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Proficient Distribution in Mobile Ad hoc Network

D.Thirupathi, A.Srinivas and D.Sagar

Sree Chaitanya College of Eengineering
karimnagae AP 505001, India

Abstract— **In Mobile AD HOC Network, flooding is the vital operation. Flooding suffers from signal collision, excessive redundant of messages and resource contention. This causes high protocol overhead and interference with the existing traffic in the networks. In the existing system flooding algorithms require very node has to maintain 2-hop (or more) neighbours information. In our proposed system we introduced two proficient broadcasting algorithms based on 100 percent deliver ability and every node maintaining 1-hop neighbour information. First, sender based distribution algorithm that reduces the Time complexity of computing forwarding nodes to O (n). Here, the number of for-warding nodes in worst case is 11. Second, a simple and highly proficient receiver based broadcasting algorithm, where nodes are uniformly distributed, we prove that the probability of neighbour nodes broadcasting the same message exponentially decreases when the distance between them increases or when the node density increases. Using simulation results, we confirm that the number of broadcasts in our proposed receiver based broad casting algorithm can be even less than one of the best known approximations for the minimum number of required broadcasts.**

Keywords— — Flooding, broadcasting, mobile ad hoc networks, wireless networks

I.INTRODUCTION

A proficient distribution in mobile ad hoc network is a collection of nodes, which have the possibility to connect on a wireless medium and form an arbitrary and dynamic network with wireless links. That means the links between the nodes can change during time, new nodes can join the network, and other nodes can leave it. A mobile ad hoc network is expected to be of larger size than the radio range of the wireless antennas, because of this fact it could be necessary to route the traffic through a multi-hop path to give two nodes the ability to communicate. There are neither fixed algorithm based on N nodes are used, the number of routers nor fixed locations for the routers as in cellular networks. A Mobile Ad hoc Network has no permanent infrastructure at all. All mobile nodes act as mobile routers. Flooding is one of the most fundamental operations in mobile ad hoc networks. Most of the major routing protocols, such as DSR,AODV , ZRP , etc.,rely on flooding for disseminating route discovery, route maintenance, or topology update packets. The simplest broadcasting algorithm is flooding, in which every node broadcasts the message when it receives it for the first time. Using flooding, each node receives the message from all its neighbours in a collision-free network. Therefore, the broadcast redundancy significantly increases as the average number of neighbour's increases. High broadcast redundancy can result in high power and bandwidth consumption in the network. Moreover, it increases packet collisions, which can lead to additional transmissions. This can cause severe network congestion or significant performance degradation, a phenomenon called the broadcast storm problem. The main objective of proficient broadcasting algorithms is to reduce the number of broadcasts while keeping the bandwidth and computational overhead as low as possible. Some broadcasting algorithms such as flooding and probabilistic broadcasting algorithms do not rely on neighbour hood knowledge. These algorithms cannot typically guarantee full delivery and/or effectively reduce the number of broadcasts. However, these algorithms either perform poorly in reducing redundant transmissions or require each node to maintain 2-hop neighbour information. Maintaining 2-hop neighbour information for each node in our s extra overhead of the system and the information can hardly be accurate when the mobility of the system is high .A dominating set is a subset of nodes such that every node in the graph is either in the set or is adjacent to a in the set.. Any routing in Mobile ad hoc network can be done proficiently via CDS Although finding minimal CDS is NP-hard even in unit disk graph however, maintaining a CDS in the network is costly, which is not suitable for flooding operations in highly mobile situations .In the proposed model, the broadcasting algorithms reduce the number of broadcasts and achieve local optimality by selecting the nodes with a higher battery life time to forward the message. Forwarding-node selection algorithm results in fewer broadcasts in the network .For proficient broad casting, if sender-based broadcast algorithm based on N nodes are used, the number of forwarding nodes can be reduced from O(n) to O(11) nodes in the worst case by using battery life time and in receiver-based broadcast the size of the message is not increased by adding a list of forwarding nodes We prove that our proposed sender-based algorithm can achieve full delivery with tie complexity O (n). We also propose a receiver-based broadcasting algorithm. In this, the receiver decides whether or not to broadcast the message. The proposed receiver-based algorithm can significantly reduce the number of broadcasts in the network. We show that using our proposed receiver-based algorithm, two close neighbours are not likely to broadcast the same message receiver-based algorithm is less than one of the best known approximations for the minimum number of required broadcasts. We propose a simple and highly proficient receiver-based broadcasting algorithm

II.SYSTEM MODEL

We assume that all nodes are located in a 2D plane and have a transmission range of R. Therefore, the topology of the network can be represented by a unit disk graph. We assume that the network is connected. Two nodes are considered neighbours if they are in the transmission range of each other. We suppose that each node knows its location via a localisation technique such as Global Positioning System

(GPS) or the lightweight techniques summarised in. Each node periodically broadcasts a very short Hello message, which includes its ID and position. Thus, each node gets the position of its neighbours as well. In the medium access control (MAC) layer, we assume that scheduling is done according to the p-persistent CSMA/CA protocol, which is based on IEEE 802.11 in the broadcast mode. In the p-persistent CSMA/CA protocol, when a node has a message to transmit, it initiates a defer timer by a random number and starts listening to the channel. If the channel is busy, it continues to listen until the channel becomes idle. When the channel is idle, it starts decrementing the defer timer at the end of each time unit.

III.PROPOSED SYSTEM

An Proficient Sender-Based distribution Algorithm Our first proposed broadcasting algorithm is a sender- based algorithm, i.e., each sender selects a subset of nodes to forward the message. Each message can be identified by its source ID and a sequence number incremented for each message at the source node. Algorithm 1 is a general sender-based broadcasting algorithm and indicates the structure of our proposed sender-based broadcasting algorithm. After receiving a message from the sender each node schedule a broadcast. If the node is selected by the sender, and if it has not scheduled the same message before, then the message has been broadcasting . Otherwise node will drop the message. Each node may only schedule a broadcast when it receives a message for the first time. Broadcast schedule can be set by using timer in MAC layer. Broadcasting algorithm can reduce both the computational complexity of selecting the forwarding nodes and the minimise number of selected nodes even in the worst-case . Upon expiration of the timer, the algorithm requests the MAC layer to schedule a broadcast. The message scheduled in the MAC layer is buffered and then broadcast with a probability p. This adds another delay in broadcasting the message. The MAC-layer delay in IEEE 802.11 is a function of several factors including the network traffic. Note that there is a chance that a node changes its decision (regarding the selected nodes or regarding whether to broadcast) during the MAC-layer delay due to receiving other copies of the message. The network can be represented as a unit disk graph G (V, E). We assume the network is connected. Each node v in V has a unique ID, denoted by id (v). Let N (v) denote the set of neighbour nodes of v. That is, nodes in N (v) are within the transmission range of v and can receive signals transmitted by v. Node v needs to know the information of its direct neighbours, including their IDs and their geographic locations. The 1hop neighbour information can be easily obtained from the HELLO messages periodically broadcaster by each node. The basic idea scheme is as follows. When a node (source) has a message to be flooded out, it computes a subset of its neighbours as forwarding nodes and attaches the list of the forwarding nodes to the message. Then, it transmits (broadcasts) the message out. After that, every node in the network does the same as follows. Upon receiving a flooding message, if the message has been received before, it is discarded; otherwise the message is delivered to the application layer and the receiver checks if itself is in the forwarding list. If yes, it computes the next hop forwarding nodes among its neighbours and transmits the message out in the same way as the source. The message will eventually reach all the nodes.

Algorithm 1: A general sender-based algorithm 1 shows the basic structure of our proposed sender-based broadcasting algorithm. Each node schedules a broadcast for a received message if the node is selected by the sender and if it has not scheduled the same message before. Clearly, each message is broadcast once at most by a node. A broadcast schedule can be set at any time. For example, a message can be dropped after the first reception but scheduled for broadcast the second time.

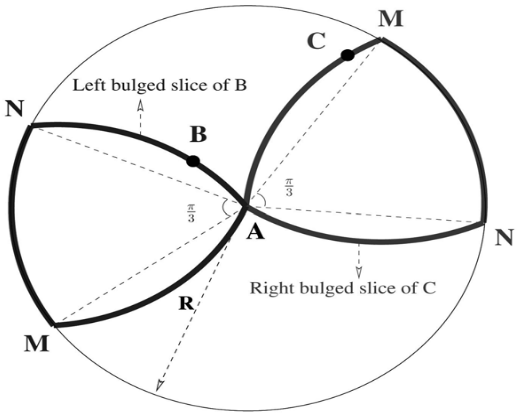
Extract information from the received message M.
if M has been scheduled for broadcast or does not
contain node's ID then
drop the message
else
set a defer timer
end if
else
set a defer timer   end if
When defer timer expires
Select a subset of neighbours to forward the message.

Algoritham2:slice based selcetion algorithm
Attach the list of forwarding node to the message. Schedule a broadcast
Input: ListA[1] . . . n: List of all neighbors of NA
Output: A B-coverage set of NA
ind =1; i= 0
repeat
ang max =0; ang min= 2
i =i+ 1
NSi =ListA[ind]
chk =false
for j =1; j <= length[ListA]; j++ do
if ListA[j] is in LBAS[i] then
if(LA(LBA(Si),LBA(ListA[j]))>ang_max
then
chk= true
ind= max= j
ang max =LB(LBA(Si), LBA(ListA[j]))
end if
else
if LA(LBA(Si)RBA(ListA[j] < ang min
Then
ind_min =j
ang min =LA(LBA(Si),RBA(ListA[j]))
end if
end if
end for
if chk .

Forwarding-Node Selection Algorithm

A forwarding node is a downstream node designated by the current node that will forward the broadcast packet. Forwarding node can be selected based on following constraints. Let LBA (P) and RBA (P) denote the left bulged slice, right bulged slice of P around A respectively.

Fig.1. Left bulged and Right bulged slice around 'A'A forwarding node selection algorithm is called a slice-based selection algorithm if for any node NA, it selects a B-



coverage set of it. We first show that Algorithm 1 can achieve full delivery if it uses any slice- the based algorithm to select the forwarding nodes. We then present an efficient slice-based algorithm that selects 11nodes in the worst case and has computational complexity O (n), where n is the number of neighbour. Algorithm 1: A general sender-based algorithm Algorithm 1 shows the basic structure of our proposed sender-based broadcasting algorithm. Each node schedules a broadcast for a received message if the node is selected by the sender and if it has not scheduled the same message before. Clearly, each message is broadcasting at most by a node. A broadcast schedule can be set at any time. For example, a message can be dropped after the first reception but scheduled for broadcast the second time.

Extract information from the received message M.if M has been scheduled for broadcast or does not contain node's ID then

drop the message

else

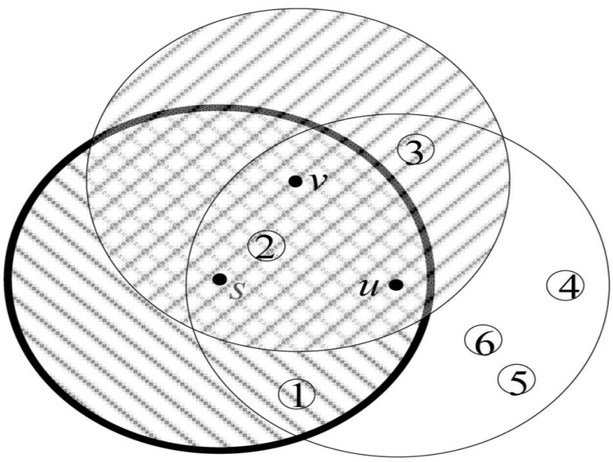
set a defer timer

end if

When defer timer expires. Select a subset of neighbour to forward the message. Attach the list of forwarding node to the message .Schedule a broadcast

Theorem 1: In a collision-free network, Algorithm 1 can achieve full delivery if it uses a slice-based selection algorithm to select the forwarding nodes .Theorem 2: The proposed slice-based selection algorithm will select at most 11 nodes.

C.Forwarding node optimisation



In sender-based broadcasting algorithms each broadcasting node attaches a list of its selected forwarding nodes to the message before broadcasting it. This procedure will increase the bandwidth and power required to broadcast the message. Forward node can get reduce by sorting the neighbour's weight. Node weight can represent the neighbour's battery life time or its distance to NA or the average delay of the node, the level of trust, or a combination of them. Forward node selection algorithm reduces the number of selected forwarding nodes to 11 in the worst case. In this scenario assume that the weight of each node represents its battery lifetime in a wireless network. It may be desirable to select the nodes with a higher battery lifetime to forward the message in order to keep the nodes with a lower battery life time alive. By selecting node with higher battery lifetime to forward message an optimal solution can be obtain.

Theorem 3: The OptFwdNodes algorithm guarantees that all nodes can receive a flooding message. Time complexity of the proposed slice-based selection algorithm is O (n), where n is the number of neighbours Theorem 4: In a collision-free network, Algorithm 2 can false if and only if it finds a neighbour that has not received achieve full delivery if it uses the proposed RBS to the message. determine whether or not to broadcast

.Algorithm3:A general receiver-based algorithm Extract information from the received message M

if M has been received before

then

drop the message

else

set a defer timer

end if

When defer timer expires

decide whether or not to schedule a broadcast

D. Highly Efficient Receiver-Based Broadcasting

Algorithm Receiver-based broadcasting algorithm can significantly reduce redundant broadcasts in the network. The main design challenge of receiver-based broadcasting is to determine whether or not to broadcast a received Fig .3.An Example of RBS Decision message. In receiver-based broadcasting algorithms, the Algorithm 3: Responsibility Based Scheme receiver of the message decides whether or not to broadcast the message. Therefore, a potential advantage

receiver of the message decides whether or not to

broadcast the message. Therefore, a potential advantage of receiver-based broadcasting algorithms over sender-based ones is that they do not increase the size of the message by adding a list of forwarding nodes. A trivial algorithm is to refrain broadcasting if and only if all the neighbours have received the message during

defer period. Although this algorithm is simple to

implement, it has limited effect in reducing the number of redundant broadcasts. Suppose NA's defer time expires at t0. Using the above strategy, node NA will broadcast if some of its neighbours (at least one) have not received the message by t0. However, this broadcast is redundant if all such neighbours receive the message from other nodes after time t0. This scenario typically occurs when t0 is small compared to the maximum defer time. To avoid this responsibility-based scheme it reduces the redundant broadcasts without any changes in the MAC-layer defer-time design.

IV. RESPONSIBILITY-BASED SCHEME

The main idea of RBS algorithm is that a node avoids broadcasting if it is not responsible for any of its neighbours. A node NA is not responsible for a neighbour NB if NB has received the message or if there is another neighbour NC such that NC has received the message and NB is closer to NC than it is to NA . Suppose NA stores IDs of all its neighbours that have broadcast the message during the defer period. When executed by a node NA , Algorithm 5 first uses this information to determine which neighbours have not received the message It then returns false if and only if it finds a neighbour NB that has not received the message and An example of an RBS decision. for any NA 's neighbour NC that has received the message. The output of RBS determines whether or not the broadcast As a result, we have is redundant.

Algorithm . RBS

Input: ListA : List of all neighbours of NA , and ListB : List of broadcasting neighbours

Output: true or false

```
 1: ListC     ListA
 2: for i= 1; i<= length(ListC) ; i++ do
 3: for j = 1; j <=length(ListB) ; j++ do
  4:     if dist(ListC [i]; ListB [j])<= R then
5:  removeElement(ListC 1⁄2i□; ListC )
 6:     break
 7:    end if
 8: end for
 9: end for
10:  ListD=ListA=ListC
11: for (i =1; i,= length(ListC ); i++) do
12: check       true
13: for( j=1; j <=length(ListD); j++) do
      if dist(ListC [i], ListD [j] < dist(ListC [i],NA )
14:then
15:     check     false
16:     break
17:    end if
18: end for
19: if check then
20:    return (false)
21: end if
22: end for 23: return (true)
```

V.CONCLUSION

We have presented an proficient flooding scheme that uses only 1-hop neighbour information. We showed that our proposed forwarding-node selection algorithm results in fewer broadcasts in the network. In the first part, we proposed a forwarding node selection algorithm that selects at most 11 nodes in O (n), this limited number of nodes is an improvement.

VI. ACKNOWLEDGMENTS

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