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Implementation of OLSR Protocol in MANET

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Abstract: Mobile ad hoc networks (MANETs) are autonomously self-organized networks without infrastructure support. In a mobile ad hoc network, nodes move arbitrarily; therefore the network may experience rapid and unpredictable topology changes. Because nodes in a MANET normally have limited transmission ranges, some nodes cannot communicate directly with each other. Hence, routing paths in mobile ad hoc networks potentially contain multiple hops, and every node in mobile ad hoc networks has the responsibility to act as a router. In this paper, we implement the OLSR Protocol in MANET to know how much data sent by the OLSR in bits/sec.

Keywords: Mobile ad hoc networks, Routing Protocols, OLSR

I. INTRODUCTION:

Wireless technologies such as Bluetooth or the 802.11standards enable mobile devices to establish a Mobile Ad-hoc Network (MANET) by connecting dynamically through the wireless medium without any centralized structure [1]. MANETs offer several advantages over traditional networks including reduced infrastructure costs, ease of establishment and fault tolerance, as routing is performed individually by nodes using other intermediate network nodes to forward packets [2], There are a number of issues which affect the reliability of Ad-hoc networks and limit their viability for different scenarios; lack of centralized structure within MANET requires that each individual node must act as a router and is responsible for performing packet routing tasks; this is done using one or more common routing protocols across the MANET [3].A Mobile ad hoc network is a group of wireless mobile computers (or nodes); in which nodes collaborate by

Ad hoc networks require no centralized administration or fixed network infrastructure such as base stations or access points.. The network topology may vary rapidly and unpredictably over time, because the nodes are mobile. MANETs possess certain characteristics like Bandwidth-constrained, variable capacity links, Energy constrained Operation, Limited Physical Security, Dynamic network topology, Frequent routing updates.

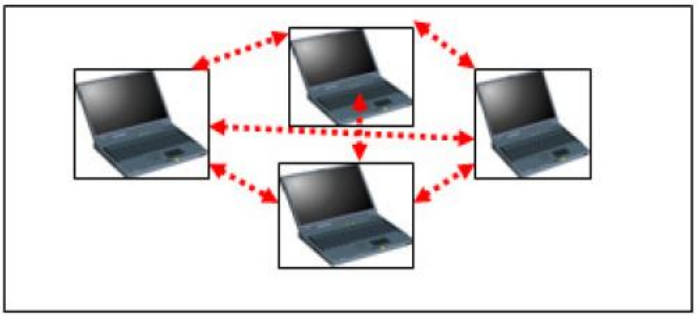

Fig 1: MANET NETWORK

II. ROUTING PROTOCOLS FOR MANET:

Routing is the most fundamental research issue in MANET and must deal with limitations such as high power consumption, low bandwidth, high error rates and unpredictable movements of nodes. Generally, current routing protocols for MANET can be categorized as:

2.1. Proactive Routing Protocols: Proactive protocols are also called as table driven routing protocol because they maintain the routing table of the entire network. In proactive each node has to maintain its tables for storing routing information and also update the table i,e changes is done whenever the network changes. If any changes in topology as each node will send a broadcast message to entire network so it will affect the routing table for maintaining the routing entries. For large network proactive routing protocol not be suggested because for each node maintaining the table causes more bandwidth consumption and overload to routing table .the examples of proactive routing protocol are DSDV (destination sequence distance vector) and OLSR (optimized link state routing)

2.2 Reactive Routing Protocols:

In On Demand routing protocols, the nodes don't maintain any routing table but they have a route cache. Routes are discovering dynamically only when a node want to communicate with another node with the help of the route discovery process which is invoked by the source node. DSR and AODV are the example of on demand routing protocols.

2.3 Hybrid Routing:

This type of protocols merges the best features of table driven and on demand routing protocols. In case of the intra-domain routing, these protocols uses the table driven approach, while in case of inter-domain routing these protocols uses the on demand approach. Such as Zone Routing Protocol (ZRP) etc.

III. OLSR Routing Protocol in MANET:

The Optimized Link State Routing (OLSR) is a table-driven, proactive routing protocol developed for MANETs. It is an optimization of pure link state protocols that reduces the size of control packets as well as the number of control packet transmissions required. OLSR reduces the control traffic overhead by using Multipoint Relays (MPR), which is the key idea behind OLSR. An MPR is a nodes one-hop neighbor which has been chosen to forward packets. Instead of pure flooding of the network, packets are forwarded by nodes MPRs. This delimits the network overhead, thus being more efficient than pure link state routing protocols. OLSR is well suited to large and dense mobile networks. Because of the use of MPRs, the larger and more dense a network, the more optimized link state routing is achieved. MPRs help providing the shortest path to a destination. The only requirement is that all MPRs declare the link information for their MPR selectors (i.e the nodes which have chosen them as MPRs). The network topology information is maintained by periodically exchange link state information. If more reactivity to topological changes is required, the time interval for exchanging of link state information can be reduced. Control messages OLSR uses three kinds of control messages: HELLO, Topology Information (TC), and Multiple Interface Declaration (MID). A Hello message is sent periodically to all of nodes neighbors. Hello messages contain information about a nodes neighbors, the nodes it has chosen as MPRs (i.e., the MPR Selector set), and a list of neighbors with whom bidirectional links have not yet been confirmed.

Every node periodically floods the network with a TC message using the multipoint relaying mechanism. This message contains the nodes MPR Selector set. A MID message is used for announcing that a node is running OLSR on more than one interface. The MID message is flooded throughout the network by the MPRs. Multipoint Relays is defined as; A node N selects an arbitrary subset of its 1-hop symmetric neighbors to forward data traffic. This subset, referred to as an MPR set, covers all the nodes that are two hops away. The MPR set is calculated from information about the nodes symmetric one hop and two hop neighbors. This information is extracted from HELLO messages. Similar to the MPR set, an MPR Selectors set is maintained at each node. An MPR Selector set is the set of neighbors that have chosen the node as their MPR. Upon receiving a packet, a node checks its MPR Selector set to see if the sender has chosen the n node as MPR. If so, the packet is forwarded, else the packet is processed and discarded. Selection of Multipoint Relay Nodes is done by choosing MPR set so that a minimum of one-hop symmetric neighbors are able to reach all the symmetric two-hop neighbors. In order to calculate the MPR set, the node must have link state information about all one-hop and two-hop neighbors. Again, this information is gathered from HELLO messages. Only nodes with willingness different than WILL_NEVER may be considered as MPR. Neighbor discovery is doing as links in an ad-hoc network can be either unidirectional or bidirectional, a protocol for determining the link status is needed. In OLSR, HELLO messages serve this purpose. HELLO messages are broadcast periodically for neighbor sensing. When a node receives a HELLO message in which its address is found, it registers the link to the source node as symmetric. As an example of how this protocol works, consider two nodes A and B which have not yet established links with each other. Firstly, A broadcasts an empty HELLO message. When B receives this message and does not find its own address, it registers in the routing table that the link to A is asymmetric. Then B broadcasts a HELLO message declaring A as an asymmetric neighbor. Upon receiving this message and finding its own address, A registers the link to B as symmetric. A then broadcasts a HELLO message declaring B as a symmetric neighbor, and B registers A as a symmetric neighbor upon reception of this message. Topology Information is Information about the network topology is extracted from topology control (TC) packets. These packets contain the MPR Selector set of a node, and are broadcast by every node in the network, both periodically and when changes in the MPR Selector set are detected. The packets are flooded in the network using the multipoint relaying mechanism. Every node in the network receives such TC packets, from which they extract information to build a topology table. Route Calculation is done by the shortest path algorithm is used for route calculations, which are initiated when a change is detected in either of the following: the link set, the neighbor set, the two-hop neighbor set, the topology set, or the Multiple Interface Association Information Base. To calculate the routing table, information is taken from the neighbor set and the topology set. The calculation is an iterative process, in which route entries are added starting from one-hop neighbors, increasing the hop count each time through.[4][5]

IV. Simulation

We create MANET network with 4 nodes and a mobile server is created in which all the nodes are connected to them. In this, two other nodes such as Application Configuration & Profile Configuration have been used. These are used to define the application definition & profile definition. OLSR protocol manages a network & shows how hello packet travels in the network. In this simulation we create a MANET network with OLSR Routing protocol & check the network performance.802.11g standard are used as a wireless standard to create a MANET Network.

Fig 2: MANET Network

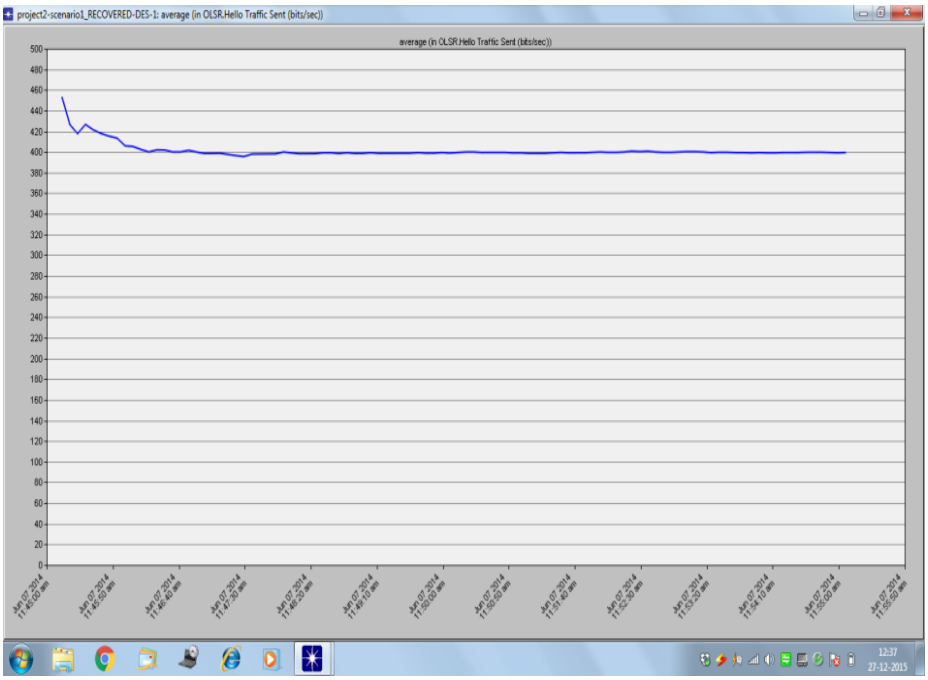

Fig 3: Hello Traffic Sent b/s

V. CONCLUSION AND FUTURE WORK

In This Paper we will Study OLSR Protocol in MANET .We check that how much hello Traffic sent per bits/sec in OLSR Protocol. As shown in Fig 3 Its clearly shows that 400b/s data send in OLSR in MANET. For, Future work we will find a way that how can we increase the network performance of OLSR in MANET.

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