RELIABLE DATA DELIVERY WITH REDUCED ROUTING OVERHEAD IN MOBILE ADHOC NETWORKS

Arpit yadav, Anurag parmar, Abhishek Sharma

ABSTRACT: **High mobility of nodes in Mobile Adhoc Network causes frequent link breakages which lead to frequent path failure and route discoveries. In route discovery, broadcasting is a fundamental and effective data dissemination mechanism, where a mobile node blindly broadcast the first received route request packets unless it has a route to the destination. This causes broadcast storm problem and also increases ro uting overhead. The Neighbor Coverage based Probabilistic Rebroadcast (NCPR) protocol reduces the routing overhead by decreasing the number of retransmission of route request packets. This protocol uses neighbor coverage knowledge to determine the rebroadcast delay and additional coverage ratio. A Rebroadcast probability is set based on this additional coverage ratio and connectivity factor.The proposed system is the hybrid solution NCPR-DFR (NCPR with Directional Forward Routing) which combines the positive aspects of both proactive and reactive routing schemes. NCPR-DFR automatically finds the alternate appropriate node for packet forwarding in case of route breakage. For this purpose, each node keeps gradient directons towards the destination. This direction is dynamically refreshed based on periodic proactive update issued by the destination. Thus this approach constitutes the reliable data delivery to the destinations.**

Keywords,
Mobile ad hoc network, neighbour coverage, network connectivity, probabilistic rebroadcast, Routing overhead, gradient direction

I. INTRODUCTION

Mobile adhoc networks (MANETs) consist of a collection of mobile nodes which can move freely. These nodes can be dynamically self organized into an arbitrary topology networks without a fixed infrastructure. One of the fundamental challenges of MANETs is the design of dynamic routing protocols with good performance and less overhead.

A.**SCOPE OF THE PAPER**

The scope of the proposed system is to avoid data loss problem due to link breakages in a mobile adhoc network.Therefore, reducing routing overhead due to broadcasting mechanism and to include proactive routing strategy is the goal of the proposed system. In order to quickly recover the broken path due to the mobility and random packet loss, a hybrid approach called NCPR-DFR is taken.The Neighbour Coverage based probabilistic Rebroadcast protocol (NCPR) with Directional forward Routing (DFR) combines proactive and on demand routing features. Like all on demand routing protocols, NCPR,DFR is initiated by a connection request and terminated when data transfer ends. NCPR is used during the connection setup phase and directional forward routing (DFR) is used during data transfer phase. During data transfer, proactive routing updates help to track moving nodes and efficiently recover from route breakages.

B.ORGANISATION OF THE PAPER

Section 2 discusses about the 1existing system and advantages of proposed system. Section 3 presents the system design. Section 4 explains the details of project implementation with module wise description.Section5 mentions the concluding remarks about the paper

II..SYSTEM ANALYSIS

A.EXISTING SYSTEM

The existing system is the on demand routing protocol NCPR, which discovers a route whenever there is a need to transfer the data packet.. In order to reduce the routing overhead, the NCPR protocol limits the number of rebroadcast by effectively exploiting the neighbor coverage knowledge.

B.NCPR PROTOCOL

Source node which wants to send the data package initiates the route discovery by sending the RREQ packet to its neighbor set of nodes. When a node ni on receives the RREQ packet from its previous nodes, it can use the neighbor list in the RREQ packet to estimate how many its neighbor have not been covered by the RREQ packet from s. When a neighbor receives RREQ packet, it calculates the rebroadcast delay according to the neighbor list in the RREQ packet and its own neighbor list .

Rebroadcast Delay, Td(ni) = Tp(ni)*MaxDelay

Set the timer equal to delay obtained . Within the timer any duplicate RREQs received from other neighbours (nj) are discarded after adjusting its uncovered neighbour set. After determining the final uncovered set, calculate the Additional Coverage Ratio for the node ni as , Ra(ni)=|U(ni)| / |N(ni)|.This metric indicates the ratio of the number of nodes that are additionally covered by this rebroadcast to the total number of neighbors of node ni. Connectivity metric of the network Nc is 5.1774logn, where n is the total number of nodes in the network..Fc(ni)=Nc / |N(ni)|. By combining the Additional Coverage Ratio and Connectivity Factor, the Rebroadcasr Probability is given by ,

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

If the Rebroadcast probability is between (0,1),then the node ni broadcasts the RREQ packets to the final uncovered set of nodes, else no rebroadcast of RREQ is by this node ni. This process will be iterated for each node receiving RREQ packet until reaching the destination node. On reaching destination node, it will send the RREP packet to the source node about the route discovered. The source node will start sending data packets to the destination using NCPR Protocol.

C.DISADVANTAGE OF EXSISTING SYSTEM

In NCPR protocol no link recovery Strategy has been defined whenever link break occurs while transferring data packets.

D.PROPOSED SYSTEM

The proposed system is the hybrid solution NCPR-DFR, an NCPR protocol with Directional Forward Routing which combines the positive aspects of proactive and reactive routing schemes. Using NCPR protocol, the sender nodediscovers a route to the destination node. Like all on-demand routing protocols NCPR-DFR is initiated by a connection request and terminated when data the transfer ends.Once it reaches the destination sends the route reply to the source node . After sending route reply, the destination starts to advertise its existence to the neighbors by broadcasting a periodic beacon. The beacon includes destination ID, node ID and node co-ordinates. Periodically, the nodes that have received the beacon, will in turn broadcast to their neighbors, and so on. This is essentially a Distance vector routing type procedure, and itprovide a back up path to the destination node .

III.SYSTEMDESIGN

A. NCPR_DFR PROTOCOL

1.Route Discovery through NCPR protocol

2.Link Break Notification
3.Link Break Recovery using DFR
4.Performance analysis

B. NCPR_DFR DESCRIPTIONS

The following section gives a brief description about steps consitituted in proposed NCPR_DFR Protocol.

C.ROUTE DISCOVERY THROUGH NCPR PROTOCOL

Algorithm:
RREQs: RREQ packet received from nodes.
Rs id: the unique identifier (id) of RREQs.
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.
In the implementation of NCPR proto col every different

RREQ needs a UCN set and a Timer.
1. ifni receives a new RREQs from s then
2. {Compute initial uncovered neighbors set (ni,Rs.id)for RREQs:}
3. U(ni,Rs.id)=N(ni)-[N(ni) ∩ N(s)]-{s}
4.{Compute rebroadcast delay Td(ni):}
5. Tp(ni)=1-(| N(s)∩ N(ni)|)÷|N(s)| //Tp(ni)-Delay Ratio of ni
6. Td(ni)=MaxDelay *Tp(ni)
7. Set a Timer(ni,Rs.id)according to Td(ni)
8. end if
9. While ni receives a duplicate RREQj from nj before timer(ni,Rs.id)expires do
10. {Adjust U(ni,Rs.id):}
11. U(ni,Rs.id)=U(ni,Rs.id)-[U(ni,Rs.id) ∩ N(nj)]
12. discard(RREQj)
13. end while

14. if Timer(ni;Rs:id) expires then
15. {Compute the rebroadcast probability Pre (ni)}
16. Ra(ni)=|U(ni)| / |N(ni)| //Ra(ni)-Additional Coverage ratio
17. Fc(ni)=Nc / |N(ni)| //Fc(ni)-ConnectivityFactor,Nc-Connectivity metric
18. Pre (ni) =Fc(ni) * Ra(ni)
19. if Random(0,1)≤ Pre (ni) then
20.broadcast(RREQs)
21.else
22.discard(RREQs)
23. end if
24. end if

D.Link Break Notification

Using NCPR protocol, data packets are transferred to the destination node through the route discovered. During data transfer, if any of the link breaks across the path of the route, node which finds out the link break sends the RERR (Route Error) control packet to the source node.

E.Link Break Recovery Using DFR

After sending route reply, the destination starts to advertise its existence to the neighbours by broadcasting a periodic beacon. The beacon includes destination ID, node ID and node coordinates. The node coordinates can be GPS coordinates or local coordinates. Each node, upon receiving the beacon, updates its route entry to the destination. The entry includes destination ID, beaconing node ID, hop distance to the destination, and direction to the beaconing node (computed from its coordinates). Periodically, the nodes that have received the beacon, will in turn broadcast to their neighbours, and so on.To support NCPR-DFR, each node keeps two data structures: a direction cache(with directions to destinations and neighbor coordinates) and a routing table.The direction cache keeps the coordinates of all direct neighbors advertised by the beacon updates. For each distinct destination the direction entry stores where the update came from. The entries are continuously refreshedand are expired after a defined timeout.. The routing table is continuously updated based on routing updates and the entries of the direction cache if an original path fails. This table provides complete routing information,i.e., next hop and hop distance to all destination nodes NCPR-DFR is able to recover from the route breakage efficiently. Generally, a packet is forwarded to the neighbour whose hop distance to the destination is the minimum among all neighbours. Clearly, when this neighbour moves away, the data packet must be re-routed. The current node first consults the neighbour cache as it provides accurate and up-to-date direction information of the destination. The direction is used to decide which route is most suitable for forwarding the packet. If a neighbour is along the direction, the packet is re-routed using this neighbour.In the case that there are multiple neighbour candidates, the neighbour with the smallest angular deviation from the direction to destination is selected. If no suitable candidate exists, the packet is dropped and an error message is sent upstream to notify the source of the presence of a “dead end”.

F.PERFORMANCE ANALYSIS

The performance of routing protocols AODV (Ad hoc on-demand Distance Protocol) and NCPR is evaluated based on the metrics,Normalized Routing Overhead:,Average end-to-end delay.The experiments are divided to two parts, and each part evaluated the impact of one of the following parameters on the performance of routing protocols.

Number of nodes: The number of nodes are fixed as 50 to 300 to evaluate the impact of different network destiny. In this part, set the number of CBR connections to 15, and do not introduce extra packet loss.Number of CBR connections: Vary the number randomly of CBR connections from 10 to 20 with a fixed packet rate to evaluate the impact of different traffic load. In this part, set the number of nodes to 150, and also do not introduce extra packet loss.

IV.SYSTEM IMPLEMENTATION AND SCREENSHOTS

A.SIMULATION SCENARIO

A mobile adhoc network consisting of 50 nodes have been simulated. These nodes are connected by wireless links. A constant bit rate (CBR) data traffic is considered with randomly chosen different source –destination connections. Every source sends four CBR packets whose size is 512 bytes/sec. The simulation time for each simulation scenario is set to 300 sec.

V.CONCLUSION

In this paper, neighbor coverage base probabilistic rebroadcast protocol with Directional Forward Routing is implemented. This protocol discovers the route when there is a demand. It reduces the routing overhead by reducing the number of rebroadcasting RREQ packets. This neighbour coverage includes additional coverage ratio and connectivity factor.This scheme dynamically calculates the rebroadcast delay, which is used to determine the forwarding order and more effectively exploit the neighbour coverage knowledge.Whenever the discovered route breaks while transfering data packets,DFR provides alternate appropriate route for reliable data transmission. Simulation results show that the proposed protocol generates less rebroad cast traffic than the flooding and some other optimized scheme in literatures. Because of less redundant rebroadcast, the proposed protocol mitigates the network collision and contention, so as to increase the packet delivery ratio and decrease the average end-to-end delay.

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