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Delay Torent Probabilistic Rebroadcast for Mobile ADHOC Networks

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***Abstract*—The impact of High Mobility in Manet, Frequent link breakages it tends to frequent link failure and Route discovery. The overhead of Route discovery cannot be omitted. In the Route discovery, Broadcasting is a basic and effective data dissemination ,where a mobile nodes blindly rebroadcast the first received route request packets in case it has a route to destination path and causes the Broadcasting storm problem .In this paper we proposes a Neighbour Coverage Based Rebroadcasting protocol for Mobile Ad hoc Networks. In this way to attain the Neighbour coverage knowledge we propose the Novel rebroadcast delay to set (rebroadcast) mobile node order and we can obtain the more accurate additional coverage ratio. The connectivity factor metrics to provide the node Adaptation (local) by combining Additional coverage ratio and connectivity factor to provide the Rebroadcasting probability. This approaches Neighbor coverage knowledge and probability canimprove Routing performance and decrease the number of Retransmission, Routing overheads.**

***Keywords*— Mobile Ad hoc Network, Neighbour Coverage, Network connectivity, Rebroadcasting Probability, Routing overhead, Rebroadcast Delay.**

I. INTRODUCTION

Manet is self–organized wireless network consist of mobile nodes which can freely moves in the network. The node can be dynamically self –organized into excellent topology networks without any restriction of infrastructure.

The changeling issues in manet is design of dynamic routing protocols with good performance and reduce overhead. AD HOC –on demand distance vector routing [AODV] [1] and dynamic source routing [2] is proposed protocol for manets. The two protocol strategy causes less over head and easier to scalability. [3]Optimizing when a new route is request, however, due to mobility nodes in manet, Frequent link breakages it tends to frequent path failure and route discovery which significantly improve routing performance and increase the end to end delay, Reduce packet delivery ratio. [4]Routing overhead is essential problem. The conventional on demand routing protocol is flooding to discover the route, then we broadcast the routing RREQ packet and cause broadcasting storm problem, which leads to consistent amount of packet collision indense network. [6]Thus it is uncomfortable to optimize the broadcasting mechanism. So we optimized proposed methods for broadcasting. [7]Comparison of broadcasting protocol shows "simple Flooding, probability based methods, Area based methods and Neighbour knowledge method" increase in number of nodes in static network will degrade the performance analysis of probability based and area based methods of broadcasting networks. [8]Therefore it shows the performance of neighbour knowledge method is better than Area based and performance of area based method is better than probability based methods. We propose NCPR protocol.

1. Neighbour coverage knowledge, novel rebroadcast delay to set mobile node order and we get accurate additional coverage ratio 2. Network connectivity is to reduce redundant retransmission. We named metrics connectivity factor to provide how many neighbour should receive RREQ packet. Then combining additional coverage ratio and connectivity to get rebroadcasting probability.

Some Criteria,

1. The Novel scheme to calculate rebroadcast delay in forward order. The node which has common Neighbours with the previous node has lower delay of order. Therefore the delay enables the information that nodes have transmits the packet to more Neighbours.
2. To calculate the rebroadcast probability: this considers the information from uncovered neighbour set, connectivity metrics and local node density.

   It considers of two parts,

a. Additional coverage ratio: It is ratio of the number of nodes that should be covered by single broadcast to the total number of neighbours in networks.
b. Connectivity factor: The factor that reflects the relationship of network connectivity and number of nodes of a given node in network. This section2 includes existing method and section 3 shows proposed method, section 4 shows simulation parameters and scenario of proposed protocol.

II. EXISTING FLOW

Broadcasting is effective mechanism for route discovery, but routing overhead is associated with broadcasting. It can be large in high dynamic networks. [9]This incurs large routing overhead and causes many problems such as redundant-retransmission, collision and contention. So we optimized broadcasting is effective solution to improve routing performance.

Existing approaches only considers coverage ratio by previous node and it does not consider neighbour receiving duplicate RREQ packet which will degrade the routing performance as well as increased the routing overheads will alleviate network traffic. [10]Gossip is based on each node forward a packet with required probability. It save upto 35% overhead compared to the flooding in network density is high or load is heavy. [11]Proposed scheme is scalable broadcast algorithm (SBA) determine rebroadcast reach the additional nodes. [12]Proposes another method dynamic probabilistic route discovery is based on neighbour coverage to provide each node determines forwarding probability by number of neighbours, set of neighbour which are covered by previous broadcast. This protocol is does not considers receiving duplicate RREQ packet. [13]AODV-DFR use in directional forwarding in geographical routing when a route breaks this protocol automatically finds next –hop by hop nodes for packet forwarding. [14] Timer based protocols: Dynamic reflector broadcast (DRB) and dynamic connector –connector is achieves a full reachability over idealistic lossless MAC layer. [15] The robust protocol is proposes a robust broadcast propagation to provide a near perfect reachability for flooding in wireless networks .the goal is to make dissemination of neighbour knowledge methods is efficient.

III. PROPOSED FLOW

This scheme is to calculate rebroadcast delay and rebroadcast probability. We use upstream coverage ratio of RREQ packet from previous node and used additional coverage ratio of RREQ packets and connectivity factor to provide rebroadcast probability. In our protocol every node should have 1-hop neighbour information. For block diagram perspective use manet, formation of belt region, node deployment, RREQ broadcasting, calculation of UCN and rebroadcast delay, calculation of rebroadcast probability and simulation results.

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A. MANET

Manet is self -organized network, fixed infrastructure network and it can freely moves in any direction (eg: gsm ,cdma).

B. FORMATION OF BELT REGION

It includes each node should send hello packets to its neighbour's node which are in its communication range to update the topology.

C. NODE DEPLOYMENT

Node deployment is location and placing of node in fixed point depending on values generated by Trace file.

D. RREQ BROADCASTING

It is destination address of neighbour which is sends route discovery, route cache hop by hop transmission in forward order.

E. CALCULATION OF UCN AND REBROADCAST DELAY

When a node ni receives an RREQ packet from its previous node s. the node can use neighbour list in the RREQ packet to estimate the how many neighbours should covered by the RREQ packet from the node. We defined the uncovered neighbour set u(ni) of node ni

$$U(ni)=N(ni)-[\ N(ni)\cap N(s)]-\{s\}$$

where N(ni)andN(s) are neighbour set of node s and ni.the node s sends RREQ packet to node ni.the initial stage of ucn set ,due to broadcast characteristics of an RREQ packet . The node can receives duplicate RREQ packets from its neighbours node.sothe node ni can further be adjusted u(ni) with neighbour knowledge. In order to get sufficient exploit neighbour knowledge and avoid channel collision, each node to set delay.We defined Rebroadcast delay Td(ni) of node ni

$$Tp(ni) = \frac{1-|\ N(s) \cap N(ni)|}{N(s)}$$

$$Td(ni) = \text{max delay} \times Tp(ni)$$

Where Tp(ni) is delay ratio of node ni, maximum delay is constant. When number of element in a set .thedelay consideration first delay time is determination of node transmission order to get coverage knowledge should be disseminated as soon as possible. When a node sends RREQ packet from all of neighbours ni,for i=(0,1,2,….. N(s)).according to second node nk has a lower delay ,more number of nodes can knowledge to adjust in their neighbour set at once .after determining the rebroadcast delay ,node sets own timer.

F. NEIGHBOUR KNOWLEDGE AND REBROADCAST PROBABILITY

The Node which has a larger rebroadcast delay may listen to RREQ packet from node only lower one. For example the node receives a duplicate RREQ packet from its neighbour nj, knows how many neighbours covered by RREQ packet from nj. Thus node ni be adjusted in ucn, neighbour list from node nj. Then u(ni) can be adjusted as follows

$$U(ni)=U(ni)-[\ U(ni)\cap N(nj)]$$

Now u(ni) , RREQ packet received from the node nj is discarded. To determine the order of coverage knowledge to nodes from upstream nodes receives same RREQ packet. The final UCN sets of node ni by the timer.

Note: In case nodes do not sense any duplicate RREQ packet from neighbourhood. The ucn set is not change and its remaining constant. We defined metrics additional coverage ratio Ra(ni)

$$Ra(ni)=\frac{|\ u(ni)\ |}{|N(ni)|}$$

If Ra becomes large number of nodes covered by rebroadcast to receive and process the RREQ packet. [16]xue and kumar illustrates that each node connects to more than 5.1774logn of its neighbour to get probability.in order to keep network connectivity Fc(ni),as follows

$$Fc(ni)=Nc\ /\ |N(ni)|$$

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Where Nc=5.1774logn for nodes in network, Fc(ni)≥5.1774logn. if N(ni) >Nc, Fc(ni) is less than one and N(ni) <Nc, Fc(ni) is greater than one by RREQ packet connectivity. After combining additional coverage ratio and connectivity to get rebroadcast probability Pre(ni),

Pre(ni)= Ra(ni). Fc(ni)

Where, if Pre(ni) is greater than 1 ,to set Pre(ni) as1

IV. Algorithm Description

The Formal description of NCPR of algorithm

RREQv: RREQ packet received from node v.

Rv:id: the unique identifier (id) of RREQv.

N(u): Neighbor set of node u.

U(u,x): Uncovered neighbors set of node u for RREQ whose ID is x.

Timer(u,x); Timer of node u for RREQ packet whose id is x.

{Note that, in the actual implementation of NCPR protocol, every different RREQ needs a UCN set and a Timer.}

It follows the following steps

1: if ni receives a new RREQs from s then

2: {Compute initial uncovered neighbors set U(ni,Rs,id) for RREQs:}

3: U(ni,Rs,id) = N(ni)-[N(ni)∩N(s)]-{s}

4: {Compute the rebroadcast delayTd(ni)

5: $Tp(ni)=1-\frac{|N(s) \cap N(ni)|}{N(s)}$

6: Td(ni)=max delay× Tp(ni)

7: Set a Timer(ni,Rs,id) according to Td(ni)

8: end if

9: next loop

10: while ni receives a duplicate RREQj from njbeforeTimer(ni,Rs,id) expires do

11: {Adjust:U(ni,Rs,id) }

12: U(ni,Rs,id)=U(ni)-[U(ni)∩N(nj)]

13: discard(RREQj)

14: end while

15: next loop

16: if Timer(ni,Rs,id) expires then

17: {Compute the rebroadcast probability Pre(ni):}

18: $Ra(ni)=\frac{|u(ni)|}{|N(ni)|}$

19: Fc(ni)=Nc / |N(ni)|

20: Pre(ni)= Ra(ni).Fc(ni)

21: if Random(0,1) Pre(ni)then

22: broadcast(RREQs)

23: else

24: discard(RREQs)

25: end if

26: end if

IV. Protocol Implementation

We innovate the source code of DSR in Ns2 to implement our protocol. The proposed protocol needs a hello packet to contain neighbour list information in RREQ packets. Thus our implementation techniques are used to reduce hello packet and neighbour list in the RREQ packets.

A. To reduce overhead of hello packet, do not use periodical hello mechanism, if any node sending broadcasting packet can inform its neighbours of previous such as RREQ (request), RERR (error).

B. To reduce the overhead of neighbour list in RREQ packets. Every node should monitor the variation of its neighbour table, and maintain cache of neighbour list in received RREQ packets. We modify RREQ header of DSR and add fixed fields Num_neighbours.

The nodes depends on

a. Neighbour table of nodeni adds at least one neighbour nj then node ni sets num_neighbours to positive integer
b. Neighbour table of node nideletes neighbour of node ni sets to negative integer.
c. Neighbour table of node ni does not any. When the Num_neighbour is to zero. Both of two case (i) and case (ii) techniques can reduce overhead of neighbour list in RREQ packets.

V. Simulation Environment

To evaluate performance of proposed NCPR protocol using the Ns2. Broadcasting is a fundamental and effective data dissemination mechanism in most applications of manet.The application wise RREQ in route discovery.

Simulation parameters are distributed co-ordinated function [DCF] in IEEE 802.11 protocol used for mac layer. The radio channel mode uses Lucent's wave LAN with 2mbps of bit rate and transmission power range is 250m. Constant bit rate (CBR) is randomly choosing the source to destination of different connection; each source sends the four CBR packets. The size is 512bytes per seconds. The mobility is based on random way point in field is 1000×1000m and speed to form a uniform distribution of node.

The node reaches its destination and its stops a time interval, until new destination and speed max is 5m/s and stops to 0. The maximum delay is used to determine rebroadcast delay to set as value 0.01s is equal to upper limit of random jitter of sending broadcast periodicals,

For every simulation is 300seconds and confidence level is 95 percent in vertical bar. Evaluation of routing protocol follows metrics,

- *MAC collision rate:* By dropping the average number of packets resulting from MAC layer per seconds.
- *Normalized routing overhead:* It is ratio of total packet size of control packet size of data delivered to destination. For controlling packet multiple hops is using to send over, each single hop considers as a one transmission.
- *Average end to end delay:* It is successfully delivered the average delay of CBR packet from source to destination nodes, includes all possible delays.

We evaluate impact of routing protocols,

- *Number of nodes:* It should be increase 50 to300 in fixed fields to get node density and set CBR connection to 15. There is no need of extra packet loss.
- *Number of CBR connections:* we choose the number of CBR connections from 10 to 20 with fixed packet rate to evaluate the impact of traffic load.
- *Random packet loss rate:* The impact of packet loss to evaluate packets in Ns2 simulator. If packet is uniformly distributed range is0 to 0.1.so we fix number of nodes 150 and CBR connections to 15.

VI. Simulation Results

A. THROUGHPUT

Refers to volume of data that flows through a network. It contains by the factor such as network protocol used, capabilities of routers, switches and type of cabling used such as Ethernet, fiber optics.

Throughput =Number of Byte×8.0/Interval Yime ×100

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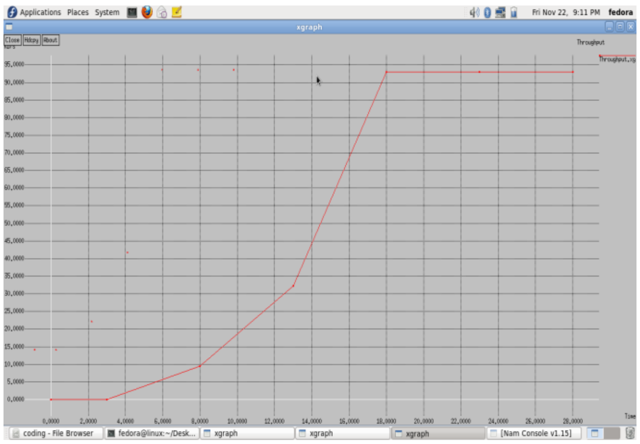

Figure 1: Throughput graph

From x-axis time value in sec and y-axis PDR graph. This shows initially data flows is lowand gradually increase the value to required outputs of proposed systems.

B. PACKET DELIVERY RATIO

It is ratio of data packet successfully send and received by CBR connections.

PDR= Number of packet sent/Number of packet received

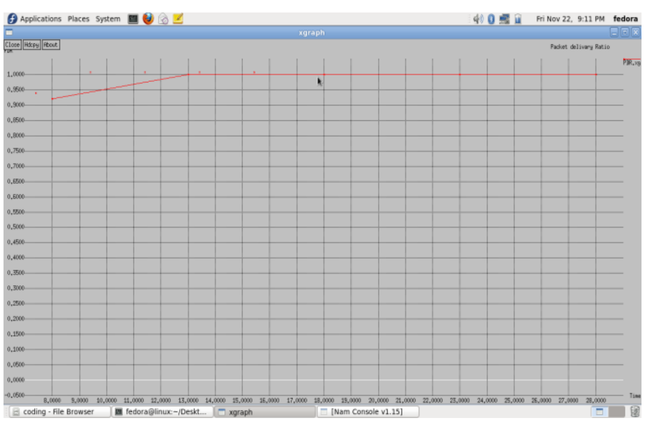

Figure 1: Throughput graph

The graph starts with zero is no communication .The communication is in fifth send will be increasing.when the communication stops it remains constant. If any case attacker node is present in network it will degrade the network performance.

VII. CONCLUSION

In this paper, we proposed NCPR protocol to reduce the overhead in manets. The additional coverage ratio and connectivity factor to provide neighbour coverage knowledge. We propose a novel scheme to calculate the rebroadcast delay in forward order to exploit the neighbour coverage knowledge. Simulation results show the proposed protocol provides less rebroadcast traffic than the flooding. The proposed protocol mitigates less redundant rebroadcast, Network Collision and contention. This shows that increase the packet delivery ratio, through put and reduced Average end to end delay. The Simulation results also show that network is in High density or Traffic is in heavy load has Good Performance.

REFERENCES

[1] C. Perkins, E. Belding-Royer , and S. Das , Ad Hoc On- Demand Distance Vector (AODV) Routing, IETF RFC 3561 , 2003.

[2] D. Johnson , Y. Hu, and D. Maltz, The Dynamic Source Routing Protocol for Mobile Ad Hoc Networks (DSR) for IPv4, IETF RFC 4728, vol. 15, pp. 153-181, 2007.

[3] H.AlAamri , M.Abolhasan, and T. Wysocki, "On Optimising Route Discovery in Absence of Previous Route Information in MANETs, " Proc. IEEE Vehicular Technology Conf. (VTC), pp. 1-5, 2009.

[4] X. Wu, H.R. Sadjadpour, and J.J. Garcia-Luna- Aceves, "Routing Overhead as a Function of Node Mobility: Modeling Framework and Implications on Routing," Proc. IEEEInt'l Conf. Mobile Ad Hoc and Sensor Systems (MASS '07), pp. 1- 9, 2007.

[5] S.Y. Ni, Y.C. Tseng, Y.S. Chen, and J.P. Sheu, The Broadcast Storm Problem in a Mobile Ad Hoc Network," Proc. ACM /IEEE Mobi Com, pp. 151-162, 1999.

[6] A. Mohammed, M. Ould-Khaoua, L.M. Mackenzie, C. Perkins, and J.D. Abdulai, "Probabilistic Counter- Based Route Discovery for Mobile Ad Hoc Networks," Proc. Int'l Conf. Wireless Comm. And Mobile Computing: Connecting the World Wirelessly (IWCMC '09), pp. 1335-1339, 2009.

[7] B. Williams and T. Camp, "Comparison of Broadcasting Techniques for Mobile Ad Hoc Networks," Proc. ACM MobiHoc, pp. 194-205, 2002.

[8] J. Kim, Q. Zhang, and D.P. Agrawal, "Probabilistic Broadcasting Based on Coverage Area and Neighbor Confirmation in Mobile Ad Hoc Networks," Proc . IEEE Globe Com, 2004.

[9] Z. Haas, J.Y. Halpern, and L. Li, "Gossip-Based Ad Hoc Routing," Proc. IEEE INFOCOM, vol. 21, pp. 1707-1716, 2002.

[10] W. Peng and X. Lu, "On the Reduction of Broadcast Redundancy in Mobile Ad Hoc Networks," Proc. ACM Mobi Hoc, pp. 129-130, 2000.

[11] J.D. Abdulai, M. Ould-Khaoua, L.M. Mackenzie, and A. Mohammed, "Neighbour Coverage: A Dynamic Probabilistic Route Discovery for Mobile Ad Hoc Networks," Proc. Int'l Symp. Performance Evaluation of Computer and Telecomm. Systems (SPECTS '08), pp. 165-172, 2008.

[12] J. Chen, Y.Z. Lee, H. Zhou, M. Gerla, and Y. Shu, "Robust Ad Hoc Routing for Lossy Wireless Environment," Proc. IEEE Conf. Military Comm. (MILCOM '06), pp. 1-7, 2006.

[13] A. Keshavarz-Haddady, V. Ribeirox, and R. Riedi, "DRB and DCCB: Efficient and Robust Dynamic Broadcast for ad Hoc and Sensor Networks," Proc. IEEE Comm. Soc. Conf. Sensor, Mesh, and Ad Hoc Comm. and Networks (SECON '07), pp. 253-262, 2007.

[14] F. Stann, J. Heidemann, R. Shroff, and M.Z. Murtaza, "RBP: Robust Broadcast Propagation in Wireless Networks," Proc. Int'l Conf. Embedded Networked Sensor Systems (SenSys '06), pp. 85-98, 2006.

[15] F. Xue and P.R. Kumar, "The Number of Neighbors Needed for Connectivity of Wireless Networks," Wireless Networks, vol. 10, no. 2, pp. 169-181, 2004.

[16] X.M. Zhang , E.B. Wang, J.J. Xia, and D.K. Sung, "An Estimated Distance Based Routing for Mobile Ad Hoc Networks ," IEEE Trans . Vehicular Technology, vol. 60, no. 7, pp. 3473-3484, Sept. 2011.

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[19] D.K.Sung is with Department of Electrical Engineering, Korea ad1vanced institute of science & Technology 2013.