Joint Optimal Data Rate in Lossy Mobile Ad Hoc Networks Using AODV and RREQ

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Abstract – In this paper, we have a contemplate lossy mobile impromptu networks wherever the information rate of a given flow becomes lower and lower on its routing path. one in all the most challenges in lossy mobile impromptu networks is the way to bring home the bacon the conflicting goal of exaggerated network utility and reduced power consumption, whereas while not following the fast state of a attenuation channel. to deal with this drawback, we have a tendency to propose a cross-layer rate-effective network utility maximization (RENUM) framework by taking into consideration the lossy nature of wireless links and therefore the constraints of rate outage chance and average delay. within the planned framework, the utility is related to the effective rate received at the destination node of every flow rather than the injection rate at the supply of the flow. we have a tendency to then gift a distributed joint transmission rate, link power and average delay management algorithmic rule, during which specific broadcast message passing is needed for power allocation algorithmic rule. impelled by the need of power management barren of message passing, we have a tendency to provides a near-optimal power-allocation theme that creates use of autonomous SINR measurements at every link and enjoys a quick convergence rate. The planned algorithmic rule is shown through numerical simulations to outstrip different network utility maximization algorithms while not rate outage probability/average delay constraints, resulting in a better effective rate, lower power consumption and delay. moreover, we have a tendency to conduct in depth network-wide simulations in NS-2 machine to guage the performance of the algorithmic rule in terms of outturn, delay, packet delivery magnitude relation and fairness.

1. INTRODUCTION

A Mobile Ad-hoc Network (MANET) may be a self-configured network of mobile terminals connected by wireless links. Mobile terminals like cell phones, moveable play devices, personal digital assistants, (PDAs) and tablets all have wireless networking capabilities. By collaborating in MANETs, these terminals could reach the web after they aren't within the vary of Wi-Fi access points or cellular base stations, or communicate with one another once no networking infrastructure is out there. MANETs may be utilized within the disaster rescue and recovery. One primary issue with continuous participation in MANETs is that the network time period, as a result of the said wireless terminals area unit battery powered, and energy may be a scarce resource. Cooperative communication (CC) may be a promising technique for protective the energy consumption in MANETs. the printed nature of the wireless medium (the alleged wireless broadcast advantage) is exploited in cooperative fashion. A distributed CMAC protocol has been planned to enhance the time period of wireless detector networks, however it's supported the belief that each node will hook up with the bottom station inside one hop that is impractical for many applications.There area unit 2 sorts of wireless mobile networks at the moment. These networks may be classified into 2 design categories with totally different operation mechanisms and connected problems. One sort is infrastructure wireless networks, within which there area unit mounted wireless gateways that connect the mobile systems with a wired network. Typical applications of such networks area unit the mobile phone networks and therefore the wireless native space networks (WLANs). The gateways within the mobile phone systems area unit called base stations, and therefore the infrastructure during a {wlan|wireless local area unita network|WLAN|wireless fidelity|WiFi|local area network|LAN} is known as the access points (APs). The networks with infrastructure area unit appropriate for locations wherever base stations area unit gift or may be simply placed. a bonus of this sort of networks is that the prevailing wired networks may be utilized to support access from mobile users while not modifications to the networks' management structure. an obstacle of those networks is that the mounted infrastructure would constrain node quality, limit network deploy ability, and increase installation and management prices of the networks.

There area unit usually 2 sorts of MANETs: closed and open [62]. during a closed Manet, all mobile nodes get together with one another toward a standard goal, like emergency search/rescue or military and enforcement operations. In associate open Manet, {different|totally totally different completely different} mobile nodes with different goals share their resources so as to confirm world property. despite which kind of MANETs is employed, an advert hoc network will work correctly given that the collaborating nodes get together during a proper means.

2. RELATED WORK

Abdulai et al., [5], proposed a Dynamic Probabilistic Route Discovery (DPR) scheme based on neighbour coverage. In this approach, each node determines the forwarding probability according to the number of its neighbours and the set of neighbours which are covered by the previous broadcast. The DPR scheme prioritizes the routing operation at each node with respect to different network parameters such as the number of duplicated packets, and local and global network density.

C. Perkins et al., [2], proposed that an ad hoc network is the cooperative engagement of a collection of mobile nodes without the required intervention of any centralized access point or existing infrastructure.

D. Johnson et al., [3], proposed a Dynamic Source Routing (DSR) protocol for wireless mesh networks. It is similar to AODV in that it forms a route on-demand when a transmitting computer requests one. However, it uses source routing instead of relying on the routing table at each intermediate device. Determining source routes requires accumulating the address of each device between the source and destination during route discovery.

Z. Hass et al., [4], proposed the gossiping-based approach, in which each node forwards a message with some probability, to reduce the overhead of the routing protocols. Gossiping exhibits bimodal behavior in sufficiently large networks. In some executions, the gossip dies out quickly and hardly any node gets the message. In the remaining executions, a substantial fraction of the nodes gets the message. The fraction of executions in which most nodes get the message depends on the gossiping probability and the topology of the network. For large networks, the simple gossiping protocol uses up to 35% fewer messages than flooding, with improved performance.

Xin Ming Zhang and et al., [6], suggested that the initial motivation of the system is to optimize broadcasting. For optimization of broadcasting in route discovery, many methods have been introduced.

3. DISCUSSIONS

We consider lossy mobile ad hoc networks where the data rate of a given flow becomes lower and lower along its routing path. Furthermore, we conduct extensive network-wide simulations in NS-2 simulator to evaluate the performance of the algorithm in terms of throughput, delay, packet delivery ratio and fairness.

NCPR (Neighbor Coverage Based Probabilistic Routing Protocol) [3] The main aim of probabilistic rebroadcast protocol based on neighbor coverage is to reduce the routing overhead and improve the routing performance in MANETs. This approach combines the advantage of probabilistic method and neighbor knowledge method which can solve the broadcast storm problem. Algorithm of NCPR Assumptions: Ai is intermediate node, s is Source node, E(s) is the neighbour set of node s, RREQs is the route request packet received from node s, Rs.id is unique identifier of route request, U(s , i) is Uncovered Neighbour Set of node s for RREQ whose id is i and Timer(s , i) is timer of node s whose id is i. In NCPR Protocol, when source node sends different RREQ need uncovered neighbour set and Timer.

Step 1: If Ai received new RREQs from s then

Step 2: Calculate initial uncovered neighbour set U(Ai, Rs.ID) for RREQs

Step 3: Compute the Rebroadcast Delay i.e. Td(Ai)

Step 4: Set a Timer (Ai, Rs.ID) according to T(Ai)

Step 5: end if

Step 6: if Ni received new RREQs from S then repeat from step 2 to step 4

Step 7: While Ai receives a duplicate RREQm from node Am before Timer (Ai, Rs.ID) expires do…

Step 8: Adjust U (Ai, Rs.ID)

Step 9: Discard (RREQm)

Step 10: Repeat step 7 to 9 until Timer expired

Step 11: end while other node received a duplicate RREQ message repeat step 7 to 9

Step 12: If Timer (Ai, Rs.ID) expires then

Step 13: calculate Rebroadcast Probability P(Ai)

Step 14: Check random probability <=P(Ai)

Step 15: If Yes Broadcast (RREQs)

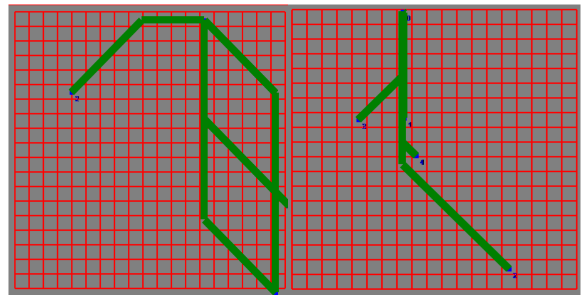
Step 16: Else Discard (RREQs)

Step 17: Repeat until it reach to Destination.

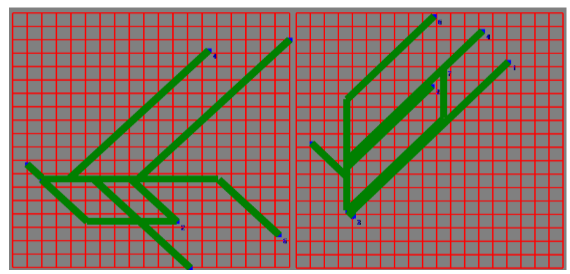
When source node send RREQ packet to intermediate node it check whether it receive RREQ packet first time then calculate initial UCN set i.e Uncovered neighbor set by comparing neighbor list of itself with previous node neighbor list. After that calculate rebroadcast delay to determine forwarding order, set timer according to rebroadcast delay. Due to characteristics of broadcasting RREQ packet node can receive the duplicate RREQ packet from its neighbor node could adjust the uncovered neighbor set until timer expired. As time expired with the help of finial UCN set it calculates rebroadcast probability by multiplying the additional coverage ratio and connectivity factor. This rebroadcast probability decide whether to rebroadcast the packet or not. As compare to flooding NCPR protocol generate less redundant rebroadcast and because of this protocol mitigates the network collision and contention, so as to decrease the average end to end delay and increase packet delivery ratio. Although the protocol increases the RREQ packet size, it reduces the number of RREQ packet more significantly.

Probabilistic Broadcasting Based on Coverage Area and Neighbor Confirmation [4] This approach combines the advantage of probabilistic and area based method. In probabilistic method depend on predefined fixed probability to determined whether to rebroadcast the packet or not but the problem is that how to set rebroadcast probability. As the values of all nodes are same so it is critical to identify and categorise the node in the various regions and appropriately adjust their rebroadcasting probability. So we can dynamically determine the rebroadcasting probability. By using dynamic probabilistic broadcasting based on coverage area and neighbour confirmation in that coverage area is used to adjust the rebroadcasting probability and by using neighbour confirmation confirm that all neighbour received the broadcast packet if some are not received forward packet to that node and determine the suitable probability. For this author used three steps to determine or adjust the rebroadcasting probability. Shadowing effect help to reduce number of rebroadcast packet. Each node is choosing different probability according to its distance from the sender. As mobile node are closer to the sender or distance from the sender are less than the retransmission probability are set low and if mobile node are far from the sender than retransmission probability of that node is set high. It is better for the node that is far away from the sender because it may potentially act as relay node on behalf of node closer to the sender. Based on shadowing effect we determine rebroadcast probability by calculating it coverage ratio and connectivity parameter. As distance between sender and node increase coverage area is also increase. As coverage area is directly proportional to distance from sender to node rebroadcast probability should be consider according to their coverage area. After determining the coverage ratio and adjust rebroadcasting probability we should confirmed that all neighbour should received the RREQ packet. If some of them not received RREQ packet its rebroadcast the packet.

4. RESULT



(Fig1, Fig2)



(Fig 4, Fig5)

Nodes	Source	Destination	No Of Data	Threshold	Loss
4	1	4	5	150	3
5	1	5	7	150	7
6	1	6	6	150	2
7	1	7	5	150	2

(Fig 6)

5. CONCLUSION

The routing overhead in MANET by introducing probabilistic rebroadcast mechanism based on neighbor coverage knowledge which includes additional coverage ratio and connective factor. Consider lossy mobile ad hoc networks where the data rate of a given flow becomes lower and lower along its routing path. Because of less redundant rebroadcast, the proposed work will mitigate the network collision and contention; this will increase the packet delivery ratio and reduce the average end to end delay. Although the network is in high density or the traffic is heavily loaded, the proposed work will have good performance.

Further work is required to address various properties of MARS and E-MARS. Currently, the basic MARS and E-MARS require a predetermined timeout value τ at the destination for misbehavior detection.

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