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Comparing: Routing Protocols on Basis of sleep mode

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Abstract: *The architecture of ad hoc wireless network consists of mobile nodes for communication without the use of fixed-position routers. The communication between them takes place without centralized control. Routing is a very crucial issue, so to deal with this routing algorithms must deliver the packet in significant delay. There are different protocols for handling the mobile environment like AODV, DSR and OLSR. But this paper will focus on performance of AODV and OLSR routing protocols. The performance of these protocols is analyzed on two metrics: time and throughput.*
Keywords: *WSN ,MANET, UDP ,TCP,OLSR ,AODV.*

I. Introduction

Routing means, to choose a suitable path from source to destination. Routing is used in different networks like telephony network, internet network, electronic data network. Routing protocols will help to route the packet from source to destination in correct path. In most of the routing algorithms routing is done through routing tables. When routing is going on there are three main mechanisms i.e. unicast, broadcast and multicast. The wireless networks are classified as Infrastructure or Infrastructure less. In Infrastructure wireless networks, the mobile node can move while communicating, the base stations are fixed and as the node goes out of the range of a base station, it gets into the range of another base station. In Infrastructure less or Ad Hoc wireless network, the mobile node can move while communicating, there are no fixed base stations and all the nodes in the network act as routers. The mobile nodes in the Ad Hoc network dynamically establish routing among themselves to form their own network 'on the fly'.

Mobile Ad Hoc Network is a collection of wireless mobile nodes forming a temporary network without any fixed infrastructure where all nodes are free to move about arbitrarily and where all the nodes configure themselves. In this network, each node acts both as a router and as a host & even the topology of network may also change rapidly. Some of the key challenges in the area of MANET include stable uncast/multicast routing, dynamic network topology, network overhead, scalability, security and power aware Routing. In this research paper, intend is to study the mobility patterns of two prominent MANET routing protocols i.e. DSR and AODV using simulation modeling over varying number of UDP/TCP connections. Rest of the paper is organized as: gives description of routing protocols for MANET, about critique analysis of AODV and DSR, elaborates on mobility metrics, discusses experimental analysis of DSR, AODV using network simulator. At last, concludes the paper and provides an idea to researchers about challenges in the field of ad hoc wireless networks that may be carried out as research work in future.

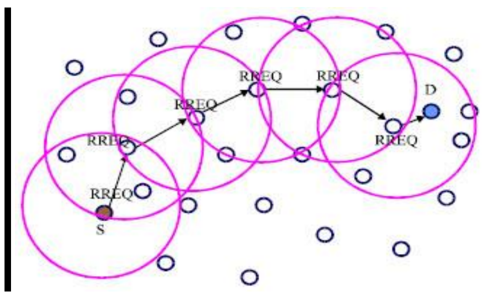


Figure.1 RREQ and RREP messages send in AODV

II. Reactive Routing Protocols

Reactive routing protocols are called on-demand routing protocols so these routing protocols are called when they are needed and the routes are built. These routes can be acquired by sending route requests through the network. Disadvantage of this algorithm is that it offers high latency in searching a network

a) Dynamic Source Routing (DSR)

Dynamic Source Routing (DSR) is a reactive kind of protocol which reacts on-demand. The main feature of DSR is source routing in which the source always knows the complete route from source to destination. It frequently uses source routing and route caching. Route Discovery and Route Maintenance are two main methods used in DSR. It is uncomplicated and efficient protocol. It does not depend on timer-based activities. It allows multiple routes to destination node and routing is loop-free here. Any broken link is notified to the source node with an error message. It works well in large networks where routes change quickly and mobility of routes is higher. In DSR, intermediate nodes do not need to preserve the routing information. Instead the packets themselves contain every routing decision. DSR uses a route discovery process to find a route when a node in the network tries to send a data packet to a destination for which the route is unknown. A route is found by flooding the network with route requests. When a node receives this request, it broadcasts it again until it itself is the destination or it has the route to the destination. This node then replies to the request to the original source. The request and response packets are source routed. Request packet creates the path of traversal. Response packet creates the reverse path to the source by traversing backwards.

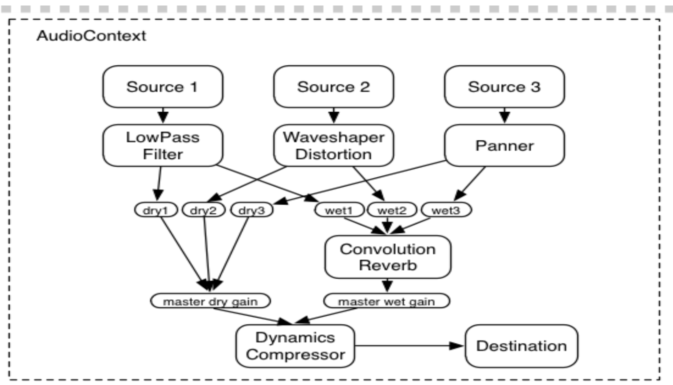


Figure.2 Route discovery procedure in DSR

b) Ad hoc On-Demand Distance Vector Routing (AODV)

AODV is an on –Demand routing protocol which is confluence of DSDV and DSR.Route is calculated on demand, just as it is in DSR via route discovery process. However, AODV maintains a routing table where it maintains one entry per destination unlike the DSR that maintains multiple route cache entries for each destination.AODV provides loop free routes while repairing link breakages but unlike DSDV, it doesn't require global periodic routing advertisements.

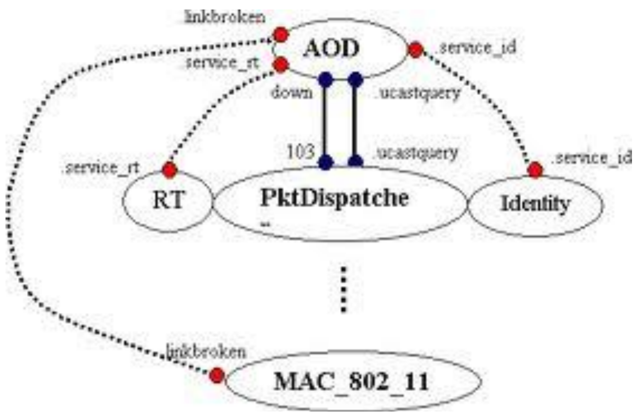


Figure.3 Route discovery procedure in AODV

III. Proactive Routing Protocol

The routing information about all the nodes is build and maintained by the proactive protocols. The proactive routing protocols are independent of whether or not the route is needed There are many advantages and disadvantages of proactive routing protocols. One of its advantages is that the nodes can easily get routing information, and it easily starts a session. The disadvantages are, too much Performance Analysis of AODV, DSR and OLSR in MANET data kept by the nodes for route maintenance, when there is a particular link failure its reform is too slow.

a. Optimized link –state routing (OLSR)

The Optimized Link State Routing (OLSR) protocol is an optimization of the classical link state algorithm, adapted to the requirements of a MANET ([10]). Because of their quick convergence, link state algorithms are somewhat less prone to routing loops than distance vector algorithms, but they require more CPU power and memory. They can be more expensive to implement and support and are generally more scalable. OLSR operates in a hierarchical way (minimizing the organization and supporting high traffic rates). The key concept used in OLSR is that of multipoint relays (MPRs). MPRs are selected nodes which forward broadcast messages during the flooding process. This technique substantially reduces the message overhead as compared to a classical flooding mechanism (where every node retransmits each message received). This way a mobile host can reduce battery consumption. In OLSR, link state information is generated only by nodes elected as MPRs. An MPR node may choose to report only links between itself and its MPR selectors. Hence, contrarily to the classical link state algorithm, partial link state information is distributed in the network. This information is then used for route calculation. OLSR provides optimal routes .The protocol is particularly suitable for large and dense networks as the technique of MPRs works well in this context.

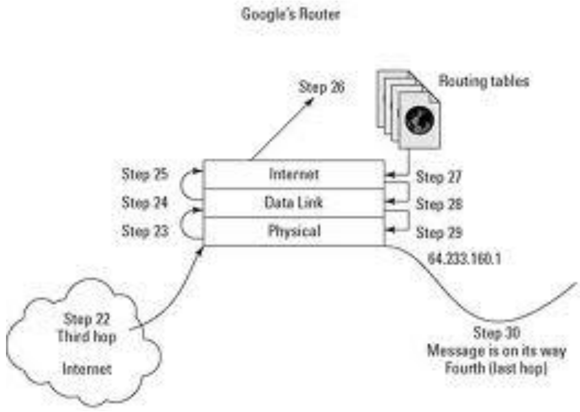


Figure. 4 Routing table of OLSR

Optimized Link State Routing (OLSR) protocol is a table-driven proactive routing protocol for wireless mobile ad hoc networks. This protocol optimizes the flooding process and reduces the control message overheads by marking subset of neighbors as multi-point relays (MPRs). In OLSR, each node periodically broadcasts two types of messages: HELLO messages and Topology Control (TC) messages. A HELLO message contains two lists in which one list includes the addresses of the neighbors to which there exists a valid bi-directional link and the other list includes the addresses of the neighbors from which control traffic has been heard but bidirectional links are not confirmed. Upon receiving HELLO message, a node examines list of addresses, if its own address is in the list, it is confirmed that bidirectional communication has been established with the sender. HELLO messages also allow each node to maintain information describing link between neighbor node and nodes which are two-hop away. The set of nodes among the one-hop neighbors with a bi-directional link are chosen as multipoint relays (MPRs). Only these nodes forward topological information about the network. On the reception of HELLO messages, each node maintains a neighbor table which contains one-hop neighbor information, their link status information and a list of two hop neighbors. Each node also maintains a set of its neighbors which are called the MPR Selectors of the node. When these selectors send a broadcast packet, only its MPR nodes among its entire neighbors forward the packet. The MPR nodes periodically broadcast its selector list throughout the network. The smaller set of multipoint relay provides more optimal routes. The path to the destination consists of a sequence of hops through the multipoint relays from source to destination. A TC message contains the list of neighbors who have selected the sender node as a multipoint relay and is used to diffuse topological information to the entire network. Based on the information contained in the neighbor table and the TC message, each node maintains a routing table which includes destination address, next-hop address, and number of hops to the destination. Fisheye State Routing (FSR) protocol is a proactive (table driven) ad hoc routing protocol and its mechanisms are based on the Link State Routing protocol used in wired networks. FSR is an implicit hierarchical routing protocol. It reduces the routing update overhead in large networks by using a fisheye technique. Fish eye has the ability to see the objects better when they are nearer to its focal point that means each node maintains accurate information about near Nodes and not so accurate about far-away nodes. The scope of fisheye is defined as the set of nodes that can be reached within a given number of hops. The number of levels and the radius of each scope will depend on the size of the network. Entries corresponding to nodes within the smaller scope are propagated to the neighbors with the highest frequency and the exchanges in smaller scopes are more frequent than in larger. That makes the topology information about near nodes more precise than the information about farther nodes. FSR minimized the consumed bandwidth as the link state update packets that are exchanged only among neighboring nodes and it manages to reduce the message size of the topology information due to removal of topology information concerned far-away nodes. Even if a node doesn't have accurate information about far away nodes, the packets will be routed correctly because the route information becomes more and more accurate as the packet gets closer to the destination. This means that FSR scales well to large mobile ad hoc networks as the overhead is controlled and supports high rates of mobility. The FSR concept originates from Global State Routing (GSR). GSR can be viewed as a special case of FSR, in which there is only one fisheye scope level and the radius is infinite. As a result, the entire topology table is exchanged among neighbors that consume a considerable amount of bandwidth when network size becomes large.

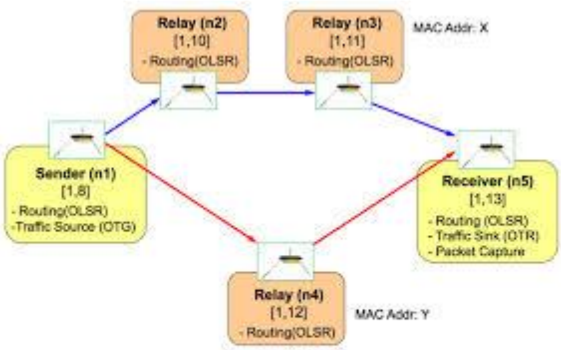


Figure .5 Communication in OLSR

Problem Statement:

Energy conservation is one of most happening and hot issue in the wireless sensor network. Wireless sensor network refers to a network where a lot of nodes share similar network architecture and follow routing algorithms to save energy of the system. There are two different architecture types namely AODV and OLSR .The routing overhead associated with dissemination of routing packets is quite huge.

The aim of the research work is to design a sophisticated protocol which can save maximum amount of energy and can increase the throughput of the system. The proposed routing algorithm is supposed to achieve by combining two algorithms namely AODV and OLSR. The overall aim of this thesis is to design novel energy efficient AODV +OLSR protocol for Wireless Sensor network.

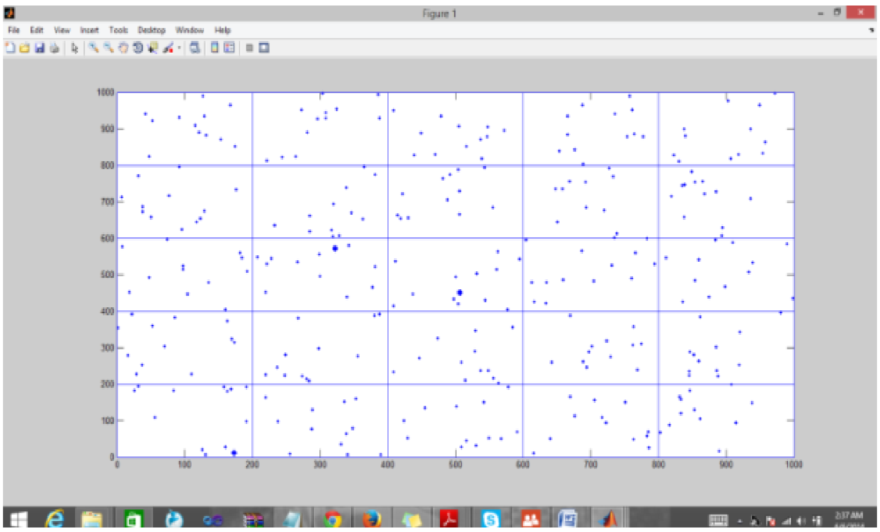
IV. Mobility Metrics

We have selected the energy consumption and accuracy as a metrics during the simulation in order to evaluate the performance of the different protocols.

V. Result and Conclusion

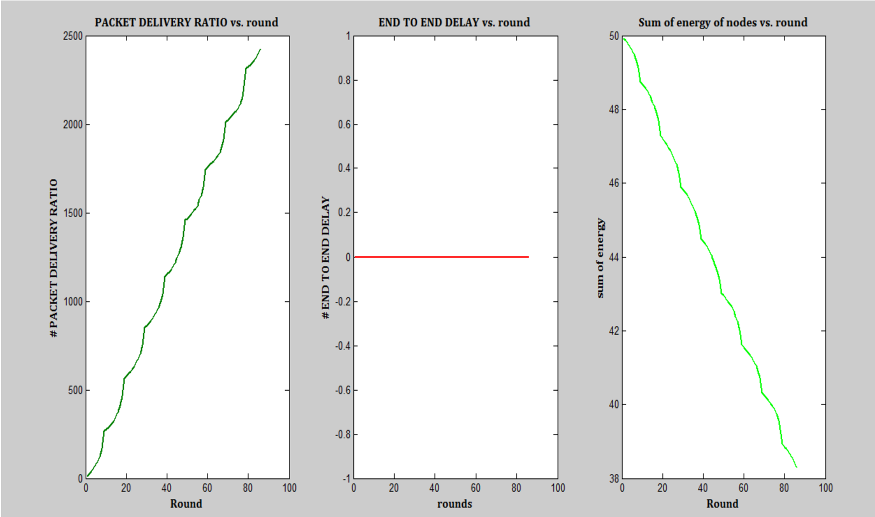
The following figures describe the results of this research work.

Step1:



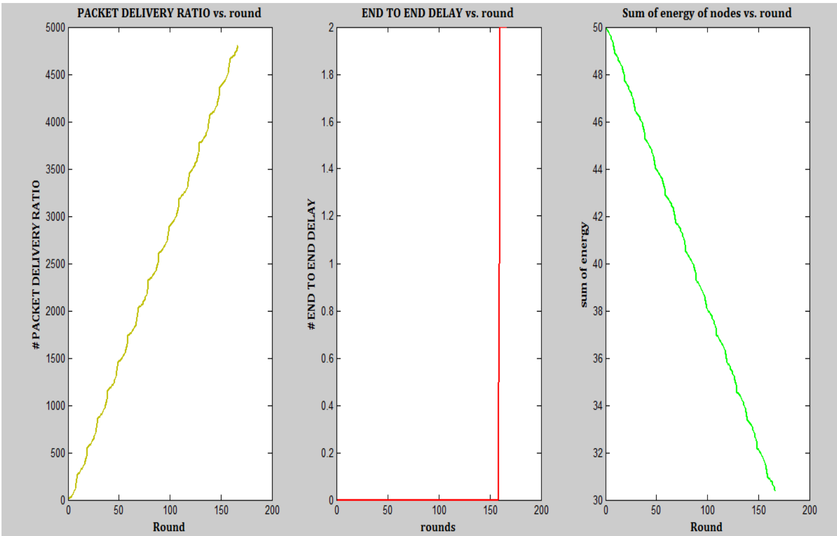
The above figure represents the node movement in the proposed system architecture. When a network node fails,OLSR is called. The till now operation is performed using AODV network topology. Instead of checking for another active node through AODV, the network opt for OLSR.

Step 2:



The above figure represents the end to end delay versus the number of rounds. Till now, no extra dead node is found

Step 3:



The above figure represents the scenario of dead node .When the dead node occurs OLSR is called and the transmission of data continued.

VI. Conclusion

The research work performed concludes that the AODV and OLSR both are optimal protocols for any kind of routing and energy conservation schemes but AODV can be optimized using OLSR protocol if they are combined. The research work has computed its results over different aspects like packet delivery ratio, end to end delay and through put.

VII. Future work

The current research work opens up a lot of possibilities for the future research works like combination of AODV with NEURAL NETWORKS or combination of OLSR with NEURAL NETWORK. The current research work only actives one dead packet or node scenario. It does not deal with multiple node failure system which can become one of the future research works.

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