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Enhanced routing performance and overhead in Mobile Ad-hoc network for big data Transmission in Telemedicine using computer communication network

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Abstract: Due to high mobility of nodes in mobile ad hoc networks (MANETs), there exist frequent link breakages which lead to frequent path failures and route discoveries. The overhead of a route discovery cannot be neglected. In a route discovery, broadcasting is a fundamental and effective data dissemination mechanism, where a mobile node blindly rebroadcasts the first received route request packets unless it has a route to the destination, and thus it causes the broadcast storm problem. [1 to 3]. In this paper, we propose a neighbor coverage-based probabilistic rebroadcast protocol for reducing routing overhead in MANETs. In order to effectively exploit the neighbor coverage knowledge, we propose a novel rebroadcast delay to determine the rebroadcast order, and then we can obtain the more accurate additional coverage ratio by sensing neighbor coverage knowledge.[4] We also define a connectivity factor to provide the node density adaptation. By combining the additional coverage ratio and connectivity factor, we set a reasonable rebroadcast probability. Our approach combines the advantages of the neighbor coverage knowledge and the probabilistic mechanism, which can significantly decrease the number of retransmissions so as to reduce the routing overhead, and can also improve the routing performance.

Keywords: MANETS, Telemedicine, neighbour coverage , network connectivity, computer communication network, probabilistic rebroadcast , Data transmission, routing overhead.

I. INTRODUCTION

There has been a growing research activity on wireless mobile ad hoc networks (MANETs) over the past years due to their potential useful civilian and military applications. MANETs are formed dynamically by an autonomous system of mobile nodes that are connected via wireless links without using an existing fixed network infrastructure or centralized administration. The nodes are free to move randomly and organize themselves arbitrarily; thus, the network's wireless topology may change rapidly and unpredictably. Nodes in MANETs act as end points and sometimes as routers to forward packets in a wireless multi-hop environment.

One of the fundamental challenges in the design of MANETs in a multi-hop environment is the design of dynamic routing protocol that can efficiently establish routes to deliver data packets between mobile nodes with minimum communication overhead while ensuring high throughput and low end-to-end delay.[1 to 4]. Many routing protocols have been suggested for MANETs over the past few years. In general, the routing protocols for MANETs fall into two categories based on how route discovery process is initiated: proactive and reactive (or on-demand). Proactive routing protocols, such as DSDV and OLSR, attempt to maintain consistent and up-to-date routing information from each node to every other node in the network. Each mobile node is required to periodically discover and maintain routes to every possible destination in the network. In the on-demand routing protocols, such as AODV and DSR, routes are discovered only when they are needed. Each node maintains a route for a source-destination pair without the use of periodic routing table exchanges or full network topological view. Additionally, there are hybrid protocols that combine the features of both proactive and on-demand protocols. In such protocols, each node maintains routing information about its zone using proactive routing, but uses on-demand routing outside the zone. The periodic routing information updates and updates due broken links that are inherent in proactive routing protocols can lead to a large routing control overhead in high mobility environments. Hence, these protocols surfer from excessive routing control overhead and therefore are not scalable in MANETs, which have limited bandwidth and whose topologies are highly dynamic.

In conventional on-demand routing protocols, a node that needs to discover a route to a particular destination, broadcasts a Route Request control packet (RREQ) to its immediate neighbours. Each mobile node blindly rebroadcast the received RREQ packet until a route is established. [6]. This method of route discovery is referred to as blind flooding. Since every mobile node is required to rebroadcast the received RREQ packet once. If the destination node is reached, the maximum number of rebroadcasts is about N – 2, where N is the total of number of nodes in the Network. This can potentially lead to excessive redundant retransmissions and hence causing

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considerable collisions of packets in a contention-based channel, especially in dense wireless networks. Such a phenomenon induces what is known as broadcast storm problem, which has been shown to greatly increase network communication overhead and end-to-end delay. [6]. To reduce the deleterious impact of blind flooding, a number of broadcasting techniques have been suggested.

In conventional probabilistic broadcast schemes, every mobile node rebroadcasts a packet based on a predetermined fixed forwarding probability p. Probabilistic broadcast schemes do not require global topological information on the network in order to make rebroadcast decisions [7]. Thus these schemes are localized and can be used to effectively reduce the overhead associated with the dissemination of RREQ packets during route discovery. However, most probabilistic methods have focus on pure probabilistic scenarios with relatively little investigations on the effects of such broadcast algorithms on specific applications such as route discovery.

This thesis proposes a neighbor coverage-based probabilistic rebroadcast (NCPR) protocol. In order to effectively exploit the neighbor coverage knowledge, need a novel rebroadcast delay to determine the rebroadcast order, and then can obtain a more accurate additional coverage ratio [8]; In order to keep the network connectivity and reduce the redundant retransmissions, need a metric named connectivity factor to determine how many neighbors should receive the RREQ packet. After that, by combining the additional coverage ratio and the connectivity factor, we introduce a rebroadcast probability, which can be used to reduce the number of rebroadcasts of the RREQ packet, to improve the routing performance.

A. *Counter-Based Method*

In this technique, when a node receives a broadcast packet, it starts a random assessment delay (RAD) and counts the number of received duplicate packets. When the RAD expires, the node rebroadcasts the packet only if t he counter does not exceed a threshold value C. If the counter exceeds the threshold after expiration of RAD, the node assumes all its neighbours' have received the same packet, and refrains from forwarding the packet. The predefined counter threshold C is the key parameter in this technique. Ni et al. have demonstrated that broadcast redundancy associated with simple flooding can be reduced while maintaining comparable reach ability in a network of 100 nodes, each with 500m transmission range placed on an area between 1 500m x 1500m and 5500m x 5500m by using a counter based scheme with the value of C set to 3 or 4.

B. *Area Based Method*

A node using an Area Based Method can evaluate additional coverage area based on all received redundant transmissions. We note that area based methods only consider the coverage area of a transmission; they don't consider whether nodes exist within that area. The additional coverage area is determined by a distance-based scheme or location-based scheme. For example, if the node receiving the packet is located a few meters away from the sender, the additional area covered by forwarding the packet is quite low. At the other extreme, if the node receiving the packet is located at the boundary of the sender's transmission range, then a rebroadcast would reach a significant additional area, 61%.

Distance-based scheme: A node compares the distance between itself and each neighboring node that has previously forwarded a given packet. Upon reception of a previously unseen packet, a random assessment delay (or RAD for short) is initiated and redundant packets are cached. When the RAD expires, the locations of all the sender nodes are examined to see if any node is closer than a threshold distance value. If true, the node does not rebroadcast. Therefore, a node using the distance-based scheme requires the knowledge of the geographic locations of its neighbors' in order to make a rebroadcast decision. A physical layer parameter such as the signal strength at a node can be used to gauge the distance to the source of a received packet. Alternatively, if a GPS receiver is available, nodes could include their location information in each packet transmitted. The distance-based scheme succeeds in reaching a large part of the network but does not economize the number of broadcast packets. This is because a node may have received a broadcast packet many times, but will still rebroadcast the packet if none of the transmission distances are below a given distance threshold .

Location-based scheme: Using a location based scheme, each node is expected to know its own position relative to the position of the sender using a geo location technique such as GPS. Whenever a node originates or forwards a broadcast packet it adds its own location to the header of the packet. When a neighboring node initially receives the packet, it notes the location of the sender and calculates the additional coverage area obtainable if it were to rebroadcast. If the additional area is less than a threshold value, the node will not rebroadcast, and all future receptions of the same packet will be ignored. Otherwise, the node assigns a RAD before delivery. If the node receives a redundant packet during the RAD, it recalculates the additional coverage area and compares that value to the threshold. The comparison of the area calculation and threshold occurs for all redundant broadcasts received until the packet reaches either the scheduled send time or is dropped.[10]

C. *Neighbor Knowledge Based Methods*

Neighbor knowledge based schemes maintain state information about their neighborhood via periodic exchange of "hello" packets, which is used in the decision to rebroadcast. The objective is to predetermine a small subset of nodes for broadcasting a packet such that every node in the network receives it. Often this subset is called the forwarding set. Below are brief descriptions of the various neighbor-knowledge-based schemes.

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Vol. 3, Issue 11, November 2014

Forwarding Neighbors Schemes: In forwarding neighbors schemes, the forwarding status of each node is determined by its neighbors. Specifically, the sender proactively selects a subset of its 1-hop neighbors as forwarding nodes. The forwarding nodes are select educing a connected dominating set (CDS) algorithm and the identifiers (IDs) of the selected forwarding nodes are piggybacked on the broadcast packet as the forwarder list.

D. *Scalable Broadcast Algorithm (Sba)*

This algorithm requires that all nodes have knowledge of their neighbors within a two hop radius. This neighbor information coupled with the identity of the node from which a packet is received allows a receiving node to determine if it would reach additional nodes by forwarding the broadcast packet. 2-hop neighbor information is achievable via a periodic exchange of

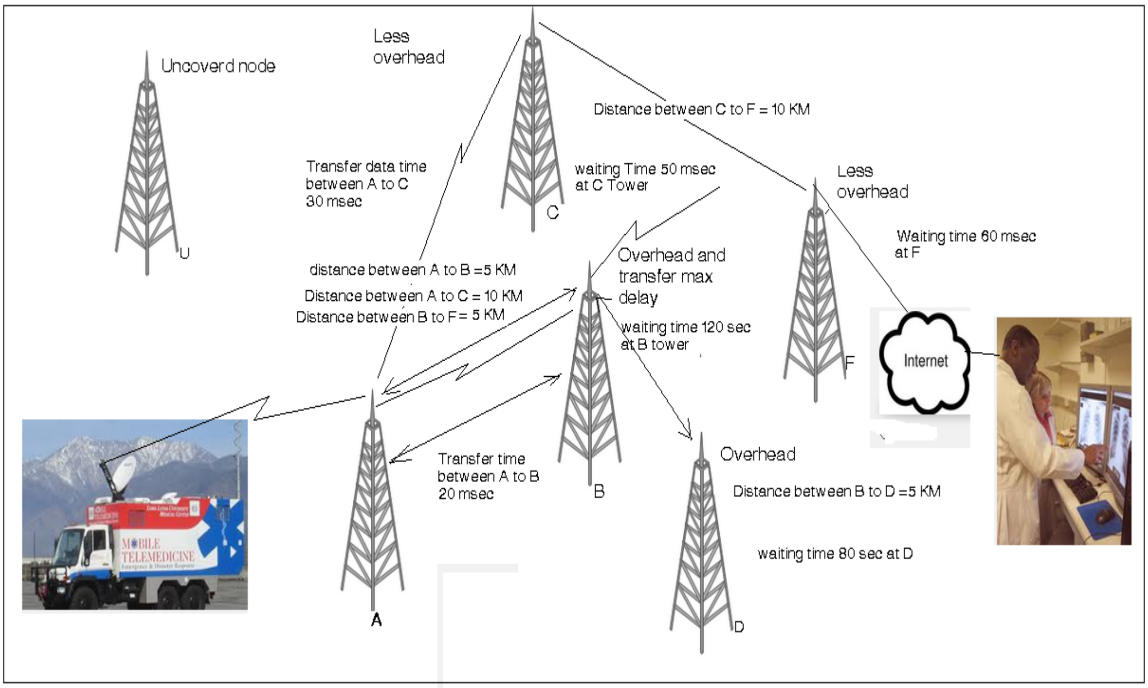

Fig. 1 A sample diagram of neighbouring node Tower

Each designated forward node in turn designates its own list of forward nodes before forwarding the broadcast packet. The Dominant Pruning algorithm is a typical example of the forwarding neighbors' schemes. Ideally, the number of forwarding nodes should be minimized to decrease the number of redundant transmissions. However, the optimal solution is NP-complete and requires that nodes know the entire topology of the network.

Self Pruning Schemes: For broadcasting based on a self pruning scheme each node may determine its own status as a forward node or non-forward node, after the first copy of a broadcast packet is received or after several copies of the broadcast packet are received. For example the authors of have suggested that each node must have at least 2-hop neighborhood information which is collected via a periodic exchange of "hello" packets among neighboring nodes. A node piggybacks its list of known 1-hop neighbors' in the headers of "hello" packets and broadcast packets and each node that receives the packet construct a list of its 2-hop and 1-hop neighbors that will covered by the broadcast. If the receiving node will not reach additional nodes, it refrains from broadcasting; otherwise it rebroadcasts the packet.

"hello" packets; each "hello" packet contains the node's identifier and the list of known neighbors. After a node receives a "hello" packet from all its neighbors, it has 2-hop topology information centered at itself.

II. IMPROVE THE ROUTING PERFORMANCE IN MANET

The broadcasting incurs large routing overhead and causes many problems such as redundant retransmissions, contentions, and collisions. Thus, optimizing the broadcasting in route discovery is an effective solution to improve the routing performance.[9]

Haas et al proposed a gossip based approach, where each node forwards a packet with a probability. They showed that gossip-based approach can save up to 35 percent overhead compared to the flooding. However, when the network density is high or the traffic load is heavy, the improvement of the gossip-based approach is limited.

Kim et al. proposed a probabilistic broadcasting scheme based on coverage area and neighbour confirmation. This scheme uses the coverage area to set the rebroadcast probability, and uses the neighbor confirmation to guarantee reach ability.

Peng and Lu proposed a neighbor knowledge scheme named Scalable Broadcast Algorithm (SBA). This scheme determines the rebroadcast of a packet according to the

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fact whether this rebroadcast would reach additional nodes.

Abdulai et al. proposed a Dynamic Probabilistic Route Discovery (DPR) scheme based on neighbor coverage.

Keshavarz-Haddad et al. proposed two deterministic timer-based broadcast schemes: Dynamic Reflector Broadcast (DRB) and Dynamic Connector-Connector Broadcast (DCCB). They pointed out that their schemes can achieve full reach ability over an idealistic lossless MAC layer, and for the situation of node failure and mobility, their schemes are robustness.

Stann et al. proposed a Robust Broadcast Propagation (RBP) protocol to provide near-perfect reliability for flooding in wireless networks, and this protocol also has a good efficiency. They presented a new perspective for broadcasting: not to make a single broadcast more efficient but to make a single broadcast more reliable, which means by reducing the frequency of upper layer invoking flooding to improve the overall performance of flooding.

In this paper a neighbour coverage-based probabilistic rebroadcast (NCPR) protocol is proposed. In order to effectively exploit the neighbour coverage knowledge, a novel rebroadcast delay to determine the rebroadcast order, and then we can obtain a more accurate additional coverage ratio; In order to keep the network connectivity and reduce the redundant retransmissions, we need a metric named connectivity factor to determine how many neighbours should receive the RREQ packet. After that, by combining the additional coverage ratio and the connectivity factor, we introduce a rebroadcast probability, which can be used to reduce the number of rebroadcasts of the RREQ packet, to improve the routing performance.

The main contributions of this paper are as follows:

1. We propose a novel scheme to calculate the rebroadcast delay. The rebroadcast delay is to determine the forwarding order. The node which has more common neighbours with the previous node has the lower delay. If this node rebroadcasts a packet, then more common neighbours will know this fact. Therefore, this rebroadcast delay enables the information that the nodes have transmitted the packet spread to more neighbors, which is the key to success for the proposed scheme.

2. We also propose a novel scheme to calculate the rebroadcast probability. The scheme considers the information about the uncovered neighbors (UCN), connectivity metric and local node density to calculate the rebroadcast probability. The rebroadcast probability is composed of two parts:

a. additional coverage ratio, which is the ratio of the number of nodes that should be covered by a single broadcast to the total number of neighbours; and

b. connectivity factor, which reflects the relationship of network connectivity and the number of neighbors of a given node.

E. Modules description

Network Formation**:** In this module we form the network. The network contains number of nodes and one base station. We can construct a topology to provide communication paths for wireless network. Here the node will give the own details such as Node ID and port number through which the transmission is done and similarly give the known nodes details such as Node ID, IP address and port number which are neighbors to given node.

Rebroadcast Delay**:** In this module we find the uncovered neighbor set and calculate the rebroadcast delay. The UnCovered Neighbors set U(ni) of node ni as follows:

U(ni) = N(ni) – [N(ni) ∩ N(s)] – {s}

where N(s) and N(ni) are the neighbors sets of node s and ni, respectively. s is the node which sends an RREQ packet to node ni.

The rebroadcast delay can be calculated as,

$$T_p(ni) = \frac{|N(s) \cap N(ni)|}{|N(s)|}$$

$$T_d(ni) = MaxDlay * T_p(ni)$$

$T_p(ni)$ is the delay ratio of node ni, and Max Delay is a small constant delay.

Rebroadcast Probability**:** The rebroadcast probability can be computed as follows:

$P_{re}(n_i)=F_c(n_i).R_a(n_i)$

Where $R_a(n_i)$ is the additional coverage ratio of node n_i

$F_c(n_i)$ is the connectivity factor .

NCPR : Neighbor Coverage-based Probabilistic Rebroadcast algorithm used for reducing routing overhead in route discovery. [11 to 13].

Neighbouring routing Algorithm (NRSA)
Step 1: compute overhead – On
Step 2: Compute Max transmission delay – Td (ni)
Step 3: Compute the waiting time – Tw(ni)
Step 4: if On> max and if Td (ni)>max and if (Tw(ni) > max
Step 5: compute covered neighbors set of nodes C (c,x)
Step 6: compute uncovered neighbors set ( ) U (ni, Rs.id)
Step 7: U(ni) = N(ni) – [N(ni) ∩ N(s)] – {s}
Step 8: compute the re broad cast delay Td (ni)
Step 9: compute rebroadcast delay Tp(ni) = | 1-[N(S) ∩ N(ni)] | / | N(S) |
Step 10: Td (ni)= max delay* Tp(ni)
Step 11: Set a Timer (ni, Rs.id) according to Td (ni)
Step 12 end if
Step 13: if ni receives a new RREQ from S then C (ni, Rs.id)
Step 14: Compute shortest distance of covered neighbours set of nodes
Step 15: Compute neighbours set of nodes of max overhead and waiting time
Step 16 if compare C (ni, Rs.id), C (nj, Rs.id)
Step 17: if new neighbors overhead and waiting time are less

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Step 18: discard to new neighbors nodes of j
Step 19: discard (RREQj)
Step 20: broad cast

(RREQs),$P_{re}(n_i)=F_c(n_i).R_a(n_i)$

III. CONCLUSION

we proposed a probabilistic rebroadcast protocol based on neighbour coverage to reduce the routing overhead in MANETs. This neighbour coverage knowledge includes additional coverage ratio and connectivity factor. We proposed a new scheme to dynamically calculate the rebroadcast delay, which is used to determine the forwarding order and more effectively exploit the neighbour coverage knowledge. Simulation results show that proposed protocol generates less rebroadcast traffic than the flooding and some other optimized scheme in .the 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. The simulation results also show that the proposed protocol has good performance when the network is in high density or the traffic is in heavy load.

REFERENCES

[1] SHaiyun Luo , Ramachandran Ramjee, Prasun Sinha, Li (Erran) Li, Songwu Lu, MobiCom '03 ,UCAN: a unified cellular and ad-hoc network architecture, Proceedings of the 9th annual international conference on Mobile computing and networking, Pages 353-367, ACM New York, NY, USA ©2003, table of contents ISBN:1-58113-753-2 doi>10.1145/938985.939021.

[2] S.M.George, w.zhou, H.Chenji,M.Won,Y.O.Lee, A.Pazarloglou and R.Stoleru, "DistressNet:A wireless Adhoc and Sensor Network Architecture for situation Management in Disaster Response"IEEE Communications Magzine ,PP:-128-136, March 2010

[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 Proactive Routing," Proc. IEEE Int'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 MobiCom, 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 GlobeCom, 2004.

[9] J.D. Abdulai, M. Ould-Khaoua, and L.M. Mackenzie, "Improving Probabilistic Route Discovery in Mobile Ad Hoc Networks," Proc. I EEE Conf. Local Computer Networks, pp. 739-746, 2007.

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 MobiHoc, pp. 129-130, 2000.

[11] J.D. Abdulai, M. Ould-Khaoua, L.M. Mackenzie, and A. Mohammed, "Neighbour Coverage: A Dynamic Probabilistic Route Di scovery 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