PERFORMANCE COMPARISON OF TWO ON-DEMAND MULTI PATH ROUTING PROTOCOLS FOR AD HOC NETWORKS

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Abstract: In recent years, on-demand routing protocols have attained more attention in mobile ad hoc networks as compared to other routing schemes due to their abilities and efficiency. There exist many on-demand routing protocols for Mobile Ad hoc Networks (MANETS). Most of the protocols, however, use a single route and do not utilize multiple alternate paths. Multi path routing allows the establishment of multiple paths between a single source and single destination node and when a path breaks an alternate path is used instead of initiating a new route discovery, hence multi path routing represents a promising routing method for wireless mobile ad hoc networks. Multi path routing achieves load balancing and is more resilient to route failures. Recently, numerous on-demand multi-path routing protocols have been proposed for wireless mobile ad hoc networks. Performance evaluations of these protocols showed that they achieve lower routing overhead, lower end-to-end delay and alleviate congestion in comparison with single path routing protocols. In this work we have compared the node disjoint Dynamic Source Routing Multi path (DSRM) with link disjoint Load Based Channel Aware Ad hoc On demand Multi path Distance Vector (LBCA-AOMDV) using NS2 to illustrate DSRM performs better than LBCA-AOMDV.

Keywords: Mobile ad hoc networks, routing protocols, Load Based Channel Aware Ad hoc on demand Multi path Distance Vector, Ad hoc on demand Multipath Distance Vector, Dynamic Source Routing Multipath

I. INTRODUCTION
Routing means to choose a path. Routing in Mobile Ad hoc Networks (MANETS) means to choose a right and suitable path from source to destination. Routing terminology is used in different kinds of networks such as in telephony technology, electronic data networks and in the internet network. Here we are more concern about routing in mobile ad hoc networks. Routing protocols in mobile ad hoc network means that the mobile nodes will search for a route or path to connect to each other and share the data packets [1], [2], [3].

Protocols are the set of rules through which two or more devices (mobile nodes, computers or electronic devices) can communicate to each other. In mobile ad hoc networks the routing is mostly done with the help of routing tables. These tables are kept in the memory cache of these mobile nodes. When routing process is going on, it route the data packets in different mechanisms [4], [5]. The first is unicast, in which the source directly sends the data packets to the destination [6], [7]. The second is multicast, in this the source node sends data packet to the specified multiple nodes in the network. The third is broadcast; it means the source node sends messages to all the near and far nodes in the network [8], [9], [10], [11]. We presented the proposed methodology in Section2. In Section 3, we discuss the Load Based Channel Aware Ad hoc On-Demand Multi path Distance Vector. The performance evaluation of protocol features are shown in Section 4 and conclusion Section 5.

II. OVERVIEW OF THE WORK
A more recent research topic for MANETs is multi path on demand routing protocols. Multi path routing protocols establish multiple node/link disjoint paths from a source to a destination and are thereby improving resilience to network failures and allow for network load balancing. These effects are particularly interesting in networks with high node density (and the
corresponding larger choice of disjoint paths) and high network load (due to the ability to load balance the traffic around congested networks). We specifically address the issues, challenges and comparison of multi path routing protocols in MANETs. We have compared node disjoint multi path protocol (DSRM) [12][13][14], with link disjoint multi path protocol (LBCA-AOMDV) [21] in the work; the channel based routing in MANET with reusable paths using Ns 2 to illustrate. DSRM provides higher packet delivery ratio, throughput and consumes lower routing overhead as compared to LBCA-AOMDV.

III. PROPOSED METHODOLOGY
Transmission in AOMDV protocol results in more packet loss. To over this the CA-AOMDV has been proposed. Using this protocol we reduced packet loss but getting throughput is about 35% and it’s not sufficient, so we proposed another protocol LBCA-AOMDV [21] is an extension of CA-AOMDV. Here we are to compare the performance of two on demand multi path protocols LBCA-AOMDV and DSRM. In this Section, we review two protocols that are used in this paper.

(A) Load Based Channel Aware Aomdv (LBCA-AOMDV)
In MANETs routing, the node failure occurs due to two reasons. One is link failure and other is node overloaded. In this LBCA-AOMDV, we have concentrated on node over loaded by the threshold value. Here we fix the threshold values, if any node exist that particular value consider that node will be overloaded and it comes away from the path and not from the channel. The particular load is replaced by some neighboring node. The load balancing is introduced in this work additionally to improve the throughput. In this, the load of nodes are identified in such a way that it will display the loaded node, after finding the loaded node the channel starts its transmission via another route were it doesn’t contains any loaded node. When the over loaded node has reduced its load after transmission then that particular node will enter into the channel.

(B) Route Discovery Process of LBCA-AOMDV
Route discovery in LBCA-AOMDV is an enhanced version of route discovery in AOMDV. The ANFD (Average non fading duration) for one link of a path is calculated, according to the mobile-to-mobile channel model. LBCA-AOMDV uses the ANFD as a measure of link lifetime.

Before forwarding a RREQ (Route Request) to its neighbors, a node inserts its current speed into the RREQ header so that its neighbors can calculate the link ANFD. The path duration, is also recorded in the RREQ, updated, as necessary, at each intermediate node. Thus, all information required for calculating the ANFD is available via the RREqs, minimizing added complexity. Similarly, to the way the longest hop path is advertised for each node in AOMDV to allow for the worst case at each node LBCA-AOMDV is a slight modification of that of AOMDV. The handoff time field in the routing table for LBCA-AOMDV is the amount of time for which the path should be made due to channel fading. It is set to the maximum value of the AFDs (Average fading duration) over all links in the path. This use of handoff time is described in more detail in the next section.

(C) Dynamic Source Routing Multi Path (DSRM)
DSRM is used to find the multiple node disjoint [15][16][17] routes under MANET nodes. The local link information will be used in the discovering route process. When the selected route fails, it choose another route for communication. DSRM achieves a higher rate of successful packet delivery than existing best-effort ad-hoc routing protocols.

(D) Route Discovery Process of DSRM
The following are the parameters (1) The number of paths it needs to discover; and (2) In order to satisfy end-to-end requirement the lowest path reliability requirement for each path is searched. In the RREQ message, it checks whether this message meets the path reliability requirement when there is a presence of an intermediate node. When the RREQ message fails, the node will discard the message. Then the multiple copies of this message will be forward to its neighbors.
RREQ message will receive the number of neighbor copies without failing the path reliability requirement. The destination node will collects RREQ messages, multiple disjoint paths will be selectively chosen, and then RREP messages will send back to the source node in the selected paths. After the arrival of RREP messages in the source node, it will start to send the data via the selected paths.

IV. EXPERIMENTAL RESULTS AND PERFORMANCE ANALYSIS

Using the NS 2.34 simulator, the performance comparison of two on demand multi path routing protocols has been illustrated. We compare the performance of DSRM and LBCA-AOMDV according to the following performance metrics:

**Throughput**: Throughput is the measure of how fast we can actually send through network. The number of packets delivered to the receiver provides the throughput of the network Fig. 4. Describes DSRM provides higher throughput as compared to LBCA-AOMDV.

**Packet Delivery Ratio**: The ratio of data packets delivered to the destinations to those generated by the constant bit rate Fig. 2. Describes LBCA-AOMDV consumes higher packet delivery ratio as compared to DSRM.

**Average End-to-End Delay of Data Packets**: This includes all possible delays caused by buffering during route discovery, queuing at the interface queue, retransmission delays at the MAC, propagation and transfer times Fig. 3. Describes LBCA-AOMDV consumes less end to end delivery as compared to DSRM.

**Routing Overhead**: The total number of routing packets transmitted during the simulation. For packets sent over multiple hops, each transmission of the packet (each hop) counts as one transmission Fig. 4. DSRM provides higher Routing Overhead load as compared to LBCA-AOMDV.
V. CONCLUSION AND FUTURE WORK

We have compared node disjoint multi path protocol in DSRM with link disjoint multi path protocol in LBCA-AOMDV and proved, DSRM provides higher packet delivery ratio, throughput and consumes lower routing overhead as compared to LBCA-AOMDV.

This study could be continued by, for instance, developing the multi path aspect of our protocol. It could be achieved by splitting data packets from the source to the destination; the whole message would not be transmitted by the same path or the same nodes all the time.

References


