

Routing Protocol OLSR for MANETs

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Abstract: In this paper we are going to discuss the working strategy of an optimized link state routing protocol for MANETs. OLSR routing protocol is suited for large and heavy mobile network as optimization is achieved with the help of MPRs. There is different type of routing protocol present in market but OLSR is one of the routing protocols which are reliable for dense networks, in which traffic exist more due to the maximum number of mobile devices. Optimized link state routing protocol is works on link state algorithm. Protocol is proactive in nature also known as table-driven routing approach. Key concept used in OLSR routing protocol is multipoint relays (MPRs). In case of flooding process, MPRs are used to forward broadcast messages. MPRs technique significantly decreases the message overhead as compared to a traditional flooding technique. OLSR routing protocol provides the optimal routes for the transmission of messages.

Keywords: MANETs, Protocol, OLSR, MPRs, Table-driven routing, Neighbor node set.

I. INTRODUCTION

With the rise in modern technologies and the need for workability and simplicity in working environment, the use of mobile wireless computing is spreading rapidly. A MANET is a group of mobile devices which can communicate with each other device without having any infrastructure. Mobile ad hoc Networks is one of the types of adhoc networks, in which several nodes exist and they are free to move independently and frequently communicate with every node present in network. Nodes are mobile devices which don't require any infrastructure or wires to set their network. Nodes are free to move randomly at any path and change their links to other node dynamically, so it's clear that there is no restriction for node to move one place to another. As the size of network increases, we apply routing techniques, for out of range nodes may communicate with each other via intermediate nodes. This issue of routing in MANETs is our basis of discussion in this paper, and how OLSR is proposed as a solution.

There are different designs issues for establishing a routing protocol for wireless network with flexibility is very different and more composite than that of wired network where all the nodes are static. Major obstacles in mobile ad hoc networks are less bandwidth, the level of mobility, power management and high rate of topological changes. Thus the aim for a routing protocol is to reduce its control traffic overhead while at the same moment, it should be eligible of rapidly acquiring to link failure and changes caused by movement of nodes. Hence it's clear that a routing protocol should work in distributed way and it should be self-organizing.

II. MANETs ROUTING PROTOCOL

To create routes between multiple nodes in mobile adhoc networks we use MANETs routing protocols. Different routing protocol use to solve different problems of routing in mobile networks. Mainly three types of routing protocols are used in MANETs. They are (a) proactive (b) reactive (c) hybrid. There are different criteria for designing routing protocols for mobile adhoc networks. Below mention figure shows the classification of mobile ad hoc routing protocols.

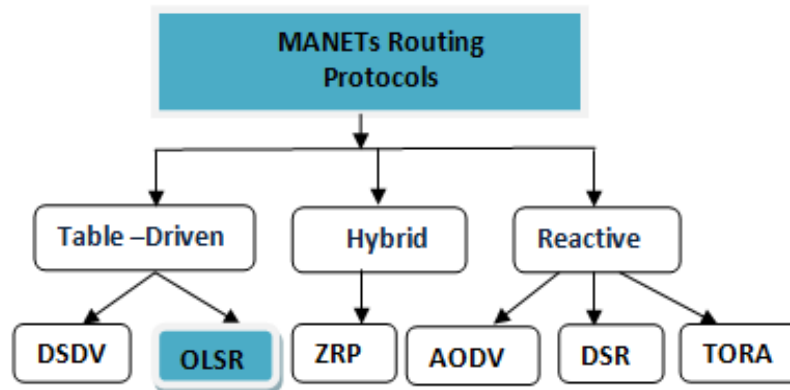


Fig. 1 Classification of MANETs Routing Protocol

2.1 Table-Driven (Proactive) Routing Protocol:

Table-Driven routing protocols are also known as Proactive routing protocol. Every node maintains routing information in table that continually updated. On the periodically basis exchange of control messages takes place. Destination Sequence Distance Vector (DSDV) and Optimized Link state routing protocol (OLSR) are some of the protocols which fall under the category of Proactive routing protocol.

2.2 Reactive (On-Demand) Routing Protocol:

Reactive routing protocol is also known as on-Demand routing protocol. Routing information is not stored in tables. A long delay exists in this type of protocols for finding destination route node. It only provide route when needed. In this type of protocols information is not takes place periodically. Ad hoc On-Demand Distance Vector, Dynamic Source Routing and TORA are some of the protocols which fall under the category of Reactive routing protocol.

2.3 Hybrid Routing Protocol:

Combination of Proactive and Reactive routing protocol is known as Hybrid routing protocol. A hybrid routing protocol [6-7] attempts to combine the best features of proactive and reactive algorithms. The zone-based routing protocol (ZRP) [7] and sharp hybrid adaptive routing protocol (SHARP) [6] are well known examples of hybrid routing protocols.

III. OLSR (LINK STATE ROUTING PROTOCOL)

3.1 Protocol Overview:

OLSR routing protocol works in a fully distributed manner. OLSR minimizes the overhead from flooding of control traffic by using only selected nodes, called MPRs, to retransmit control messages [4]. OLSR routing protocol is designs for mobile adhoc networks to provide better performance. As described in [4] it operates as a table driven, proactive protocol, i.e., exchanges topology information with other nodes of the network regularly. Exchange of the control information is take palace on periodically basis. OLSR routing protocol is suitable for dense and large area networks where more chances of traffic. OLSR routing protocol uses the multipoint relay technique to improve traffic issues. It works on hop by hop routing technique, every node uses its top most information to route a packet. In OLSR routing protocol, every node selects their MPR from their neighbor nodes. Every MPS Each MPR node maintains the list of nodes that were selected as an MPR this list is called an MPR selector list [2]. OLSR receives the strength of the link state technique and has the benefit of having routes instantly obtainable, when needed due to its proactive behavior.

3.2 Multipoint Relays (MPRs):

The goal of routing technique MPRs is to reduce the overflow of broadcast packets in the MANETs by minimizing duplicate channels in the same area. Every node selects a set of neighbor nodes in the network, which are responsible for the retransmission of packets. Selected set of neighbor nodes in network are known as multipoint relays of the node. Below mention figure showing the multi-point relay nodes in network.

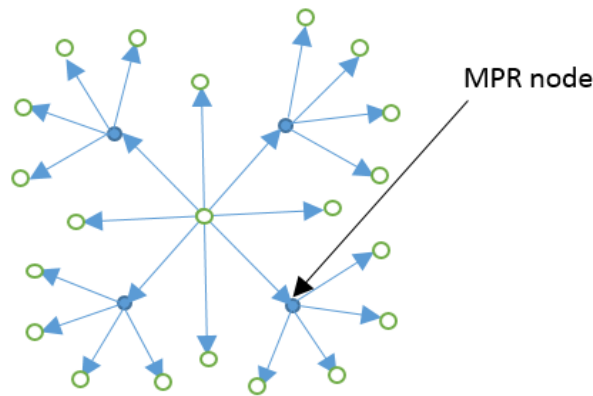


Fig. 2 Multipoint Relays

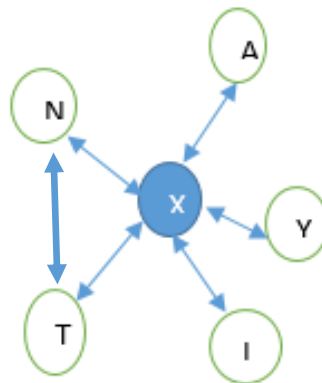


Fig. 3 Neighbor Node, MPR, 2-hop neighbor

Multipoint relay technique reduces the messages overflow as compare to traditional flooding technique where every node re-transmits information. But in optimized link state routing protocol, information is only transmitted by nodes which are selected as multi relay points. So it's proved that optimization is attained by reducing the transmission of message in the network. Optimized link state routing protocol provides optimal route for the transmission of messages.

Multipoint relay technique restricts the set of nodes transferring a message from all the nodes, to a subset (which is multi relay point). As scenario explained in Fig. 2, suppose middle node A selects the dark blue nodes as MPRs. In this way all two-hop nodes can be passed through multipoint relay.

As in shown in Fig. 3, neighbor node of N node are T, X, A because all these nodes can hear node N.

X is selected as MPR in network and node I and Y are the 2-hop neighbor because both nodes are heard by neighbor of N node. In this network node X will re-transmit all the broadcast messages that it receives from node N. Multipoint relays reduces the over flow of control messages in MANETs.

IV. FUNCTIONING of OLSR

Optimized link state routing protocol is a protocol which works on link state algorithm and proactive in nature. OLSR routing protocol uses table-driven routing technique. Uses the concept of multipoint relay flooding technique to control traffic. OLSR routing protocol is the best choice for the wireless ad hoc networks. In OLSR routing protocol traffic control is exchanged by two type of messages they are (1) HELLO and (2) TC.

Both the messages play a vital role in optimistic linked state protocol. HELLO message periodically transfer to one node to another for the node detection. TC message is known as topology control message which periodically flooded to the entire network for link state information.

4.1 HELLO Message in OLSR:

HELLO is a special message that sent on the periodically basis from the broadcast node to maintain and confirm the networks links and presented neighbors in networks. HELLO message is use for sensing the neighbor nodes. HELLO message is generated for every node and emitted to other linked nodes. HELLO message sense the MPRs in the network. It contains its own address and address of its list of neighbor nodes which are present in network.

4.2 TC Message in OLSR:

TC message is stands for Topology Control message. TC message is use for route calculation between nodes. Every MPR in a network periodically generate TC message. List of sender's MPR selector is contained by TC message. In optimized link state routing protocol every MPRs is responsible to forward TC message. Calculation of route done by the help of TC message as it contains all the MPRs selectors.

OLSR works on table driven routing as all the addresses stored in the table.

V. CONCLUSION

In this paper we have discussed about OLSR routing protocol for mobile adhoc networks. Optimized link state routing protocol is flexible in any dense network due to its proactive nature. For mobile ad hoc network, performance of optimized link state routing protocol is depends on many factors, it might be the physical structure of network, behavior, area etc. The overall output of this protocol is suitable for dense network. Optimized link state routing protocol is proactive in nature. As this protocol is proactive in nature, so protocol is very useful for those communication network in which long delays of message are not allow. OLSR routing protocol kept information in network every time, where no delays allowed.

OLSR routing protocol is beneficial for dense networks where transmission of information suppose to exist frequently between huge numbers of mobile nodes. In this paper we have describes working of OLSR routing protocol and on which techniques it works. Concept of multipoint relay enhances the performance of routing protocol. OLSR routing protocol is suitable for dense networks as it uses multipoint relay flooding. This protocol is beneficial for wireless network where no delays allowed in transmission of information.

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