



A Comparative Analysis of DSDV and AODV Routing Protocol with Respect to Data Transmission

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Abstract — Collection of large number of nodes which are not directly connected with each other and each node is acting as a sensor node to provide communication is called a wireless sensor network. Now days it is wide area of research which is growing very fast. Since in mobile ad-hoc network infrastructure is not required it becomes wide area of investment. Due to the limited capability of wireless sensor network having two or more nodes that are distributed over the network, all these nodes are communicating with each other as a adhoc. Since the intermediate node can be a laptop, mobile, or any embedded process with the limited capacity of the battery on which the system communicating. It is very hard to maintain the network. In MANET since it contain different topologies, which is frequently changes hence the deployment of the network and the maintenance of the network is very important. In this paper we will consider two network scenarios one of 25 nodes and other comprises of 35 nodes. Simulation results indicate that the energy consumption in AODV protocol increases when no packets increases from 25 to 35. The performance of DSDV protocol is quite better then the performance of AODV protocol in case of packet delivery fraction and good put. In this paper we consider two routing protocols AODV and DSDV for simulation.

Keywords— AODV, DSDV, MANET, NS-2, Routing

I. INTRODUCTION

The idea of Ad Hoc Networking is gaining popularity with the recent proliferation of mobile computers like laptops and palmtops. Minimal configuration, absence of infrastructure and quick deployment make Ad Hoc Networks convenient for emergency operations. Since host mobility causes frequent and unpredictable topological changes, the formation and maintenance of Ad Hoc Network is not only a challenging task and also it is different from the wired networks.

A network in which nodes are not directly connected with each other where each node is a sensor node is defined as a wireless sensor network (WSNs). Day by day the size of the wireless sensor network increases. Rate of growth of such type of networks are very fast and it also increases the research are of wireless sensor networks. Today such types of networks are utilized in monitoring and analysis of the environment.



Fig1. Architecture of MANET

Role of such type of networks is also increases in the industrial areas as well as agriculture. Cost of establishment of WSNs is very low and it is easy to establish in the area where environment is changes. Since WSNs is growing in various areas, it is also a wide area of research. Various researches are going on in WSN so that the sensor network operates more efficiently in the application area where data are sampled from different areas.

In wireless network all nodes are segregated at different places and each node behave like an adhoc node. Wireless sensor network consists of number of nodes and each node is having processors within it and powered by battery. Due to the limited life time of the battery it is not possible to replace it every time, thus the main aim of WSNs is to increase the life of each wireless sensor node or to increase the life of wireless sensor network [1].

II. ROUTING PROTOCOLS

DSDV Protocol

In Destination-Sequenced Distance-Vector Routing protocol a routing table is generated for each individual node. Since root looping is not there in DSDV, hence the speed of convergence between all nodes increases and it also decreases the control message overhead.

To maintain the information changes in network each mobile node dynamically updates its routing table to maintain the consistency.

This change in routing information is provided to each of the nodes in the network so that it will locate the other neighbor nodes in the adhoc network [2]. Whenever a demand for a packet comes from other nodes it will be processed in the adhoc network and routing information is again updated for the related nodes.

AODV Protocol

AODV protocol is a reactive routing protocol is basically a modification of DSDV protocol in which routes are defined only when it required. Whenever a source node want to send a packet it will broadcast a route request (PREQ) packet. If the node having PREQ is not the node in the route then PREQ packet is again retransmitted. If the node having PREQ is the node in the route it will transmit a reply (PREP) packet. After passing this packet form one node to another neighbor node it will reaches to the required destination node. And all of the intermediate

Node s during this process keeps information of its neighbor node in its routing table [3]. If any intermediate node fails then it will pass a packet (PRER) of link break to the neighboring node from where packet has been arrived. Each of the intermediate node will contain the information when a new route is established between the two nodes , which are :

- Address of the node where packet will reach finally (Destination node).
- The no of hops in reaching from source node to the destination node and
- The sequence no of the destination node.

AODV [4] adoption a simulcast route inquiry structure, it used to be (along conversion) the Dynamic Source Routing (DSR) algorithm. Besides of source routing, however AODV awaits on electrically regulating route table portals at neutral nodes. A bigger hanging is achieved by bringing source routes in every data packet when the diversity in these networks along all nodes. We borrow the concept of destination sequence numbers from DSDV to maintain the most useful routing inquiry between nodes.

III. RELATED WORKS

Hwang, C.J. et al.[5] proposed a scheme to improve the reactive protocol that works on power aware virtual node scheme. This scheme can execute with numerous routing paths without transmitting any extra control message. It applied with AODV (ad-hoc on demand routing protocol) and DSR (dynamic source routing protocol).The improvement of performance was observed. The simulation result provides durability, mobility and further intensifies the execution of protocol.

Preethi, S.et al. [6] proposed an energy efficient route discovery process for AODV which is totally based on ERS (Expanding Ring Search) technique. AODV is designed for MANET with reduced overhead using ERS technique due to battery restrain of nodes and energy consumption is one of the major problems in MANET. The main basic objective of this approach is to conserve energy of nodes by avoiding the redundant rebroadcasting of RRP(route request packets).In this paper calculation of relaying status of node based on broadcasting of its RREQ packet is done by its neighbors.

Mehdi et al. [7] a challenging task is proposed energy efficient routing protocols for MANET and wireless sensor network. This protocol proposed by ISTF (internet engineering task force). With respect to average energy consumption and routing energy consumption this paper explained thoroughly the performance comparison of DSR and AODV routing protocol Various results are shown by different routing protocols in which DSR is efficient with many of the mobility scenarios, but on the other side overhead of source routing increases. With some of mobility environment AODV is efficient in which overhead problem of source routing is eliminated. Although in AODV discovery route desires more overhead and more expensive than DSR.

Uma et al.[8] In this paper an energy efficient routing protocol (EERP) is proposed on the basis of AODV so that the transmission power of a node can be reduced which is part of an active route if next hop is closer. In MANET, all nodes are mobile in nature and have limited battery power. Due to dynamic topology of MANET, all nodes change their positions from time to time and reconnection of nodes degrades their battery power. Therefore battery power of those nodes having low battery have to be saved so that the lifetime of network can be increased.

Baysan, M. et al. [9] two approaches are used to develop energy efficient broadcast. Both approaches are different from each other. In one approach nodes used a fixed power level of transmission while in second approach nodes used power adaptive approach. An improved algorithm has been improved in this proposed work for to decide transmission power level and also to increase energy saving. Conservation of energy can be achieved by reducing the redundant transmission by including an efficient forward node set selection algorithm.

Bhatsangave, S.P. et al.[10] OAODV(optimized mobile ad-hoc network) on demand routing protocol is proposed in this paper . OAODV is modifying the AODV broadcast mechanism. If reply is lost in AODV, it rebroadcast message again then automatically increases or cause the congestion in network, decrement the packet delivery ratio, increase the end to end delay and unnecessary rebroadcasting of RREQ packet.

Dr. Patil, A.P. et al. [11] Energy conservation is an elemental application in various field such as emergency and military operations. These areas require energy efficient solution. In this paper, the proposed work is a newer mutation of AODV routing protocol which resolve major problems in mobile adhoc network like energy efficiency and adaptability Performance is evaluated through various parameters such as network lifetime, throughput, packet delivery ratio (PDR) and end to end delay.

Khan, R. et al. [12] In this paper various ad-hoc routing protocols have been evaluated for performance in terms energy efficiency such as DSDV, AODV, DSR, TORA and AOMDV. It proposed a new routing algorithm, which modifies AOMDV (ad-hoc on demand multipath distance vector) and it provide better performance compared to all the above mentioned ad-hoc routing protocol. It is simulated using ns2 simulator. MANET consists of a set of mobile nodes and all nodes are connected with each other through wireless link. These nodes may move randomly and connected dynamically to one- another.

Shalini, B et al. [13] Limited battery power and energy efficiency is an important parameter in mobile ad-hoc network. It is not possible to replace battery energy after implementation of sensor node. So, most useful method to maintain energy efficiency is to transfer data only to its nearest neighbor node which is at minimum power level. But a problem occurred in this approach. It only works for transmission power within node neighborhood and only possible for energy efficiency at link level. By this method it is not possible to minimize the overall consumed energy and overhead of network.

Mrs. Nandhini, J. et al. [14] in this paper characteristic, applications of mobile ad-hoc network and also routing in MANET's are discussed. MANET's are infrastructure-less network which used for communication between two or more nodes without establishing a common access point. On-demand routing protocols such as AODV and DSR protocols are considered as one of the very effective method for achieving QoS(Quality of services) parameter compared to table-driven method. Survey of new and improved energy based routing protocols methods are discussed and proposed modification of AODV and DSR in order to extract a better energy efficient routing algorithm.

IV. PERFORAMANCE COMPARASION USING SIMULATION RESULT

Simulation

Network simulation is a technique in which the behavior of a network can be evaluated either by calculating the interaction between different network entities (hosts/packets, etc.) by using mathematical formulas, or actually by capturing and playing back observations from a production network. In test lab one can observe the behavior of network and various applications and services. Various attributes of the environment can also be modified in a controlled manner to assess how the network would behave under different conditions and circumstances.

NS-2 Simulator

In this paper NS-2 is used as a simulator tool. NS-2 is a simulation based software which create a environment to study the behaviour of the network system and appropriate protocol. Various simulators are there such as OPNET Modeler, OMNeT++, Qualnet etc... but NS-2 provides substantial support for simulation of TCP, routing, and multicast protocols over wired and wireless (local and satellite) networks. The core of NS-2 is also written in C++, but the C++ simulation objects are linked to shadow objects in OTcl and variables can be linked between both language realms. Simulation scripts are written in the OTcl language, an extension of the Tcl scripting language.

V. SIMULATION METHODOLOGY

In our research scenario file is taken as a input which describe the exact motion of each mobile node and exact packet originated by each node along with the exact time at which each change in motion or packet origination is to occur. A trace file is created after running and it is stored to the disk which is analyzed by using a variety of scripts, call file *.tr that count the number of packets successfully delivered and the length of the path taken by the packet, as well as the internal functioning of each scripts executed.

Simulation Tables

Table 1. Simulation Parameter for Scenario 1

Operating System	Ubuntu 14.04
Network Simulator	Ns-allinone-2.35
Simulation Time	60 s
No of Nodes	25 wireless nodes
Data Traffic	CBR
Size of Packet (Bytes)	1000
Simulation Area Size	1500X900m
Speed of Node	20 m/s

Table 2. Simulation Parameter for Scenario 2

Operating System	Ubuntu 14.04
Network Simulator	Ns-allinone-2.35

Simulation Time	60 s
No of Nodes	35 wireless nodes
Data Traffic	CBR
Size of Packet (Bytes)	1000
Simulation Area Size	1500X900m
Speed of Node	20 /s

VI. RESULTS

RESULTS FOR SCENARIO 1

For DSDV Protocol for node=25 and simulation time =50ms

Avg Throughput=38.68

Packet Delivery fraction=.0098

Energy consumed=415.259

For AODV Protocols for node=25 and ,simulation time =50ms

Avg Throughput=39.58

Packet Delivery fraction=.0324

Energy consumed=621.155

RESULTS FOR SCENARIO 2

For DSDV Protocol for node=35 and simulation time =50ms

Avg Throughput=511.12

Packet Delivery fraction=.0994

Energy consumed=392.118

For AODV Protocols for node=35 and ,simulation time =50ms

Avg Throughput=37.91

Packet Delivery fraction=.0124

Energy consumed=820.125

VII. CONCLUSION

Two different routing protocols DSDV (Destination-Sequenced Distance-Vector Routing protocol) and AODV (Ad hoc On-Demand Distance Vector routing protocol) are analysed in this paper. We analyzed them over three metrics named Packet Drop, Packet delivery fraction, and Throughput. Energy consumption in DSDV protocol decreases when no packets increases from 25 to 35 and energy consumption is also increases. However energy consumption in AODV protocol increases when no packets increases from 25 to 35.

Performance of AODV routing protocol is not better than DSDV routing protocol when we analysed the delivery fraction and good put. Since the packet traverse between the nodes and as the nodes become stable form source to destination the data transfer rate become stable.

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