it can no longer use its route to destination. If the two nodes that were listed as neighbors on the route moved out of the range of each other and the link becomes broken, the source node S is notified with a ROUTE ERROR packet. The source node S can use any other known routes to the destination D or the process of route discovery is invoked again to find a new route to the destination.

VI. PERFORMANCE OF AODV & DSR ROUTING PROTOCOL

We will excite the network with a single phenomenon node that slowly travels near the perimeter of the network. As the grid density increases, the phenomenon will encounter sensor nodes more frequently, thus as the grid density increases, AODV will flood more route requests through the network. as the network becomes more congested, we should observe higher latency and higher loss rates in sensor reports delivered to the stationary data rate and loss fraction statistics. This experiment begins to show the types of results one can achieve from sensor network simulations in ns-2.suppose we would like to characterize how well AODV,DSR scales with the size of a sensor network running the sensor application ,we will look at networks of stationary sensors with infinite energy placed in a grid with d units of distance between adjacent nodes .the network size will vary between 50 and 2000 sensor nodes, we will limit the broadcast range of 802.11 radios and the range of the phenomenon to √2d2.since we are using the two ray ground radio propagation model, nodes within this boundary always receive the broadcast and nodes outside never receive the broadcast.

VII. SIMULATED RESULTS

After simulation, we obtained results for AODV, DSR of their packet rate delivery ratio, Rate- drop, rate –delay and nam outputs as shown in the following Fig 1- Fig 8, we will compare the performance of results.

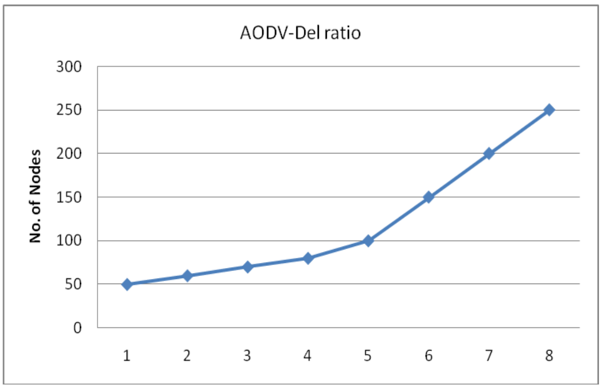

Fig.1 Packet Delivary ratio of AODV

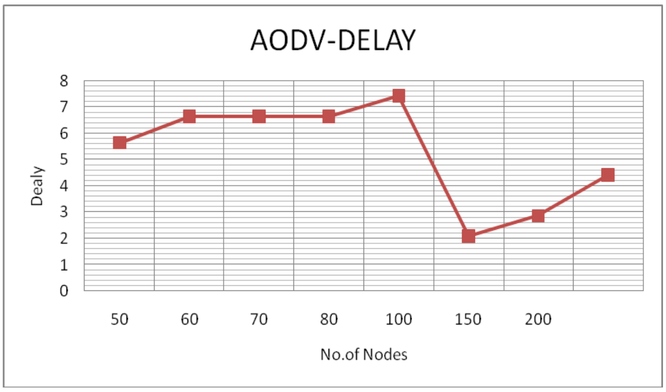

Fig 2 : Performance of AODV with delay parameter

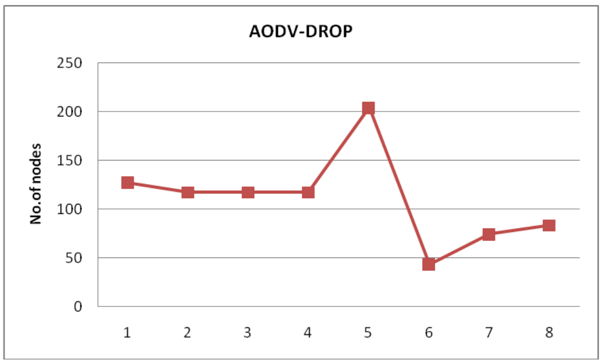

Fig 3 Drop perforarmance of AODV

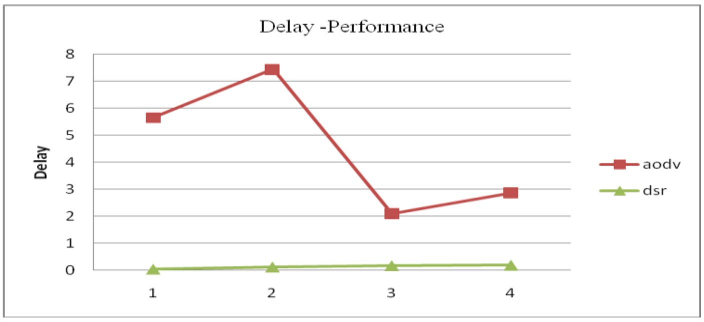

Fig 4 Delay -Perofrmance of Aodv and DSR

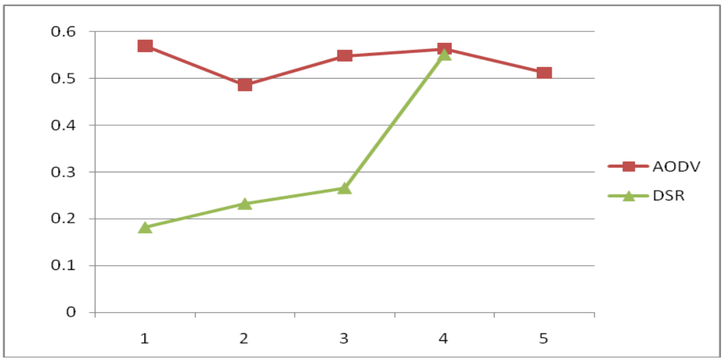

Fig.5 Delvari ratio performance of AODV and DSR

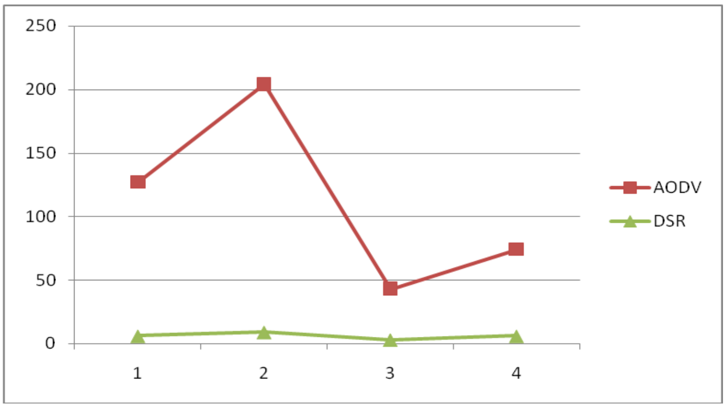

Fig 6.Drop Performance of AODV and DSR

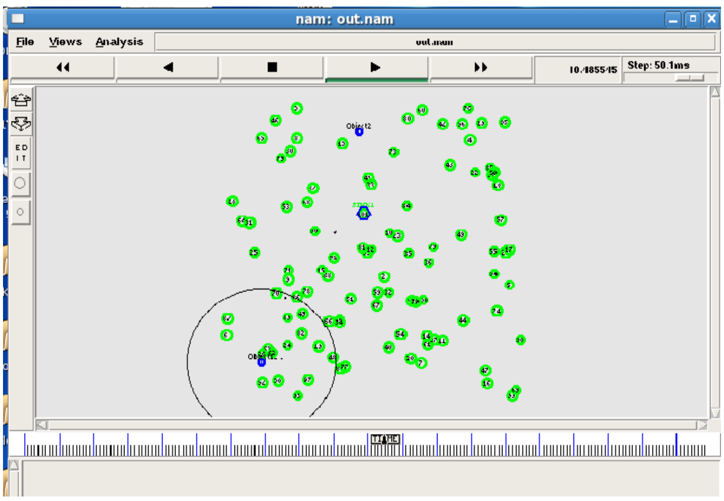

Fig 7. AODV -NAM output

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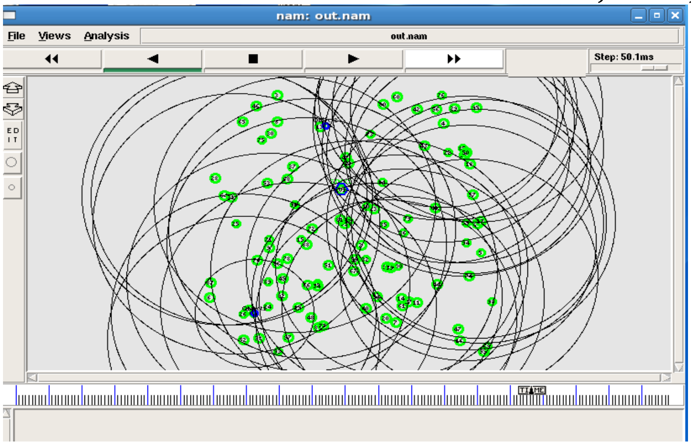

Fig.8 DSR- NAM Output

VIII. CONCLUSION

DSR and AODV implemented in three different scenarios having small, large and very large number of executing nodes in mobile nodes networks. In each scenario all the nodes were used as source nodes of sending data to a common base station. On the basis of results in this thesis we analyzed and proved that AODV is more reliable protocol in terms of delay and throughput than DSR. AODV is more superior to DSR in terms of delay in all the three scenarios. Network size has no considerable effect on AODV performance with respect to delay but it does affect DSR.With respect to throughput AODV outperforms DSR in all the three scenarios of mobile nodes networks. The network size does not have a considerable effect on the throughput of DSR but in case of AODV it has considerable effect. In mobile nodes networks AODV is a good choice in all the three scenarios of small, large and very large network for minimal delay and higher throughput.

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