A DYNAMIC APPROACH TO IMPROVE THE TRANSMISSION EFFICIENCY IN WIRELESS AD HOC NETWORK

S Nivedha[1], S Raghul Krishna[2], T Ramyapriya[3], P Boopathi[4] Asst.Prof.
Department of computer science and engineering
SNS College of Technology
Email id: nivedhasubramanian@gmail.com,boopathypalaniswamy4@gmail.com.

Abstract:-

In this paper the wireless ad hoc network used the Grid lock and dynamic local algorithm for broadcasting. The optimal solution may not be produced in the grid lock method and the topology also not changed. Dynamic local algorithm leads to flooding and it can impose the large number of repeated transmissions. It will also have the poor recognition of forwarding and non-forwarding nodes. We proposed a new dynamic approach it includes the neighbor designating algorithm which is used to select some of its neighbors to forward the message. Only the selected nodes are used to forward the message. The self-pruning algorithm will prunes by itself and it reduces the number of forwarding nodes. The dynamic source routing (DSR) algorithm will checks the path before broadcasting the message and it eliminates the failed nodes. If any failed node in between the path, then it will find the alternate shortest path to broadcast the message. It reduces the flooding and also produces the constant and optimum solutions.

Index Terms: Mobile ad hoc networks, distributed algorithms, broadcasting, connected dominating set, constant approximation.

1 INTRODUCTION

Wireless Ad hoc Networks are a decentralized type of wireless network.[1] The network is ad hoc because it does not rely on a preexisting infrastructure, such as routers in wired networks or access points in managed wireless networks. Instead, each node participates in routing by forwarding data for other nodes, so the determination of which nodes forward data is made dynamically on the basis of network connectivity. In addition to the classic routing, ad hoc networks can use flooding for forwarding the data.

Wireless ad hoc networks have emerged to support applications, in which it is required/desired to have wireless communications among a variety of devices without relying on any infrastructure or central management. In ad hoc networks, wireless devices, simply called nodes, have limited transmission range. Therefore, each node can directly communicate with only those within its transmission range and requires other nodes to act as routers in order to communicate with out-of range destinations.

One of the fundamental operations in wireless ad hoc networks is broadcasting, where a node disseminates a message to all other nodes in the network. This can be achieved through flooding, in which every node transmits the message after receiving it for the first time. However, flooding can impose a large number of redundant transmissions, which can result in significant waste of constrained resources such as bandwidth and power. In general, not every node is required to forward/transmit the message in order to deliver it to all nodes in the network. A set of nodes form a Dominating Set (DS) if every node in the network is either in the set or has a neighbor in the set. A DS is called a Connected Dominating Set (CDS) if the sub graph induced by its nodes is connected. Clearly, the forwarding nodes, together with the source node, form a CDS. On the other hand, any CDS can be used for broadcasting a message. Therefore, the problems of finding the minimum number of required transmissions and finding a Minimum Connected Dominating Set (MCDS) can be reduced to each other. Unfortunately, finding a MCDS was proven to be NP hard even when the whole network topology is known. A desired objective of many efficient broadcast algorithms is to reduce the total number of transmissions to preferably within a constant factor of its optimum. For local algorithms and in the absence of global network topology information, this is commonly believed to be very difficult or impossible.

The existing local broadcast algorithms can be classified based on whether the forwarding nodes are determined Grid locked or dynamically. In the Grid locked approach, the distinguishing feature of local algorithms over other broadcast algorithms is that using local algorithms any local topology changes can affect only the status of those nodes in the vicinity. Connected dominating set are useful in the computation of routing for mobile ad-hoc networks. In this application, a small connected dominating set is used as a backbone for communications, and nodes that are not in this set communicate by passing messages through neighbors that are in the set. The local broadcast algorithms based on the Grid locked approach are not able to guarantee a good approximation factor to the optimum solution.

In the dynamic approach the constructed CDS may vary from one broadcast instance to another even when the whole network topology and the source node remain unchanged. Consequently, the broadcast algorithms based on the dynamic approach typically have small maintenance cost and are expected to be robust against node failures and network topology changes. Many local broadcast algorithms in this category use local neighbor information to reduce the total number of transmissions and to guarantee full delivery (assuming no loss at the MAC/PHY layer).

The neighbor-information-based broadcast algorithms in this category can be further classified as neighbor-designating and self-pruning algorithms. In neighbor-designating algorithms, each forwarding node selects some of its local neighbors to forward the message. Only the selected nodes are then required to forward the message in the next step. In self-pruning algorithms, on the other hand, each node decides by itself whether or not to forward a message. The decision is made based on a self-pruning condition. In particular, using our proposed algorithm, each broadcasting node selects at most one of its neighbors to forward the message. If a node is not selected to forward, it has to decide, on its own, whether or not to forward the message.

2 SYSTEM MODELING

System modeling is extremely important in system design and development, since it gives an idea of how the system would perform if actually implemented. With modeling, the parameters of the system can be changed, tested, and analyzed... It is important to note that too many assumptions would simplify the modeling but may lead to an inaccurate representation of the system. Traditionally, there are two modeling approaches: analytical approach and Simulation approach.

The general concept of analytical modeling approach is to first come up with a way to describe a system mathematically with the help of applied mathematical tools such as queuing and probability theories, and then apply numerical methods to gain insight from the developed mathematical model. When the system is simple and relatively small, analytical modeling would be preferable (over simulation). In this case, the model tends to be mathematically tractable. The numerical solutions to this model in effect require lightweight computational efforts. If properly employed, analytical modeling can be cost-effective and can provide an abstract view of the components interacting with one another in the system. However, if many simplifying assumptions on the system are made during the modeling process, analytical models may not give an accurate representation of the real system.

Simulation is widely-used in system modeling for applications ranging from engineering research, business analysis, manufacturing planning, and biological science experimentation, just to name a few. Compared to analytical modeling, simulation usually requires less abstraction in the model (i.e., fewer simplifying assumptions) since almost every possible detail of the specifications of the system can be put into the simulation model to best describe the actual system. When the system is rather large and complex, a straightforward mathematical formulation may not be feasible. In this case, the simulation approach is usually preferred to the analytical approach. In common with analytical modeling, simulation modeling may leave out some details, since too much detail may result in an unmanageable simulation and substantial computation effort. It is important to carefully consider a measure under consideration and not to include irrelevant detail into the simulation. In the next section, we describe the basic concepts of simulation in more detail with particular emphasis on simulation of a computer network.

3 EXSISTING SYSTEM: BROADCAST USING THE GRID LOCK APPROACH

Broadcast using the grid lock approach includes the status of each node is does not depends on that of other nodes. Therefore, any changes in the topology can affect the nodes in vicinity. In designing local broadcast algorithms, we are looking for status functions that not only guarantee constructing a CDS but also ensure that the constructed CDS has small size, preferably within a constant factor of the optimum. We show that no such status function exists. The idea is to find a graph in which any status function fails either in constructing a CDS or finding a CDS whose size is smaller than ðNÞ, where N is the total number of nodes in the network.

The disadvantage of Broadcast using grid locked approach includes that it will use only the fixed routing, it cause flooding which impose the large number of repeated transmission of messages, it leads to collision .This broadcasting is only applicable to the small distance transmission. Dynamic Local broadcasting in which it includes the poor recognition of forwarding and non forwarding nodes, in this broadcasting if there is any node failure in the middle of the transmission then it will drop the message rather than transmitting in the alternate path.

4 PROPOSED SYSTEM: BROADCASTING USING THE DYNAMIC APPROACH

The dynamic approach in which status of each node is determined “on the fly” as the broadcasting message propagates in the network. By using the neighbor-information-based broadcast algorithms in this it can be further classified as neighbor-designating and self-pruning algorithms. In neighbor-designating algorithms, each forwarding node selects some of its local neighbors to forward the message. Only the selected nodes are then required to broadcast the message in the next step. Self pruning algorithm is used to stop the replicated transmission of message. Dynamic source routing algorithm in which it will check the path before broadcasting the message, because it will check node failure problem .it also checks node whether it already received the broadcast request or not. If the node already received the request means it will prunes the nodes and find the alternate node to broadcast the message. In the proposed system the modules are Flooding Transmission, Position Observation, Dynamic broadcasting, Minimize the Redundant Transmission.

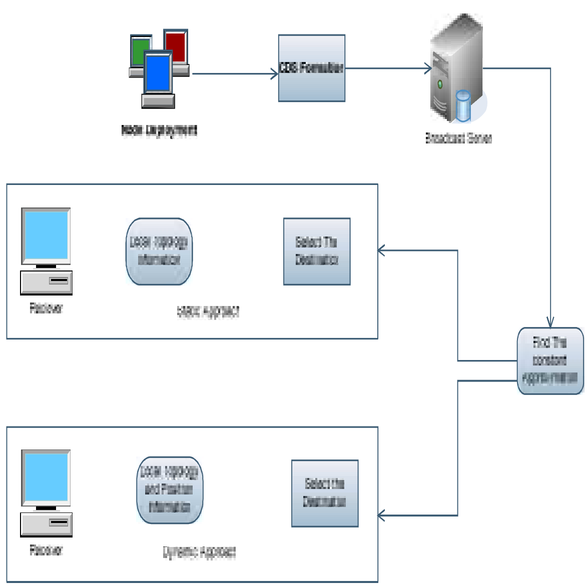


Fig.1. System Architecture Diagram

4.1 Flooding Transmission

Flooding transmission is used to construct a network as flooding network for making a redundant transmission. In Flooding network each node acts as both a transmitter and a receiver and each node tries to forward every message to every one of its neighbors except the source node. This results in every message eventually being delivered to all reachable parts of the network. Since flooding naturally utilizes every path through the network, it will also use the shortest path.

4.2 Position Observation

The approach of network partitioning to use geographical information has been used for different purposes including saving energy in sensor networks, and handling mobility in broadcast algorithms for ad hoc networks. To save energy, at each time, the algorithm selects one node in each cell as active and puts other nodes in the cell to sleep. We observed that position information can simplify the problem of reducing the total number of broadcasting nodes using this module

4.3 Dynamic Broadcasting

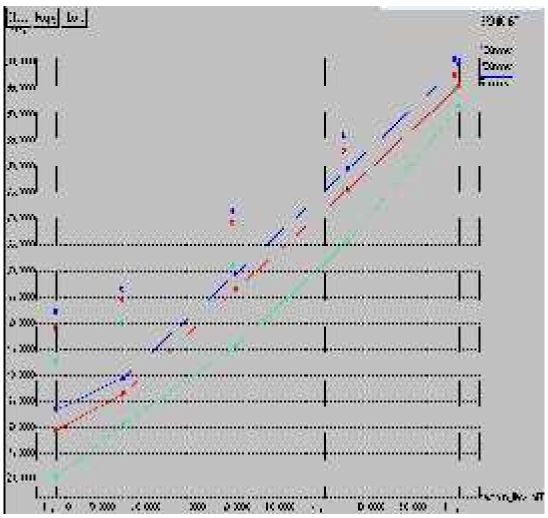
The proposed broadcast algorithm guarantees full delivery as well as a constant approximation to the optimum solution irrespective of the forwarding node selection criteria and the random delay in the MAC layer. The proposed algorithm uses position information in order to design a strong self-pruning condition. It uses the shortest path to broadcast the message to receiver. It also robust against the node failures.

4.4 Minimize the Redundant Transmission

This module proves that the proposed broadcast algorithm guarantees that the total number of transmissions is always within a constant factor of the minimum number of required ones. Because this algorithm use t he shortest path for broadcasting. In this module only the selected nodes are required to broadcast the message. It reduces the redundancy of message transmission and also save the energy to transmit the message.

5 EXPERIMENTAL RESULTS

We implemented the proposed algorithm in the network simulator ns-2 and evaluated the ratio of broadcasting nodes and end-to-end delay for each algorithm. Then piggybacks the list of the selected nodes in the message before broadcasting it. Upon receiving a message for the first time, a node schedules a broadcast if and only if it is selected to forward; otherwise, it never broadcasts the message. Flooding can be costly in terms of wasted bandwidth. In general, not every node is required to forward/transmit the message in order to deliver it to all nodes in the network.



6. CONCLUSION

In this paper we discussed the capabilities of dynamic algorithm in reducing the total number of broadcasting nodes. It was shown that having the position information can greatly simplify the problem of reducing the total number of nodes to broadcast the message and it also leads to the full delivery of the packets. This dynamic approach will use the shortest path and also leads to the full delivery of packets. And also have the good recognition of forwarding and non-forwarding nodes.it reduces the redundant transmission of message and increase the broadcast efficiency.

REFERENCES

[1] M. Garey and D. Johnson,Computers and intractability: A Guide to the theory of NP-completeness.W.H Freeman&Co., 1990.

[2] B. Clark, C. Colbourn, and D. Johnson, “ Unit disk graphs”Discrete math .,vol 86.pp 165-175,1990

[3] J. Wu and F. Dai, “Broadcasting in Ad Hoc Networks Based on Self-Pruning,” Proc. IEEE INFOCOM, pp. 2240-2250, 2003.

[4] Wu and W. Lou, “Forward-Node-Set-Based Broadcast in Clustered Mobile Ad Hoc Networks,” Wireless Comm. and Mobile Computing, vol. 3, no. 2, pp. 155-173, 2003.

[5] J. Wu and F. Dai, “A Generic Distributed Broadcast Scheme in Ad Hoc Wireless Networks,” IEEE Trans. Computers, vol. 53, no. 10, pp. 1343-1354, Oct. 2004.

[6] S. Ni, Y. Tseng, Y. Chen, and J. Sheu, “The Broadcast Storm Problem in a Mobile Ad Hoc Network,” Proc. ACM MobiCom,pp. 151-162, 1999.

[7] Z. Haas, J. Halpern, and L. Li, “Gossip-Based Ad Hoc Routing,” Proc. IEEE INFOCOM, pp. 1707-1716, 2002.

[8] H. Liu, P. Wan, X. Jia, X. Liu, and F. Yao, “Efficient Flooding Scheme Based on 1-Hop Information in Mobile Ad Hoc Networks,” Proc.IEEE INFOCOM, 2006.

[9] J. Wu, W. Lou, and F. Dai, “Extended Multipoint Relays to Determine Connected dominating Sets in Manets,” IEEE Trans. Computers, vol. 55, no. 3, pp. 334-347, Mar. 2006.

[10]M. Khabbazian and V.K. Bhargava, “Efficient Broadcasting in Mobile Ad Hoc Networks,” IEEE Trans. Mobile. Computing, vol. 8, no. 2, pp. 231-245, Feb. 2009 .

