International Journal of Emerging Research in Management &Technology ISSN: 2278-9359 (Volume-4, Issue-8)

Research Article | **August 2015**

Controlled Parameters of Wireless Community Radio Algorithms

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Abstract-

A village level community radio is an application based on ad hoc networks. Community radio comprises of basic mobile phone network, in which users can communicate with each other by the exchange of data. Spectators can generate and distribute audio data to other users of the community radio exchange. Document emphasises on the proper route network with better algorithm of communication. This document study proposes an algorithm for the communication which is tested and compared with other existing algorithms. Every algorithm has its own advantages and disadvantages with certain precincts. Usually, assessment is done with EABA and SBA algorithms of message. Hence according to the result we found algorithm has successfully reduced the latency and jitter in the broadcast for voice- quality of the audio content transferred over community radio network.

Keywords- Manet, mobility models, broadcasting algorithms.

I. INTRODUCTION

Mobile Ad-hoc network (MANET) is a assortment of nodes which are linked through a wireless medium making abrupt decisions for the node transformations. We need to give handful sets for the network infrastructure and the dynamic nature of these networks demands new set of networking strategies to be implemented and research is progressing. Constant growing in communication with wireless devices field because of its high computing speed and a number of additional features have been added while a considerable shrink in weight and size.

Mobile ad hoc networks (MANETs) symbolize compound circulated systems which include wireless mobile nodes which can liberally and enthusiastically self-organize into uninformed and transitory. We make devices and people allowed to effortlessly connect in areas where no communication infrastructure exists, e.g., disaster recovery. MANETs are easily available due to their affordability as they consists of basic, affordable mobile phones and are shows potential future as a promising alternative to create local telephony without requiring phone towers. We can make the arrangements for the better community radios deployed. Community radio has seen as a commanding means for empowerment by enabling local content creation and means of communication [4]. Most important and working layer of manet is broadcasting.

MOBILITY MODELS FOR MANETs

A mobility model is designed to describe the movements of various nodes in the network with their location, velocity and acceleration. Proper mobility modelling is central to the authentication of an investigation there are two categories of mobility models.

Models representing independent nodes (Random Models).

- **Models representing dependent nodes.**

To model nodes mobility, as per independent node assumption of this work, random models are created. Very randomly used models are random way point model and random walk model.

A. Random Walk Model:

Random walk model is based on Einstein description. It is based on the assumption that most objects in this nature moves in irregular pattern. Node in random walk method moves to a random position from its present position with random speed in random direction. The speed is chosen randomly from a given range (V_{min},V_{max}) [1]. Random walk method is memory-less model devoid of any information on previous movements.

B. Random Way Point Model:

In this model a pause time is added to the procedure of Random Walk Model [KOS05]. It is a widely used model. NS-2 provides support for scenario generation using this model.

II. BROADCASTING ALGORITHMS

A. Scalable Broadcasting Algorithm

The main idea of SBA broadcast algorithm is that a node need not rebroadcast a message if all its neighbors have been covered by previous transmissions. To achieve this, a node should gather the local topology knowledge and the photocopy data. The broadcast algorithm can be divided into two parts: local neighborhood discovery and data broadcasting for the network of the community. In radio community of the villages' Local neighborhood discovery is

trivial as it can be fulfilled by any existing techniques. For example, nodes can exchange "hello" messages periodically with their neighbors. By including the neighbor information in "hello" messages. A transmitter of a broadcast message is either the source or a node that performs rebroadcast. When a node receives a broadcast message, we assume that itcan check from where the information is transmitted. This is done to collect information that which nodes have been covered by this transmission by checking the neighbor list of the transmitter. Then these nodes (including the transmitter) are added into the broadcast cover set of the note. After every step performed, the respective node neighbors are in the position, after that the rebroadcast operation is unnecessary and can be cancelled.
The SBA protocol works as follows: every node maintains a partial network map of all nodes within a two-hop radius of the node. Then "hello messages" are generated. Assume a node (say N1) receive a broadcast message *b* from node N0. There after N0 can give all common neighbours between itself and N0 which would have already received *b* from N0. If there are additional neighbors of N1 which were not covered by N0 then *b* would be scheduled for a rebroadcast after a small delay called the RAD (Random Assessment Delay).because of the presence of the RADno other duplicity of b can be done also N1 determines wether we can reach any new node in the broadcast with different route. If some neighbors of N1 have not yet received *b* by the end of the RAD then the message is rebroadcast.

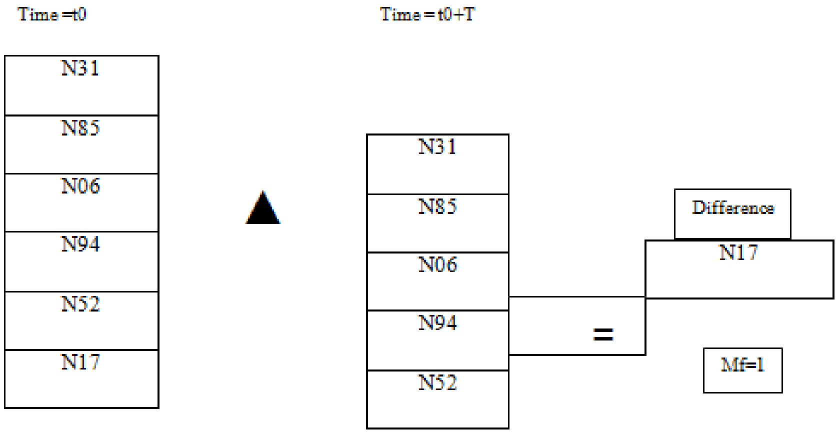
B. Environs Aware Broadcasting Algorithm
Environs Aware Broadcasting Algorithm (EABA), gives the facility for the two modes which a node can telecast: SBA or MaBA, depending on the mobility in the network and position of the message in the different levels of streams in broadcasting. EABA gives four complementary strategies which are deployed at each node

1. Mobility detection
2. Adapting the frequency of hello messages
3. Maintaining and using the node's recent history of broadcasting behavior
4. Deciding which mode to switch to: SBA or MaBa.

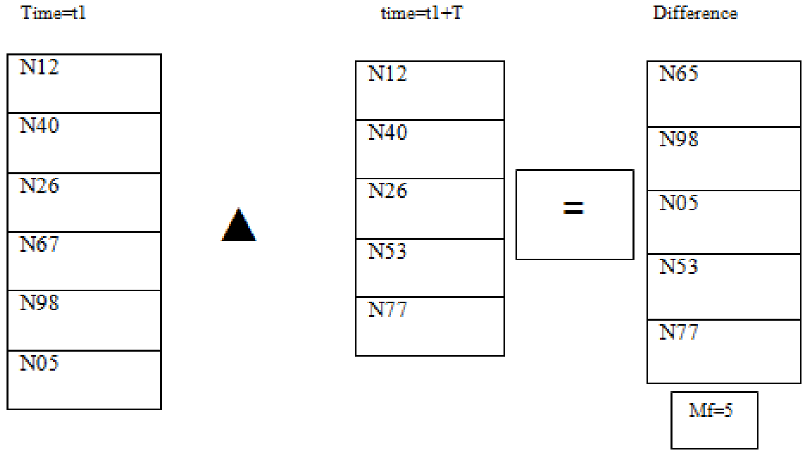
We now describe each strategy:

- **Mobility Detection:**

A node has to modify its behavior depending on the degree of mobility inside the system, initial question for network that arise for these connections is, set of connected nodes mobility is detected for different sets? Here mobility of a node is measured by the mobility factor (mf), which gives the wider view of the mobility or dynamicity in the network. Second question arises how mobility factor is intended. A nodes mf is evaluated by keeping track of changes to its neighbor table - the intuition being that rapid changes in the neighbor table of a node indicates a rapidly changing network topology and hence a high extent in the network for the mobility of the connections made. In these sets of connected network also provides a stable neighbor table indicate that the network is static or at the very least, that locally there is relative stability in the system. By comparative stability, we mean that a group of nodes could all move in the same direction at the similar speed. In equally scenarios ,supreme static network and relative stability of a node, a node can control the fact that it does not need to re-discover its neighbourhood and the same broadcast paths discovered earlier can be re-used .
The mobility factor (mf) at each node is calculated T seconds for each node; this is done by evaluating the respectively present neighbor table, with the zerox of the same table which was recorded at T seconds before the present neighbour. Though the nearby neighbours for the two versions of the table provide very economical view and residual nodes gives us the value of mf.
Mathematically: mf (Node1,t+T) = Neighbors(Node1,t+T)UNeighbors(Node1,t) - Neighbors(Node1,t+T) ∩ Neighbors(Node1, t)
where, mf (n, t) = mobility factor of node n at time t
Neighbors (n, t) = set of neighbors in the neighbor table of node n at time t.
in between any two time periods if mf=0 then the network is stable there. Network is said to be dynamic if the value of the mf is greater than the desired.



(a) Semi- static network



(b) Dynamic Network
Figure: calculation for mobility factor

Additions to a neighbor table happen whenever an unknown node's hello message is attained at the node of arrangement for the set of connections. According to these set of connections cyclic pattern deletions from the neighbour table is done according to the process mentioned in the paragraph below for the working of the connections made. At this time period when a new message is collected at the receiver, it is stored in the memory. In memory short tables of neighbour tables an update is done for every R seconds with values by providing the given check of algorithms for every node: if the difference in the current time and the last heard time of the connections made is more, then the connections time interval R, the node entrance is deleted from the set of connections of nodes for the bench made for sets. In these connections the rate of R must be twice or thrice the value of the hello message in the connections made for different algorithms by attained time. These set of connections provides node and by this it is ensured that node is only deleted if it has not been from for at-least two or three hello cycle of the connections made in the table. By these connections made in the table any fake deletion of the node in set in neighbour table is minimized caused by packet drops due to congestion in the network or collision made in the node during the route followed. In the connections of the EABA the presence of hello messages in the connection communication (*f*) sent out by a node is dynamically adapted to the amount of mobility around the node. Since *R* (refresh rate of neighbor table) is linked in the connections with f, which gives the command for the distortion of R.

Working of frequency for hello messages:
SBA needs periodic hello messages so that nodes can decipher there topology in the set of connections about their limitation. Connections also give them the freedom to create a noteworthy overhead in terms of utilization of connections in the network for different sets. These sets tell that effectiveness in connections for these hello messages is inadequate as the neighbor tables will not change frequently, therefore network can be static or semi static in the sets. sTherefore, for these connections made we find out that hello message frequency is strongly based on the mobility factor (mf) of the node connections. In these connections with sets of nodes a hello message is sent every 1 second for neighbouring connections. These connections have a mobility factor ≥ M, where M represents the threshold value of the node connections. In these connections as the mf decreases, mobility is increased by:
If mf ≥ M then Hello message interval= 1 second
Else Hello message interval = M-*mf*
Where mf is the mobility factor and M is the threshold mobility factor of node connections. In thesre connections Formula used to calculate R for set of node is:
If mf ≥ M then R = M
Else R = 2M – mf
good probability is given by the formula that broadcast interval for refresh is at-least twice the hello message interval and steadily increases as network stability increases.

How nodes behavior affects its history record:
In set of connections made each node maintains a recent history of its broadcasting behavior in the set, and then these connections uses that in MaBA of the set to influence its current broadcasting decision in the connections made by nodes. If connections made by nodes uses SBA, In SBA each node maintains 2-hop knowledge of its neighbors. In addition to this, in EABA each node maintains the following additional field for *each* node in its neighbor table - a list of the last *x* broadcasting in set make decisions, in these connections made by nodes says 0 denotes 'not broadcasting' and 1 denotes 'broadcasting' of the data in the connections. For example: let node B receives a broadcast data packet from node A, and using some algorithm (note that the algorithm could be SBA or MaBA depending on conditions described in the next subsection of the set), decides in the set to drop the packet for the connection transmission. In history of these sets neighbour table A is marked as 0 for other connections of the nodes made. Let x = 5, which mean last five broadcast decisions of B (when the source was A) are stored in the memory.

Neighbor	History
A	10010
D	11111
F	01100

Figure: Neighbor table for B in the set of connections of node

In the above figure, the five bits for A denote the five most recent broadcasting decisions of B; when the packet was collected from memory location of A. Due to this behaviour B rebroadcast twice and will dropped the packet for three times for rebroadcasting in the connections made. In these sets broadcasting of data and history is maintained for each node in the neighbor table for the purpose of connection transmission of the sets. In sets a node gets notification for the receiving of packets of data which firstly will decide which algorithm to be used for the broadcasting i.e. SBA or maBA of the connections of node made. In these sets after broadcasting all this operations if it decides to use MaBA operation, it will try to check the recorded history for that particular source node and uses the following algorithm to decide whether to broadcast or not in the set of connections made. We use the following notation for the history: N (i) where N is the source node from where the packet has been received and N (i) denotes the i th recorded history, where i ranges from 1 to x. In figure, let us suppose the range of A be: 1 to 5 and A(1) = 1 and A(5) = 0 respectively. Now we should be remembering that A(5) is the most recent history.
Now for taking the broadcasting decision we will use below mentioned algorithm:
If N(x) = 1 or sum (N(1) , …., (N(x-1)) > x/2) then broadcast packet otherwise drop the packet from the queue. This algorithm provides the user with ease that instead of relying only on one instance of past behaviour of the node checked for transmission, we will check the history that if the node has been broadcasting often in the recent past behaviour of the node from the history table. All this will us to operate in more conservative manner to decide for the algorithm, which errors on the side of more nodes broadcasting.

- **Deciding the mode: SBA or MaBA**:

Finally, we describe how a node decides between SBA or MaBa as the broadcasting algorithm sets of connections. In these sets according to our proposed algorithm a node will decide to use SBA, if the network check is dynamic. MaBA algorthim is used when the network is seen to be static or semi-static in condition. To gain mobility of the network another factor used to determine if a node uses SBA or MaBA. Recall, that for our application of the deciding factor of the broadcasting we chose a stream of messages will be emitted from the same source, for a short to medium duration of time (a typical sound-cast could last from 2 to 7 minutes of time period in the network). After this a new stream of messages will start out from a new source of the network used for broadcasting, nodes in the network will not have any memory functions to store all new set of routes from the new source to every node in the network. The memory which stores all the previous behaviour of a node is informed. Therefore we propose to give all nodes a chance to discovery a good set of routes using a neighbor-knowledge algorithm (like SBA) for each new stream.

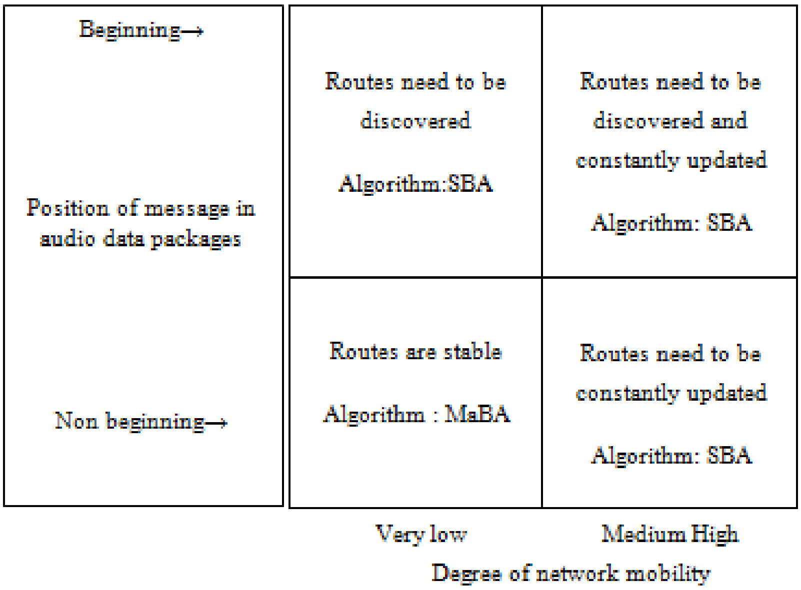


Figure: node behaviour for different set of connections

Hence, we have to give all nodes a chance to discovery a good set of routes using a neighbor-knowledge algorithm (like SBA) for each new stream. Hence, even if the network is professed as static in stes, connections of a node should use SBA for the first m messages in a stream and then switch to MaBA for the rest of that stream for different connections. In these connections, the 2*2 matrix covers the four possible situations and recommended node behavior.

- **Performance of EABA**:

Performance in the form of jitter, efficiency, latency, packet overhead and reachability loss for the checked and proposed algorithm in context with the EABA:

1. **Reachability:** EABA has reachability of about and nearby of 90% as studied which The reachability of SBA and SBA-mob is provides the fact that about 90% of the network nodes produces sound or audio for the transmission. But in comparison to it flood technique has little lower reachability.
2. **Efficiency:** EABA has a higher efficiency from other broadcasting algorithm like SBA, SBA- Mob algorithms checked from the other given information [7].
3. **Packet overhead:** Significantly lower packet overhead
4. **Jitter:** Jitter is substantially less for EABA. EABA manages to keep jitter in check because of two primary features of its mechanism.
5. **Latency:** Reduce latency in the audio- stream.
6. **Packet Loss:** Packet loss is sufficiently low.

With our proposed algorithm for the broadcast we conclude that jitter and latency are produced less in the audio-stream in comparison to SBA and its variants, while maintaining similar levels of reachability, efficiency and packet delivery in the network wide broadcast.

III. RESULT

A. Latency:

Our Method and EABA exhibits far lower latency (around 23 ms) than both SBA and SBA-mob which are close to 70 ms in the sets .in connections the primary cause of latency for SBA and SBA-mob is the RAD component. Figure shows latency for the various broadcast algorithms

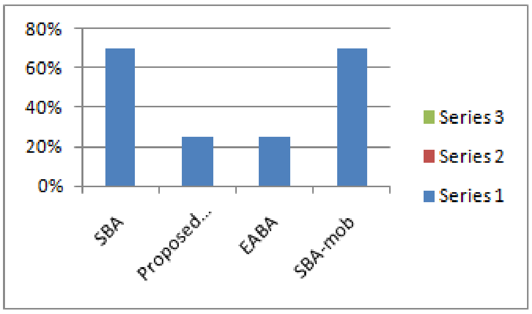


Figure: our proposed method latency

B. Jitter:

Jitter is substantially less for our method and for EABA. When SBA and SBA-mob are operated in different sets, connections of few nodes have high values of jitter (75 ms) according to attained parameters of the previously worked numbers. EABA according to our algorithms experiences a maximum of 15 ms of jitter in the proposed algorithm of our network, which is well within acceptable limits we have generated. According to the study of other works read on internet, values upto 30 ms are considered tolerable for VoIP data as most audio-codec's are capable of handing some amount of jitter [27].

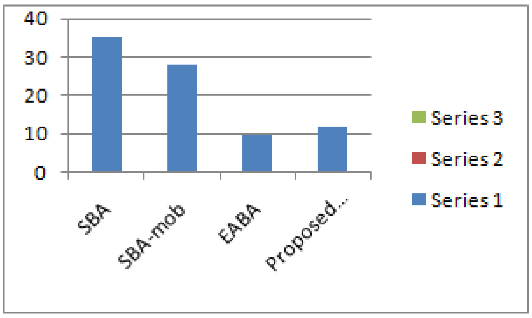


Figure: our proposed method jitter

IV. CONCLUSION

Community radio has been seen as a powerful medium not only for broadcasting information but also for empowerment via the creation and dissemination of local areas data [3]. We want the conventional message infrastructure in remote and facility deprived regions of our communities, we suggest looking at alternative approaches that might be easier to deploy and more inexpensive according to the economic situations. MANETS (mobile ad-hoc networks) comprise entirely of low-cost phone sets provide an affordable and simple substitute. We think about a truly helpful and genuine service, where users of the radio services are also the transmitters of the service messages without any controlling unit on the content to be broadcasted. To attain this we done study of various existing broadcasting algorithms in manet. We have addressed important issues related to existing broadcast algorithms for community radio facility. So, we have planned an efficient communications algorithm for effective community radio service on ad-hoc device to device mobile network.

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