



An Efficient Technique for Data Propagation in Network Broadcasting

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Abstract — Due to the rapid growth in information technology especially in the area of network lot of innovation has happened. It plays a vital role in every field of human life and mainly for the communication propose. In this research work we propose a model for efficient message transmission. In the existing system the message communication takes place only by the server. It leads to collision of message; scheduling, processing time makes the entire process more complexity. In order to overcome the drawback in the existing system. We propose a novel methodology SSB of implementing sub servers to reduce the work of main server. Also, we used two efficient algorithms Sender Based Algorithm for sending the message to server or node and Receiver Based Algorithm is receiving the message from server or node. In the proposed SSB model the message from the server received by the sub server then it schedule and find the neighbor node to send the message efficiently in this proper destination. The proposed model is typically used in the broadcasting of message to all nodes within the short period of time with any error.

Keywords — Sender Receiver Based Algorithm (SRB), Efficient and Dynamic Probabilistic Broadcasting (EDPB), On Demand Multicast Routing Protocol (ODMRP), Responsibility-Based Scheme (RBS).

I. INTRODUCTION

Broadcasting is a process of transferring a message to all recipients simultaneously. Broadcasting can be performed as a high level operation in a program, for example broadcasting Message Passing Interface, or it may be a low level networking operation, for example broadcasting on Ethernet.

Computer networking, broadcasting refers to transmitting a packet that will be received by every device on the network. In practice, the scope of the broadcast is limited to a broadcast domain. Broadcast a message is in contrast to unicast addressing in which a host sends datagrams to another single host identified by a unique IP address. Network technologies support broadcast addressing; for example, neither X.25 nor frame relay have broadcast capability, nor is there any form of Internet-wide broadcast. Broadcasting is largely confined to local area network (LAN) technologies, most notably Ethernet and token ring, where the performance impact of broadcasting is not as large as it would be in a wide area network.

The successor to Internet Protocol Version 4 (IPv4), IPv6 also does not implement the broadcast method, so as to prevent disturbing all nodes in a network when only a few may be interested in a particular service. Instead it relies on multicast addressing a conceptually similar one-to-many routing methodology. However, multicasting limits the pool of receivers to those that join a specific multicast receiver group.

Both Ethernet and IPv4 use an all-ones broadcast address to indicate a broadcast packet. Token Ring uses a special value in the IEEE 802.2 control field. Broadcasting may be abused to perform a DoS attack. The attacker sends fake ping request with the source IP-address of the victim computer. The victim computer is flooded by the replies from all computers in the domain.

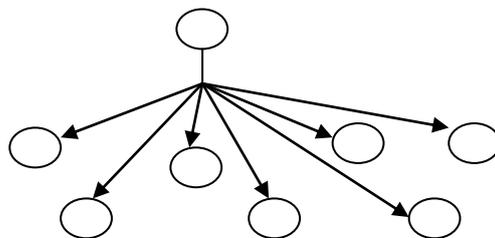


Fig.1.1 Broadcast

II. LITERATURE SURVEY

Imran Ali Khan et al [01] has been improved an cover angle-based broadcasting algorithms is proposed for Mobile Adhoc Networks (MANETs) to minimize redundancy, contention and collision known as broadcast storm problem in the literature. The propose technique uses only cover angle concept for rebroadcast decision without using neighbors knowledge

information's or complex calculations. Through the analyses and extensive simulations, the results reveal the improve cover angle-based broadcasting algorithm exhibits superior performance in term of both delivery ratio and number of retransmission. The propose technique is fully distributed, simple and can be easily implemented in MANETs.

Ravindra Vaishampayan et al [02] presented a Protocol for Multicasting Over Directional Antennas (MODA) for mobile ad hoc networks (MANET). MODA is the first protocol for MANET's that uses directional antennas to reduce data packet overhead. Without increasing energy consumption, MODA increases the range of transmission as a result of which fewer nodes are involved in the forwarding process, which results in a reduction in data packet overhead. Using simulations in Qualnet 3.5, MODA compared with PUMA and ODMRP. The results from a wide range of scenarios of varying mobility, group members, number of senders, traffic load, and number of multicast groups show that MODA attains comparable packet delivery ratios to ODMRP and PUMA, while incurring far less overhead.

Intae Kang and Radha PoovendranI et al [03] has been addressed by the problem of energy efficient multicast routing in wireless Mobile Adhoc Network (MANET). It is a challenging environment because every node operates on limited battery resources and multi hop routing paths are used over a constantly changing network environment due to node mobility. Sheng-Hsuan Hsu et al [04] proposed a reliable MAC protocol with multicast support for multi-channel ad-hoc networks. This protocol, named SNMS (Sequenced Neighbor with Multicast Support), uses sender-based data transmission strategy in order to provide efficient multicast. Reliable multicast support at the MAC (medium access control) layer will be of great benefit to the routing function, multicast applications and cluster maintenance in adhoc networks.

Cai and Lu et al [05] proposed a MAC protocol, termed SNDR (Sequenced Neighbor Double Reservation), for multi-channel ad-hoc networks. SNDR uses the neighbor sequenced method to avoid contentions and the double reservation method to improve the total throughput of ad-hoc networks. Multicast has attracted considerable interest in ad-hoc networks. Usually, the multicast problem is resolved at the network layer. These approaches are utilized above MAC protocols. To relieve this problem, utilization of multiple channels is one approach.

Tang and Gerla [06] proposed a reliable broadcast MAC protocol based on IEEE 802.11. However, the proposed protocol was available on the signal-channel model. In this paper, we propose a reliable MAC protocol, named SNMS (Sequenced Neighbor Multicast Support), can support reliable multicast for multi-channel ad-hoc networks. On the multi-channel model, SNMS can avoid hidden terminal problem and exposed terminal problem. In addition, the mobile hosts will not be interfered while their neighbors are sending or receiving the multicast packets. SNMS can make use of broadcast nature of wireless medium efficiently and still broadcast reliably. Simulation results show that, in the multicast scenario, SNMS delivers a significant improvement over SNDR.

T.Purusothaman et al [07] Adhoc network, a self-organizing wireless network is made up of mobile nodes, each node act as relay for providing data communication. The topology of the Ad-hoc Networks changes often and needs large and frequent exchange of data among the network nodes for efficient routing. Existing routing protocols are Distance vector method and Link state routing protocols. The location information of the Adhoc network nodes are broadcasted within the transmission range. The enemy can receive the location information. of the nodes.

P.Chenna et al [08] the comprehensive performance analysis of the routing protocols using ns2 simulator considering all the metrics as suggested by RFC 2501. Results indicate reactive routing protocols are more

Uyen Trang Nguyen et al [09] proposed a Rate-Adaptive Multicast (RAM) routing protocol for mobile ad-hoc networks (MANETs) that is multi rate aware. During the process of path discovery, the quality of wireless links is estimated to suggest optimal transmission rates, which are then used to calculate the total transmission time incurred by the mobile nodes on a path. Among several considered paths from a source to a destination, RAM selects the path with the lost total transmission time. Simulation results have shown that RAM outperforms single-rate multicast in terms of packet delivery ratio, packet end-to-end delay, and throughput of the multicast group. RAM is applied to effectively support video multicast in MANETs.

L M Patnaik & Thriveni J et al [10] have proposed an algorithm called Enhanced Double Covered Broadcast with Negative acknowledgements (EDCBN) which focuses on achieving high delivery ratio in an environment that has high transmission error rate. Broadcasting in Ad hoc networks is prone to broadcast storm problem and ACK implosion problem. These problems create the necessity to carefully designate some nodes in the 1-hop neighborhood of sender as forwarding nodes and reduce broadcast redundancy.

II. METHODOLOGY

3.1. EDPB

The probabilistic scheme is one of the alternative approaches to simple flooding that aims to reduce redundancy through rebroadcast timing control in an attempt to alleviate the broadcast storm problem. In this scheme, when receiving a broadcast message for the first time, a node rebroadcasts the message with a pre-determined probability p so that every node has the same probability to rebroadcast the message, regardless of its number of neighbors.

In dense networks, multiple nodes share similar transmission ranges. Therefore, these probabilities control the frequency of rebroadcasts and thus might save network resources without affecting delivery ratios. Note that in sparse networks there is much less shared coverage; thus some nodes will not receive all the broadcast packets unless the probability parameter is high.

On the other hand, if p is set to a far larger value, many redundant rebroadcasts will be generated. The need for dynamic adjustment, thus, rises. The rebroadcast probability should be set high at the hosts in sparser areas and low at the hosts in denser areas. This proposed method for density estimation requires mobile hosts to periodically exchange messages

between neighbors to construct a 1-hop neighbour list at each host. A high number of neighbours imply that the host is in a dense area, whilst a low number of neighbors imply that the host is situated in a sparser area.

Rebroadcast probability can be increased if the value of the number of neighbours is too low (or similarly if the current node is located in a sparse neighbourhood), which indirectly causes the probability at neighbouring hosts to be incremented. Similarly, the rebroadcast probabilities can be decreased, if the value of number of neighbours is too high. This kind of adaptation causes a dynamic stability between rebroadcast probabilities and the number of neighbours among neighbouring hosts.

A brief outline of the EDPB algorithm is presented in algorithm and operates as follows. On hearing a broadcast message m at node X , the node rebroadcasts a message according to a high probability if the message is received for the first time, and the number of neighbours of node X is less than average number of neighbours typical of its surrounding environment. Hence, if node X has a low degree (in terms of the number of neighbours), retransmission should be likely. Otherwise, if X has a high degree its rebroadcast probability is set low.

EDPB algorithm is a combination of the probabilistic and knowledge based approaches. It dynamically adjusts the re-broadcast probability p at each mobile host according to the value of the local number of neighbours. The value of p changes when the host moves to a different neighborhood.

In a sparser area, the rebroadcast probability is larger and in denser area, the probability is lower. Compared with the probabilistic approach where p is fixed, EDPB algorithm achieves higher saved rebroadcast. Also, the decision to rebroadcast is made immediately after receiving a packet in our algorithm without any delay.

EDPB Algorithm

```

STEP 1: If packet  $m$  received for the first time then
    // On hearing a broadcast packet  $m$  at node  $X$  //
STEP 2:      If  $n < n_{bar}$  then
    Node  $X$  has a low degree
    Set high rebroadcast probability  $p=p_1$ ;
    Else Node  $X$  has a high degree
    Set low rebroadcast probability= $p_2$ ;
    Endif
    // Get degree  $n$  of node  $X$  (no. of neighbours of node  $X$ ) //
STEP 3: If  $RN \leq p$ 
    then rebroadcast the received message;
    else drop the message
    end if
    // Get the broadcast ID from the message:  $n_{bar}$ , average number of neighbour (threshold) //
    
```

3.2. RBS MODEL

A novel receiver based broadcasting algorithm that can significantly reduce redundant broadcasts in the network. As mentioned earlier, in receiver-based broadcasting algorithms, the 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.

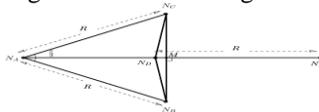


Fig 1.2 Counter Example for $\alpha = \pi/3$

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 N 's defer time expires at t_0 . Using the above strategy, node N_A will broadcast if some of its neighbors (at least one) have not received the message by t_0 . However, this broadcast is redundant if all such neighbors receive the message from other nodes after time t_0 . This scenario typically occurs when t_0 is small compared to the maximum defer time. In the next section, we introduce a responsibility-based scheme (RBS) that further reduces the redundant broadcasts without any changes in the MAC-layer defer-time design.

RBS Algorithm

```

STEP 1: Extract information from the received
    message  $M$ 
    // whether or not broadcast received
    message//
STEP 2: 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
// To identify any changes in MAC layer
defer time //
```

3.3 ODMRP MODEL

ODMRP is a mesh based rather than conventional tree based scheme and uses a forwarding group concept. The drawbacks in maintaining multicast trees in adhoc network are frequent tree reconfiguration and non-shortest path in a shared tree. In ODMRP, group membership and multicast routes are established by the source on demand when a multicast source has packets to send, but no route to the multicast group, it broadcasts Join-Query control packets to the entire network. This control packet is periodically broadcast to refresh the membership information and updates routes.

3.4. PROPOSED SRB MODEL

The proposed broadcasting algorithm is a sender based algorithm, 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 is a general sender-based broadcasting algorithm and indicates the structure of our proposed sender-based broadcasting algorithm. 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 during the MAC-layer delay due to receiving other copies of the message. This chance is not negligible when the delay in the MAC layer is comparable to the average value of the timer set in the broadcasting algorithm. As stated one solution to this problem is a cross-layer design in which the network layer is given the ability to modify or remove packets that are present in the MAC-layer queue. This solution allows the broadcasting algorithms to perform close to their ideal performance even for very small average timer values. The MAC-layer delay is negligible compared to the average delay set by the algorithm or the network layer is able to modify or remove packets buffered in the MAC-layer queue.

The sender-based broadcasting algorithms can be divided into two subclasses. In the first subclass, each node decides whether or not to broadcast solely base on the first received message and drops the rest of the same messages that it receives later.

3.5 Proposed SRB Model Algorithm

STEP 1: Sending message to server by using Sender based algorithm.

STEP 2: Scheduling to sub server through neighborhood node.

```
If M scheduled
then drop the message.
//Scheduling and distributing the message to server//
```

STEP 3: Receiving message to sub server using RBS algorithm.

STEP 4: Finding neighborhood node

```
for i=1 to n
if node found= true
    A(i) = neighbor node
else
node found= false
//Select a subset attach the neighbors node//
repeat;
```

STEP 5: if M has been received before then

```
drop the m
else
go to step1 until no more message to send
// whether message received by n//
```

The proposed methodology describes sending a message to server using server based algorithm also it defines scheduling and distributing the message to server through the sub server by receiver based algorithm. To find a neighborhood node for scheduling and broadcasting to sub server to receive a message by nodes.

IV. PERFORMANCE EVALUATION

The proposed SSB model result obtained for the parameters and simulation time, bandwidth, packet size number of nodes and transmission range for the existing system and proposed system are as tabulated below,

PARAMETER	EDPB	RMS MODEL	ODMRP MODEL	PROPOSED SRB MODEL
Simulation Time	600 Sec	540 Sec	200 Sec	175 Sec
Bandwidth	2 Mbps	2 Mb/Sec	2 Mbps	2 Mbps
Packed Size	512 bytes	256 Bytes	512 Bytes	512 bytes
No. of nodes	25-100	25-1000	15-60	25-2000
Transmission Range	25-250 meter	50-300 Meter	50-300	50-500

Performance Evaluation of SRB Model

From the above table 1.1 the simulation time of our proposed SRB models proves 175 sec in which the existing ODMRD method takes 200-600 sec. Such that used the maximum number of nodes in the range 25-2000 in which the other model contains 25-1000 the maximum. The transmission time also is high in the proposed model. The performance evaluation of pictorial presented below.

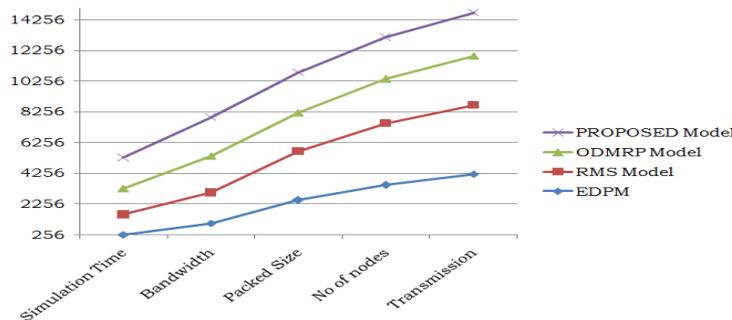


Fig 1.3 Comparison Graph for SSB with Existing Model

V. CONCLUSION

We propose a novel SRB model for forwarding message to the nodes using sub servers. The methodology detail explains the various methodologies which are presently used to solve this message forwarding issues. The various types of algorithm send based algorithm to send messages, receiver based RBS algorithm which is used to receive message. This issues in the exist or present methods were overcome with our proposed method for message transmission. The proposed method is compared with the existing EDPB model, RBS model and ODMRP model. The proposed SRB method is more efficient than the existing. The proposed methodology the message is send to the main server using sender based algorithm and the server receive the message and scheduled to transmit to the relevant sub servers. The sub server used in our methodology is reducing the complexity of the server in scheduling and sending message to the corresponding node. It is reduced by the sub server and the sub server shares the task and forward the message to the particular Id and also collision transmission time was reduced.

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