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Efficient broadcasting in mobile ad HoC networks

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Abstract-The project proposes an efficient sender-based broadcasting algorithm based on 1-hop neighbor information that reduces the time complexity of computing forwarding nodes to O (n Log n). In Liu et al.'s algorithm, n nodes are selected to forward the message in the worst case, whereas in our proposed algorithm, the number of forwarding nodes in the worst case is 11. a simple and highly efficient receiver-based broadcasting algorithm is proposed. When nodes are uniformly distributed, it proves that the probability of two neighbor nodes broadcasting the same message exponentially decreases when the distance between them decreases or when the node density increases.

1.INTRODUCTION

This project presents two efficient broadcasting algorithms based on 1-hop neighbor information. In the first part of the project, sender-based broadcasting algorithms, specifically the algorithm proposed by Liu et al is considered. In their paper, Liu et al. proposed a sender-based broadcasting algorithm that can achieve local optimality by selecting the minimum number of forwarding nodes in the lowest computational time complexity O (n log n), where n is the number of neighbors. Our approach shows that this optimality only holds for a subclass of sender-based algorithms. The project proposes an efficient sender-based broadcasting algorithm based on 1-hop neighbor information that reduces the time complexity of computing forwarding nodes to O (n Log n). In Liu et al.'s algorithm, n nodes are selected to forward the message in the worst case, whereas in our proposed algorithm, the number of forwarding nodes in the worst case is 11. In the second part of the project, a simple and highly efficient receiver-based broadcasting algorithm is proposed. When nodes are uniformly distributed, it proves that the probability of two neighbor nodes broadcasting the same message exponentially decreases when the distance between them decreases or when the node density increases. Using the experimental evaluation, it is confirmed these results show that the number of broadcasts in the proposed receiver-based broadcasting algorithm can be even less than one of the best known approximations for the minimum number of required broadcasts.

2.EXISTING SYSTEM

The sender-based broadcasting algorithms can be divided into two subclasses. In
the first subclass, each node decides whether or not to broadcast solely based on the first received message and drops the rest of the same messages that it receives later. The existing system falls in this subclass and achieves local optimality by
selecting the minimum number of forwarding nodes in the lowest computational time complexity.

DRAWBACKS OF EXISTING SYSTEM

The existing system Liu et al. proposed a sender-based broadcasting algorithm that can achieve local optimality by selecting the minimum number of forwarding nodes in the lowest computational time complexity O (n log n), where n is the number of neighbors.

In the existing Liu et al.'s algorithm, each node may only schedule a broadcast when it receives a message for the first time.

The existing sender-based algorithm results in more broadcasts because it selects all neighbor nodes in the worst case.

NEED FOR PROPOSED SYSTEM

To the best of our knowledge, the general sender and receiver based algorithms used in existing system need some modification such that minimum nodes need to found out to be more efficiently broadcast the information to minimize the overheads. Hence a new system is required to improve the broadcasting mechanism..

3.PROPOSED SYSTEM

In sender-based algorithms, the broadcasting nodes select a subset of their neighbors to forward the message. The proposed compare our proposed broadcasting algorithm to one of the best sender-based broadcasting algorithms that use 1-hop information.

In that system, Liu et al. propose a broadcasting algorithm that reduces the number of broadcasts and achieves local optimality by selecting the minimum number of forwarding nodes with minimum time complexity O (n log n), where n is the number of neighbors.

The proposed system show that this optimality only holds for a subclass of sender-based broadcasting algorithms employing 1-hop information and prove that the proposed sender-based algorithm can achieve full delivery with time complexity O(n).

ADVANTAGES OF PROPOSED SYSTEM

The proposed system has following advantages,

Liu et al.'s algorithm selects n forwarding nodes in the worst case, while our proposed algorithm selects 11 nodes in the worst case.

The new sender-based algorithm results in fewer broadcasts than does Liu et al.'s algorithm.

All these interesting properties are achieved at the cost of a slight increase in end-to-end delay. Thus, the first proposed algorithm is preferred to Liu et al.'s algorithm when the value of n is typically large, and it is important to bound the packet size.

In receiver-based algorithms, the receiver decides whether or not to broadcast the message. The proposed receiver-based algorithm is a novel broadcasting algorithm that can significantly reduce the number of broadcasts in the network. It is shown that using the proposed receiver-based algorithm, two close neighbors are not likely to broadcast the same message.

4.MODULES DESCRIPTION

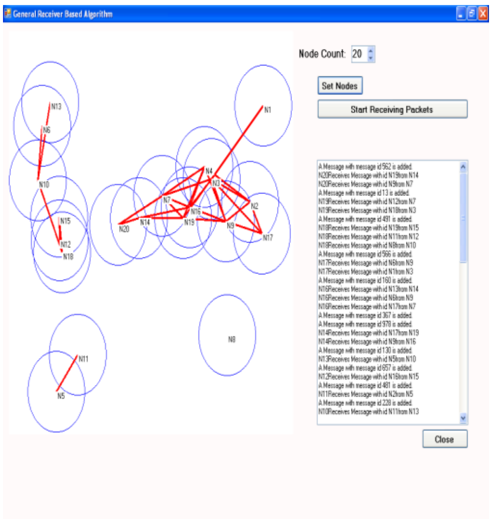
4.1IMPLEMENTATION OF A GENERAL SENDER-BASED ALGORITHM

This module (Algorthim 1) shows the basic structure of our proposed sender-based broadcasting algorithm. As shown in Algorithm 1, 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[5].

In the algorithm each node may only schedule a broadcast when it receives a message for the first time. In contrast, in Algorithm 1, 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. Clearly, the main design issue in Algorithm 1 is how to select the forwarding nodes. This module proves that in a collision-free network, Algorithm 1 can achieve full delivery if it uses a slice-based selection algorithm to select the forwarding nodes.

4.2IMPLEMENTATION OF PROPOSED SLICE-BASED SELECTION ALGORITHM

This module (Algorithm 2) shows the proposed slice-based selection algorithm. Suppose that node N_A uses the proposed algorithm to select the forwarding nodes from its neighbors Let us assume that N_A stores all of its neighbors' IDs and locations in an array of length n, where n is the number of neighbors. The algorithm selects the first node N_{S1} randomly from the array. The first node can also be selected deterministically by, for example, selecting the node that is the farthest away from N_A. Let $LB_A(P)$ and $RB_A(P)$ denote the left bulged slice and right bulged slice of P around A respectively. Suppose that N_{Si} is the last node selected by the algorithm. To select the next node, the algorithm iterates through the array and selects the node N_{Si+1} such that it is inside.

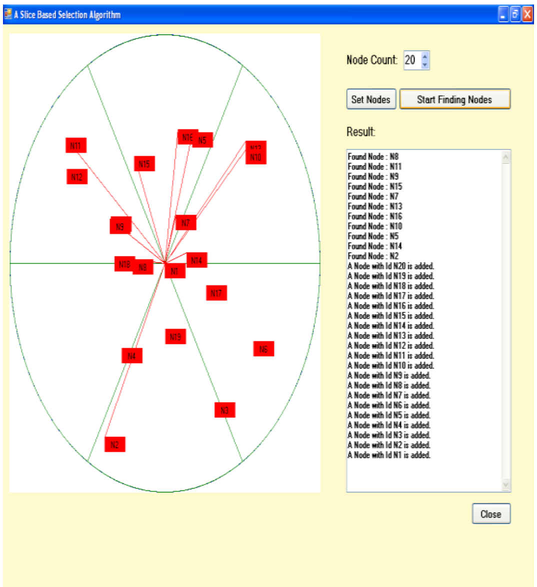


This module proves that the proposed slice-based selection algorithm will select at most 11 nodes.

4.3 IMPLEMENTATION OF A GENERAL RECEIVER-BASED ALGORITHM

This module (Algorithm 3) shows a general approach used in several receiver-based broadcasting algorithms. The proposed receiver-based broadcasting algorithm employs this approach. Clearly, the main design challenge of this algorithm is to determine whether or not to broadcast a received message. A trivial algorithm is to refrain broadcasting if and only if all the neighbors have received the message during the 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 neighbors (at least one) have not received the message by t0. However, this broadcast is redundant if all such neighbors receive the message from other nodes after time t0. This scenario typically occurs when t0 is small compared to the maximum defer time.



4.4IMPLEMENTATION OF A HIGHLY EFFICIENT RECEIVED BASED BROADCASTING ALGORITHM

(Responsibility-Based Scheme)

This module implements the proposed RBS. The main idea of this Algorithm is that a node avoids broadcasting if it is not responsible for any of its neighbors. A node $\mathbf{N_A}$ is not responsible for a neighbor $\mathbf{N_B}$ if $\mathbf{N_B}$ has received the message or if there is another neighbor $\mathbf{N_C}$ such that $\mathbf{N_C}$ has received the message and $\mathbf{N_B}$ is closer to $\mathbf{N_C}$ than it is to $\mathbf{N_A}$. Suppose $\mathbf{N_A}$ stores IDs of all its neighbors that have broadcast the message during the defer period. When executed by a node $\mathbf{N_A}$, The Algorithm first uses this information to determine which neighbors have not received the message. It then returns false if and only if it finds a neighbor $\mathbf{N_B}$ that has not received the message and length of **AB** □□length of **BC**. for any $\mathbf{N_A}$**'s** neighbor $\mathbf{N_C}$ that has received the message[4]. The output of RBS determines whether or not the broadcast is redundant.

This algorithm proves that, each node broadcasts a message at most once. Therefore, broadcasting will eventually terminate. By contradiction, suppose there is at least one node that has not received the message after the broadcasting termination.

5.OBJECTIVES

- To describe how to efficient broadcast the information in ad-hoc network.
- To propose and analyze a new sender and receiver based algorithms which broadcast up to 11 nodes only in worst case scenario.
- To explain the general sender based algorithm and graphically show the broadcasting.
- To explain the general receiver based algorithm.
- To implement the new slice based sender algorithm which finds maximum 11 nodes to broadcast even if more number of nodes in transmission range.
- To implement the new receiver based algorithm which avoids broadcast to neighbor if a node is very nearest to receiver and already received the same message.

6. CONCLUSION AND FURTHER ENHANCEMENTS

6.1CONCLUSION

In the project, an efficient broadcasting algorithm for ad-hoc network using improved mechanism in worst case scenario is developed. In particular, a slice based sender algorithm and RBS based receiver algorithm to address the broadcasting problem is proposed[3]. It proves the correctness of the algorithm and demonstrated the effectiveness. The proposed algorithms provide powerful broadcasting especially when the number of nodes in more in transmission range of sender node.

At present the application works well in network environment. Any node with .Net framework installed can execute the application and process the broadcasting algorithms. The underlying mechanism can be extended to any / all kind of systems and even in multi-platform like Linux, Solaris and more. The system is planned to extend the services can be given as input to IBM architecture also.

The new system eliminates the difficulties in the existing system. It is developed in a user-friendly manner. The system is very fast and any transaction can be viewed or retaken at any level. It reduces the time to analyze the broadcasting algorithm.

6.2SCOPE FOR FURTHER ENHANCEMENTS

In the future, we will study how to utilize the inferred information and extend the framework for efficient and effective broadcasting mechanism.

The new system become useful if the below enhancements are made in future.

- ✓ The application can be web service oriented so that it can be further developed in any platform.
- ✓ The application if developed as web site can be used from anywhere.
- ✓ The algorithm can be further improved so that nodes count is reduced for broadcasting in the worst case.

The new system is designed such that those enhancements can be integrated with current modules easily with less integration work.

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