



node maintains a counter to keep track of duplicate packets; it also inserts a small random delay before broadcasting the packet which causes the timing of the broadcasting be differentiated. This not only allows nodes sufficient time to receive redundant packets but also prevents collision. In distance based schemes, the relative distance between the source and destination node is used to make the broadcasting decision. According to position based schemes, each node must have the means to establish its own position in order to estimate the additional coverage more precisely. This scheme can be supported by the global positioning system (GPS). In topology based broadcast schemes the topological information is used take broadcast decision. It is categorized into Neighbor Knowledge Based Scheme and Cluster Based Scheme. Neighbor knowledge based schemes makes use of neighboring information to make decision of broadcast. In a cluster-based scheme, the network is partitioned into several groups of clusters. Each group has a Cluster Head (CH) with gateways nodes responsible of rebroadcasting the message and select forwarding nodes on behalf of the cluster. Apart from these traditional schemes, there are hybrid schemes which combine the advantages of two or more different broadcast schemes in order to introduce an optimal broadcasting to suppress the broadcast storm problem.

As network topology in MANETs is highly dynamic due to node mobility which often resulted in frequent changes in the node distribution in this network. In Improving the Performance of Probabilistic Flooding in MANET [5], the forwarding probability used for the dissemination of broadcast packets should be set dynamically to reflect the local neighborhood information of a given node.

An Efficient Counter-Based Broadcast Scheme [6] suggested efficient probabilistic schemes for MANETs that combine the features of fixed probability and counter-based scheme in order to mitigate the broadcast storm problem deleterious effects without sacrificing reach ability (i.e. the ratio of nodes that can receive a broadcast packet). The use of single fixed forwarding probability for all nodes in the network regardless of whether the node is in sparse or dense region of the network has make it inflexible in a typical MANET scenario where regions of varying node density co-exist in the same network.

The aim of An Adjusted Probabilistic Counter-based Broadcast Scheme [7] is to significantly reduce the broadcast redundancy without sacrificing network reach ability for a given network topology by dynamically adjusting the forwarding probability at a node according to the counter value of the given node.

The main finding of A New Adaptive Broadcasting Approach [8] is to find an effective solution on Broadcast Storm Problem by adjusting the forwarding probability P

based on the global and local neighborhood information and thus reducing dependency on using thresholds to determine the degree level of density for a given node. Many of routing protocols operate efficiently under low network mobility conditions and do not adapt well with high mobility conditions. Therefore, considering mobility is a demanding task that should be performed efficiently and accurately.

Mobility aware Velocity based Broadcasting Scheme [9] eliminates many redundant broadcasts by choosing the nodes with low mobility to discover a more stable path. Thus avoiding the frequent link breakages associated with using unstable paths that contain high mobile nodes.

New Velocity Aware Probabilistic Route Discovery Scheme [10] considers the velocity vector probabilistic route discover in MANETs. The study proposed a high broadcast probability for RNs, while a low value is assigned for U-RNs. Thus it implicitly helps in establishing the most stable routes and excluding most unstable routes. Also the have improved it adding dynamic counter and timer concepts to the mobility aware probabilistic scheme.

Hybrid Broadcasting Scheme [11] aims to reduce the overheads in mobile networks using an adaptive probabilistic flooding scheme based on neighbor knowledge and a forwarding zone criterion. The term „expansion metric“ (defined below), which differentiates the density of nodes in different areas of the deployed scenario is defined to measure the neighborhood information. In addition, a forwarding zone criterion has been defined to control the forwarding probability. The forwarding zone criterion has two major objectives, i.e. to reduce the control messages due to broken links, and to detect the dissimilarity among the forwarding nodes and select the most dissimilar nodes. The forwarding zone is implemented using a nodes positioning information. This information can be obtained from a Global Positioning System (GPS) or using Received Signal Strength (RSS).

### 3. MOTIVATION

Due to the dynamic nature of MANET, there are many problem occurred during the packet transmission. Basic routing protocols such as Ad hoc on Demand Distance Vector (AODV), Dynamic source routing (DSR) could lead to issues such as Broadcast Storm Problem, link failure due to mobility. The topology of MANET is often random and dynamic with varying degree of node density in various regions of the network. The network may contain sparse and dense regions. A node is characterized as the sparse node if degree of node is less than the average number of neighbors. Therefore there is less shared coverage. Accordingly, sparse node needs higher chance to broadcast than dense node. Hence the threshold is always very low in sparse region to achieve reach ability. The optimum threshold can be either 1,2 or 3. In the sparse

region there is much less shared coverage since there are very few nodes acting as intermediate nodes. If these intermediate nodes are too unstable then there is possibility of link failure which causes decrease in reach ability. Accordingly, sparse unstable node needs lower chance to broadcast than sparse stable node. As given in figure (1), if node 5 is unstable and sparse, optimum threshold can be set to 2 or 3 and node 6 is stable and sparse, optimum threshold can be set to 1.

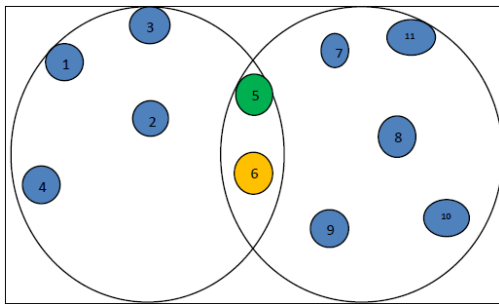


Fig -1: Topology showing Stable & Unstable nodes

A node is characterized as the dense node if degree of node is greater than the average number of neighbors. In dense region there is more shared coverage. If a dense node is stable then there is more possibility of getting the same packet again & again. Also Mobility of node doesn't have considerable effect on breakage of link. Accordingly, dense stable node needs lesser chance to broadcast than dense unstable node. Hence the threshold should be always very high if node is dense stable node to achieve considerable broadcast savings. The optimum threshold can be 1 2 4 3 7 8 10 0 6 11 9 5 either 4 or 5. Accordingly, dense stable node needs lower chance to broadcast than dense unstable node. As given in figure (1), if node 5 is unstable and dense, optimum threshold can be set to 4 and node 6 is stable and dense, optimum threshold can be set to 5. Therefore this research study aims in further refining the sparse and dense threshold based on the speed of the nodes.

#### 4. MOBILITY AWARE REFINED COUNTER BASED BROADCASTING MODEL

On hearing a broadcast packet at node N for the first time, it does not immediately broadcast the packet. It waits for Random assessment delay (RAD). It finds the degree of N that is the number of neighbors of node N. If the degree of node N is less than the average number of neighbors then it characterizes current node N as a sparse node, then it finds the speed of sparse node. If the speed of N is less than the speed threshold (That means Current Node is stable node), then it assigns low sparse threshold value to give more chance to broadcast packet. Otherwise, if speed of N is more than the speed threshold (That means Current Node is unstable node), then it assigns high sparse threshold value to give less chance to broadcast packet. If the degree of node N is greater than or equal to the

average number of neighbors, it characterizes current node N as a dense node, then it finds the speed of dense node, If the speed of N is less than the speed threshold (That means Current Node is stable node), then it assigns high dense threshold value to give less chance to broadcast packet. Otherwise, if speed of N is more than the speed threshold (That means Current Node is unstable node), then it assigns low dense threshold value to give more chance to broadcast packet. During RAD, the counter is counting the number of repeated packets received. When the RAD expires, if counter c is less than the counter threshold, the packet is broad-casted. Otherwise the packet is dropped.

#### 4.1 Steps for Taking Decision of Transmission

The decision of transmission is carried out in following steps:

Step 1 The average number of nodes can be computed using the equation.

$$\bar{n} = \frac{(N-1) * 0.8 * R * R * \Pi}{A}$$

A

Equation 1

Step 2 The degree of a node can be defined as the total number of neighboring nodes as shown in figure (2)

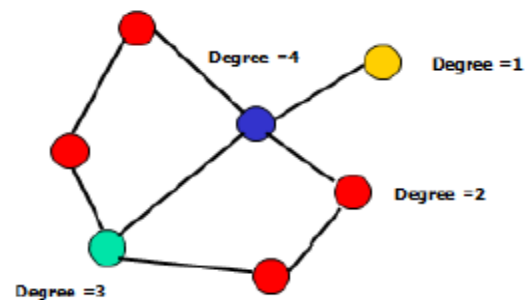


Fig -2: Computation of degree of nodes

Step 3 Based on the information obtained from step1 and step2, a decision of nodes neighborhood (sparse or dense) is made.

Step 4 If the speed of sparse node is less than the speed threshold, then it assigns low sparse threshold value. Otherwise, if speed of sparse node is more than the speed threshold, then it assigns high sparse threshold value. If the speed of dense node is less than the speed threshold, then it assigns high dense threshold value. Otherwise, if speed of dense node is more than the speed threshold, then it assigns low dense threshold value.

#### 5. CONCLUSION

The proposed Mobility Aware Refined Counter Based Broadcasting Model in mobile ad hoc networks (MANETs) is devised to address the issues like Broadcast Storm Problem, Large power consumption, link failure due to mobility. The model determines the counter threshold by considering the network density and the speed of node. Mobility Aware Refined Counter Based Broadcasting

