

Distributed Routing Protocol for Different Packet Size Data Transfer over Wireless Sensor Network using NS2 Simulator

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Abstract— In the recent technical age large data transmission is one of the big issues, numerous specialists proposed lot many hardware and simulation techniques to give solution on large data technique, they endeavor to enhance the system limit and dependability yet they avoid oblige in hardware and simulation QoS. For this issue, our principal goal of this paper is to enhance the quality of hardware to transfer data in proper packet format by using hardware circuits; same technique is used in simulation technique for different packet size with compression technique. This expects to build up the QoS based reliable architecture against the hybrid wireless routing issues. The framework likewise goes for giving both proactive and responsive answers for powerful routing. The objective of this paper is to give a proficient element routing management to bargain with difficulties of information transmission to channel the neighbor hubs through which the next hop transmission happens.

criteria of various solutions. Hybrid channels infrastructure that synergistically combines and MANETs to leverage each other. Especially, infrastructure networking sites improve the scalability of MANETs, while MANETs instantly establish self-arranging networks, extending the insurance coverage regarding the system channels.

In a vehicle opportunistic access system (a case of hybrid companies), folks in automobiles have to publish or install video from remote Internet machines through accessibility guidelines (APs) (for example. base stations) spreading call at an urban area. Since it is not likely that the bottom programs include the entire town to keep sufficiently strong transmission everywhere to guide a credit card application demanding higher website link costs, the vehicles themselves can develop a MANET to increase the coverage regarding the base station, providing steady circle relationships.

Keywords: - Hybrid Network, Wireless Sensor Network, QoS Routing, Distributed Routing.

I. INTRODUCTION:

The hybrid network is an extension of a structured network, in which a mobile number may hook up to an accessibility point (AP) making use of multi-hop wireless routes via various another mobile hosts. The APs include a configuration to use a single or several readily available networks. Mobile host and wireless routers can identify their operating stations dynamically through station switching hybrid wireless networks (for example., multihop cellular systems) are been shown to be a far better network design for the generation that is next networking sites. It will also help to deal with the strict end to end QoS specifications of various solutions. Hybrid networks synergistically blend system channels and MANETs to leverage each other.

For instance it integrates a mobile wireless Ad Hoc Network (MANET) and infrastructure that is wireless showed a better approach subsequent generation wireless companies hybrid wireless channels (for example., multi-hop cellular networks) have now been proven to be an improved network structure for the following generation wireless systems and can help deal with the stringent end-to-end QoS

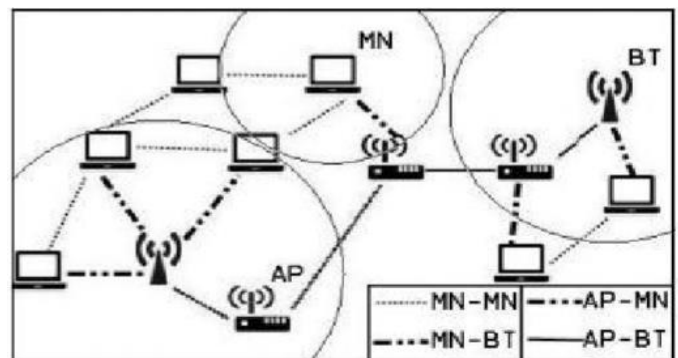


Fig. 1 Basic Wireless Communication

In a few wireless multicast programs, the resource and intermediary nodes tend to be mobile for moving the information, nevertheless, the multicast users stores are solved and known they also sent the packet in the same intermediate node. When you look at the above figure which shows the integration of wired and wireless networks, makes use of base stations in order to avoid an overwhelming load of relying on boxes between the source and resort if needed. Providing multicast that is robust when it comes to those powerful circle circumstances is actually a significant challenge for sustaining these applications.

In this paper, we are going to achieve the QoS with the help of AODV and DSDV techniques. The proposed technique is explained in the following section. The section III briefly explains the implementation following with the results and the conclusion concludes the paper.

II. PROPOSED TECHNIQUE:

In this section we are going to propose a technique made using the techniques explained below:

A. AD HOC ON DEMAND DISTANCE VECTOR ROUTING PROTOCOL(AODV):

Being a reactive routing protocol AODV makes use of routing that is traditional, one admission per location and series data are widely used to see whether routing suggestions was current also to prevent routing loops. Route Request message to their neighbors to get the path to resort. The foundation node broadcast the RREQ in other words. Destination Sequence Number may be the sequence number that is latest obtained in past times by the foundation for almost any path to the resort and supply Sequence quantity could be the latest series number to be utilized within the path entryway pointing to the way to obtain the path request. If any node from a listing of friends is resorted or understands the path to the location, it may send RREP information to the origin. AODV makes use of <RREQ, RREP> pair to get the route. It can help both in unicasting and multicasting. The RREQ message contains the supply and resort target, lifetime of content, sequence variety of supply and resort and request ID as distinctive identification.

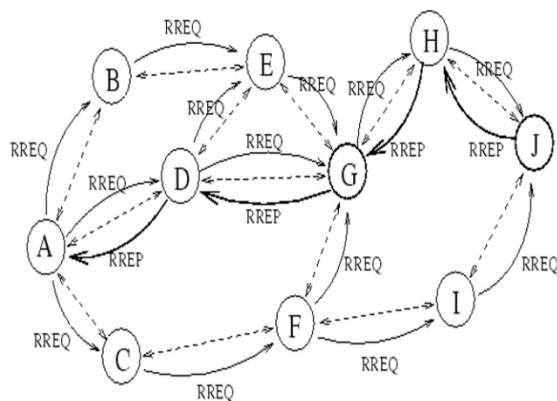


Fig. 2 AODV Wireless Communication Algorithm

B. DESTINATION SEQUENCED DISTANCE VECTOR(DSDV):

Destination-Sequenced Distance-Vector (DSDV) Routing Algorithm is founded on the classical BellmanFord Routing Algorithm with some improvements. So, the modification is that it is both time-driven and event-driven. The stations

sporadically transfer their particular routing tables for their neighbors that are immediate. A station furthermore transmits its routing desk in cases where a change that is significant took place the table through the last upgrade sent. The routing table revisions may be submitted two ways: - a "full dump" or perhaps an update that is incremental. Once the network is fairly stable, incremental revisions include sent to prevent traffic that is extra full dump become fairly rare. The sequence amounts can be used to differentiate routes that are stale brand new ones and therefore steer clear of the development of loops. Every mobile facility maintains a routing desk that lists all offered destinations, a number of hops to achieve the resort, therefore, the series quantity designated because of the location node. If you have room when you look at the progressive modify package then those records might be integrated whose sequence numbers has changed. a full dump delivers the entire routing table to the friends and might span numerous packages whereas in an incremental improve just those entries through the routing dining table are sent which includes a metric modification because the latest modify plus it must easily fit into a packet.

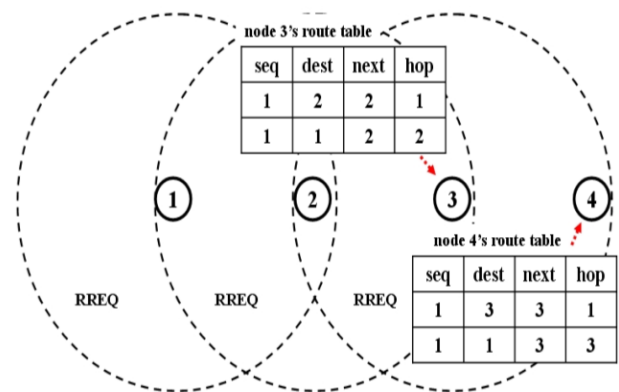


Fig. 3 DSDV Wireless Communication Algorithm

In the next section of the paper, we are going to see the implementation of the proposed system.

C. DYNAMIC SOURCE ROUTING (DSR)

It is a reactive protocol that creates a route on demand using source routing protocol i.e. it requires a full series of paths to be established between source and destination nodes to transmit packets and each packet follows the same path. The major motivations of this protocol are to limit the bandwidth by avoiding the periodic table updates and long convergence time. The underline fact to this protocol is that it floods a route request message in the network to establish a route and it consists of two procedures: Route Discovery and Route Maintenance.

Route Discovery:

As it is an on-demand routing protocol, so it looks up the routing during transmission of a packet. At the first phase, the transmitting node search its route cache to see whether there is a valid destination exists and if so, then the node starts transmitting to the destination node and the route discovery process end here. If there is no destination address then the node broadcasts the route request packet to reach the destination. When the destination node gets this packet, it returns the learned path to the source node.

Route Maintenance:

It is a process of broadcasting a message by a node to all other nodes informing the network or node failure in a network. It provides an early detection of node or link failure since wireless networks utilize hop-to-hop acknowledge. The advantage of this protocol are 1) Aware of existence of alternative paths that helps to find another path in case of node or link failure. 2) It avoids routing loops and 3) less maintenance overhead cost as it an on-demand routing protocol. On the other side, the disadvantages are 1) Long route acquisition delay for the route discovery which may not be acceptable in situations like the battle field. 2) It is not suitable for large number of nodes where speed may suffer and 3) it produced huge messaging overhead during busy times.

D. AD HOC ON-DEMAND MULTIPATH DISTANCE VECTOR (AOMDV)

Ad hoc on-demand multipath distance vector (AOMDV) protocol is an example of multipath routing protocol for wireless ad hoc networks. This is an extension of AODV protocol discussed earlier. The main idea in AOMDV is to compute multiple redundant paths during route discovery. The AOMDV protocol uses the routing information already available in the underlying AODV protocol as much as possible. So little additional overhead is required for the computation of multiple paths.

Two main components of the AOMDV protocols are

1. A route update rule to establish and maintain multiple loop-free paths at each node
2. A distributed protocol to find link disjoint paths

In AODV protocol, each copy of the RREQ packet arriving at a node defines an alternate path back to the source. But accepting all such copies to construct routes will lead to routing loops. To eliminate any possibility of loop, AOMDV uses an invariant based on a notion of “advertised hope count”.

The distributed protocol to find link-disjoint path make the multiple loop- free paths disjoint. Path disjointness has the nice property that paths fail independently. The two types of disjoint paths are node-disjoint and link-disjoint. Node-disjoint paths do not have any nodes in common other than source and destination. Similarly link-disjoint paths do not have any common link, but they may have common nodes. Even though node-disjointness guarantees that links fail independently, lesser number of such disjoint routes makes them less effective compared to link disjoint routes, when the interest is mainly fault tolerance. However with simple modification, AOMDV can allow the discovery of either node or link-disjoint paths.

III. IMPLEMENTATION:

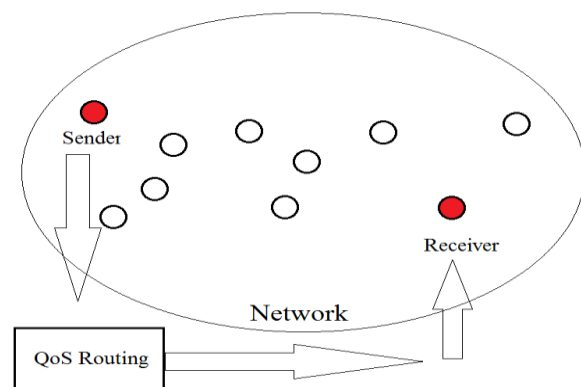


Fig. 4 Implementation of Wireless Sensor Network

As observed from the above we can see that there are multiple nodes present in a network the data is to be sent from sender to receiver. The modules of the system are as follows:

a. Input Data:

In this module, the data is selected by the system itself. As observed the red dot is the sender in the network it will select the data to be sent.

b. Priority:

Once the data is selected the system sends the data for processing. If the data is of high priority it is sent first similarly if the data is of low priority it is sent with a small delay. Due to which the efficiency of the network increases.

c. Routing Protocol:

We are going to use a hybrid algorithm using ASDV and DSDV protocols. According to the priority, the hybrid selects the algorithm to route the data from sender to receiver.

The next section of the paper illustrates the results observed during the initial testing.

IV. RESULT:

This performance is evaluated based on different metrics like throughput, routing overhead, average end-to-end delay and packet delivery ratio. The analysis of DSR, AODV, DSDV and AOMDV routing protocols is discussed in detail:

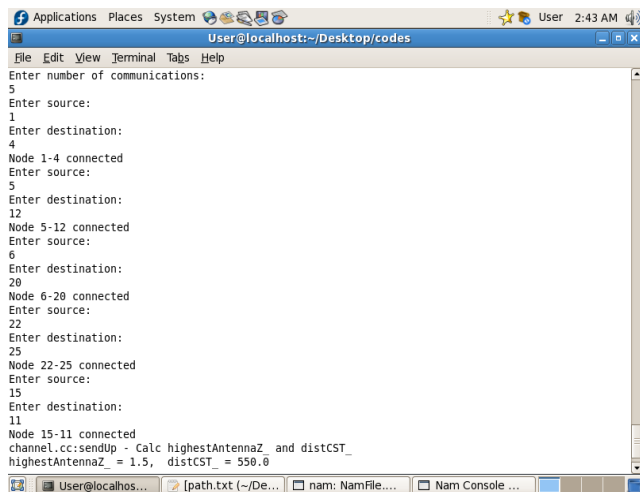


Fig 5 NS2 simulator for Routing Protocol

In above figure, it has been seen that the above algorithm s used for AODV, DSR, DSDV and AOMDV routing protocol on 50 number of communication for following parameter like energy, throughput, jitter, pdr (Packet delivery ratio).

Network simulator 2.34 is used for simulation of the WSN, the following parameters were considered while simulating the network,

Parameter	Value
Number of nodes	1000
Network size	300 m x 300 m
Routing protocols	AODV, DSDV, DSR and AOMDV
Queue type	Priority Queue
Clustering protocol	LEACH
Channel type	Virtual Wireless Channel
Data rate	10 kbps to 1000 kbps
Packet size	1 kBytes to 100 kBytes

We varied the data rate and packet size for each of the routing protocols namely AODV, DSDV, AOMDV and DSR, and then checked the performance of our implemented LEACH based MPFWSN protocol. The results obtained are as shown in table 1,2 and 3

Packet Size 1000		Packet Interval 0.001		
Parameter	Protocol AODV	Protocol AOMDV	Protocol DSDV	Protocol DSR
Delay	0.000813	0.001104	0.001078	0.000973
Energy	7.652406	0.877449	175.8610 09	48.26788 2
Packet Delivery Ratio	98.54806 5	99.332019	97.99256 3	99.87610 3
Jitter	0.000206	0.000192	0.000103	0.000045
Through Put	205.0642 20	72.408896	168.5644 17	218.2857 14

Table 1. Results for Packet size 1000 bytes and interval of 0.001

Packet Size 10000		Packet Interval 0.01		
Parameter	Protocol AODV	Protocol AOMDV	Protocol DSDV	Protocol DSR
Delay	0.000886	0.001122	0.000798	0.000964
Energy	7.766621	0.210078	146.4615 22	23.115169
Packet Delivery Ratio	100	98.47254 0	97.50104 3	99.877282
Jitter	0.000284	0.000183	0.000352	0.000173
Through Put	202.234	56.75376 9	117.0607 73	218.39622 6

Table 2. Results for Packet size 10 kBytes and interval of 0.01

Packet Size 100000		Packet Interval 0.1		
Parameter	Protocol AODV	Protocol AOMDV	Protocol DSDV	Protocol DSR
Delay	0.000701	0.01118	0.00092 6	0.000959
Energy	7.044313	0.208153	145.158 884	22.80886 4
Packet Delivery Ratio	98.021739	99.190005	97.5010 43	99.87728 2
Jitter	0.000178	0.000176	0.00036 1	0.000170
Through Put	191.475	57.196995	132.675	216.3763 20

Table 3. Results for Packet size 100 kBytes and interval of 0.1

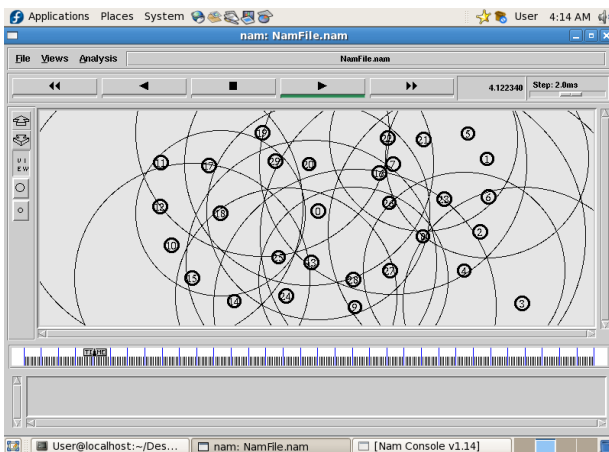


Fig 6 Simulation Routing Protocol

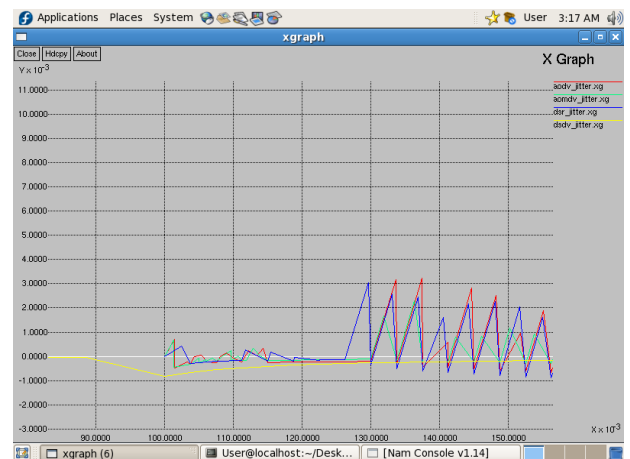
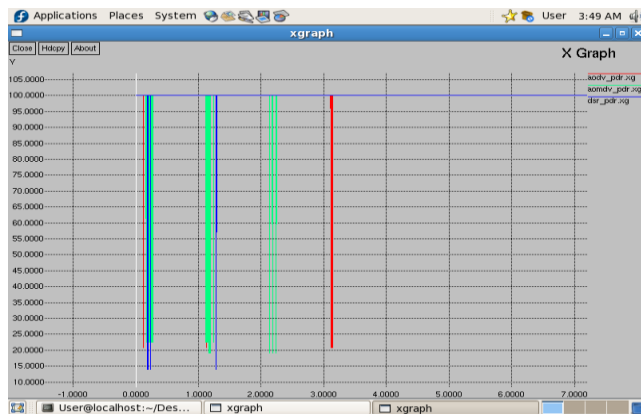


Fig 7 (a,b,c,d) Graphical presentation of Energy, Throughput, Jitter and Packet Delivery Ratio



Above figure shows the graphical presentation of Energy, Throughput, jitter and pdr, In above comparison it has been observed that as compare to other protocol AODV protocol have very good PDR, less delay required to send the data, it also required less energy consumption, and good jitter. So out of above four routing protocol only AODV having good result. In nest process we can apply Runlength coding for data compression on AODV routing protocol. So we can easily send large data through data compression technique.

A. Performance Comparison

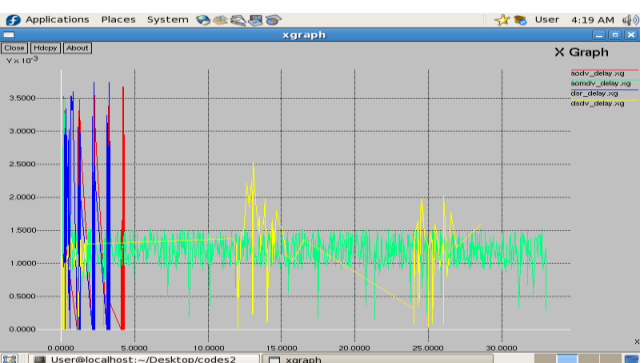
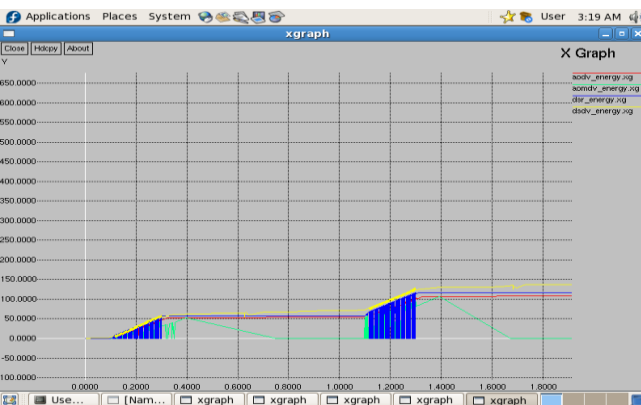
Some studies evaluated the performance of AOMDV with respect to AODV using ns-2 simulation under variety of mobility and traffic scenarios. They suggest that AOMDV is able to achieve a remarkable improvement in the end-to-end delay and is also able to reduce routing overhead by 20%.

V. CONCLUSION:

It has been conclude that we can design the WSN's for different application where the data transmitted by client node, received by server node and the same is made available on an open source API i.e. Thing Speak. The same data can also monitor by serial monitor by using COM port and also store in SD card for future use.

We can design the WSN's for industrial applications which fulfills the application requirements, providing practically early 100% reliability with the acceptable latency. This shows that WSNs are fully capable of robust and reliable communication in the harsh environment found on industrial platforms.

There are many other ways to design various potential areas for WSN application in industrial process. By using hardware node data can easily transmit and receive. This



same information process over WSN simulators for large data and for large distance.

From this study it is clear that multipath routing can be used in on-demand protocols to improve efficiency and faster recovery from route failures in highly dynamic ad hoc networks. However multipath techniques are not without pitfalls. In many of these protocols alternate routes in practice will always tend to be longer than the primary routes. This will present a trade-off between end-to-end delay and routing overhead. Also maintenance cost of multiple routes in terms of additional routing packets should be evaluated. Issues related to on-demand multipath routing protocols such as availability of multiple paths in relationship with node density and load balancing with multiple paths are needed to be explored more.

Performance comparisons of different multipath routing protocols for wireless ad hoc networks under a wide range of mobility and traffic- scenarios can be studied.

Currently the project would deal with communication between three nodes and Open source API ThingSpeak through Ethernet shield. In future, it could be further expanded to communicate between nodes placed in different location using a secured channel. Due to budgetary constraints we have made only a prototype of a communication network comprising of only three nodes but this network has got all the possibilities of expansion and can be scaled up to fifteen nodes and if not limited by hardware a network based on this concept can be scaled up to thousands of nodes.

VI. REFERENCES:

- [1]. Ze Li and Haiying Shen, "A QoS-Oriented Distributed Routing Protocol for Hybrid Wireless Networks", IEEE TRANSACTIONS ON MOBILE COMPUTING, VOL. 13, NO. 3, MARCH 2014.
- [2]. Ambuja Devidas Patil, "A QoS-oriented Distributed Routing Protocol for Hybrid Wireless Networks", International Journal of Innovative Research in Computer and Communication Engineering Vol. 4, Issue 6, June 2016.
- [3]. S.Aakasham, S.R.Mugunthan, "A Secure QOS Distributed Routing Protocol for Hybrid Wireless Networks", IOSR Journal of Computer Engineering (IOSR-JCE) e-ISSN: 2278-0661,p-ISSN: 2278-8727, Volume 17, Issue 2, Ver. II (Mar – Apr. 2015), PP 50-58.
- [4]. Mathumathi, Manjusha.T.M, "A QoS-oriented distributed routing protocol for hybrid wireless networks", International Journal of Advanced Research in Computer and Communication Engineering Vol. 4, Issue 1, January 2015.
- [5]. Dr. P.RADHA, K.S.MALARVIZHI, "A QOS-ORIENTED DISTRIBUTED ROUTING PROTOCOL FOR HYBRID WIRELESS

NETWORKS WITH QUALIFIED NEIGHBOR NODE SELECTION", International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056, Volume: 02 Issue: 06 | Sep-2015.

[6]. Ze Li and Haiying Shen, "A QoS-oriented Distributed Routing Protocol for Hybrid Networks", Clemson University, Clemson, SC 29631, USA.