CHAPTER 2

LITERATURE SURVEY

2.1 INTRODUCTION

Mobile Ad Hoc Networks (MANETs) are a collection of autonomous mobile hosts without the help of the center base stations. Broadcasting is a fundamental service in Mobile Ad Hoc Networks. Most of the research has made efforts to improve the performance of throughput.

This chapter formally makes about the literature survey and it is briefly discussed based on the following

2. Cluster Based Methods for Broadcasting for the Mobile Ad Hoc Networks.

2.2 BROADCASTING METHODS

Sze-Yao Ni et al (1999) have identified the broadcast storm problem and proposed five schemes namely Probabilistic, Counter Based, Distance based, Location Based and Cluster based scheme to reduce the redundant rebroadcasts and the authors have carried out the simulation work using C++ to compare their schemes with flooding approach. As compared with flooding, a simple counter based scheme can eliminate many redundant rebroadcasts when the host distribution is dense. If the location information is available through
devices such as GPS receivers, the location based scheme is the best choice to eliminate many redundant rebroadcasts.

Wei Peng and Xi-Cheng Lu (2000) have proposed an efficient approach called topology and statistical information about the duplicate broadcast to avoid unnecessary rebroadcasts and the authors have carried out the simulation work using NS 2 simulator to compare the performance of their approach with flooding technique and proved that this approach can reduce the broadcast redundancy efficiently. Normally, about 60% of the duplicate messages can be saved compared with that of flooding and it takes only about 30% of the broadcast cost to deliver the messages to 97% of the receivers.

Wei Lou and Jie Wu (2002) have proposed two better approximation algorithms namely total dominant pruning and partial dominant pruning to reduce the redundant transmissions and the authors have carried out the simulation work to compare the original dominant pruning with the proposed scheme. These algorithms ensure a high broadcast delivery rate when the host movement ranges from slow to moderate.

Brad Williams and Tracy Camp (2002) have presented the comparison of the broadcasting Techniques for MANETs. Simple flooding, counter based scheme, location based scheme, scalable broadcast algorithm (SBA) and Ad hoc Broadcast Protocol (AHBP) were chosen for comparison. The authors have carried out the simulation work using NS 2 simulator to evaluate the performance of the rebroadcast. The Ad hoc Broadcast Protocol (AHBP) provides better results compared with other schemes.
Jie Wu and Fei Dai Wu (2004) have proposed a mobility management method based on the use of two transmission ranges (short and long) to ensure full coverage and the authors have carried out the simulation work using NS 2 simulator to evaluate the coverage of the proposed scheme. These methods achieve a good balance between the delivery ratio and broadcast redundancy by adjusting the values of the transmission range based on the network mobility level.

Wei Lou and Jie Wu (2007) have proposed a simple broadcast algorithm called double covered broadcast (DCB) to improve the delivery ratio in an environment that has high transmission error rate and the authors have carried out the simulation work using NS 2 simulator to improve delivery ratio in MANET. This algorithm provides good performance under a high transmission error rate environment.

Lijuan Cao et al (2007) have identified the different types of energy efficient Ad hoc routing protocols such as, Minimum Total Transmission Power Routing(MTPR), Conditional Max-Min Battery Capacity routing(CMMBCR), Minimum Battery Cost routing(MBCR), Max-Min Battery Cost routing(MMBCR), Time Delay On demand routing(TDOD), Request Delay Routing Protocol(RDRP), and Minimum Drain Rate(MDR). The authors have carried out the simulation work using NS 2 simulator to evaluate the performance for energy consumption. MTPR is a better choice to minimize the energy cost and Energy consumption when compared with other protocols.

Jun Peng et al (2007) have proposed new wireless MAC protocol capable of collision detection for improving the node throughput and the authors have carried out simulation work using NS 2 simulator to compare the proposed protocol with the existing ones. This protocol achieves an outstanding throughput gains in ad hoc networks with hidden terminals.
Shadi Saleh Basurra et al (2010) have proposed a zone based routing protocol with a parallel collision guidance broadcasting (ZCG) for MANET to reduce the redundant rebroadcast and the authors have carried out the simulation work using OPNET to compare the ZCG with AODV protocol. The ZCG routing protocol has less redundant rebroadcasts compared with the AODV protocol.

Demetres Kouvatsos and Is-Haka Mkwawa (2011) have presented a tutorial on an overview of the broadcasting methods in the mobile ad hoc networks. The authors have classified the broadcasting methods into two types, namely probabilistic and deterministic based methods. The probabilistic methods are divided into distance based, location based and counter based. The deterministic methods are divided into five types; they are self pruning, scalable broadcasting, ad hoc broadcasting, cluster based and simple flooding. This tutorial has offered an overview on all the major broadcasting methods.

2.3 CLUSTER BASED BROADCASTING

Wei Lou and Jie Wu (2002) have proposed the Efficient Broadcast with a forward node set (EBFNS) protocol for broadcasting in Clustered MANET. Each cluster head computes its forward node set that connects its adjacent cluster heads. They compared the number of forward nodes with the existing clustering algorithms such as Core broadcast (CB) Minimum Connected Dominating Set (MCDS), Partial Dominating set (PDS), Lowest ID (LID), and Highest Node Degree (HD) through the simulator NS2 and proved that EBFNS protocol makes the broadcast more efficient. This EBFNS is a better choice to reduce the total number forward nodes for broadcasting in Clustered MANET.

Sajal Das et al (2002) have proposed the weighted clustering algorithm (WCA) for the election of the cluster for routing. Four parameters
are considered for the selection of the cluster, namely node degree of connectivity, mobility, transmission power and battery power. WCA has shown better performance than all the previous algorithms though it has a demerit in knowing the weights of all the nodes before starting the selection process of the cluster.

Wei Lou and Jie Wu (2003) have proposed the cluster based backbone infrastructure for broadcasting in MANET to reduce the broadcast redundancy and the authors have carried out the simulation work using NS 2 simulator to compare both the static and dynamic backbone infrastructure. Clusters are formed based on Connected Dominating Set (CDS). The dynamic backbone infrastructure on demand is a better choice for reducing the broadcast redundancy.

Yuanaanzhu Peter Chen et al (2004) have identified the different types of clustering algorithms, concentrating on those that are based on the graph domination. The clustering algorithms are clustering with the independent dominating sets, clustering with dominating sets, clustering with connected dominating sets, clustering with weakly connected dominating sets and clustering by methods other than graph domination. These clustering algorithms can be used to build virtual backbones to enhance the network quality of the service.

Wang Jin et al (2005) have proposed two clustering algorithms called an improved weighted clustering algorithm and Genetic Annealing based clustering Algorithm (GACA) to perform the topology management and energy conservation in the wireless ad hoc networks. The performance comparison is made in the aspect of average cluster number, topology stability, load balancing and network life time through simulation. These two algorithms have better performance on average.
Mohammad Rezaee and Mohammad Hossien Yaghmaee (2008) have proposed a new clustering protocol for MANET to create minimum cluster with the maximum member nodes in each cluster and the authors have carried out the simulation work using NS 2 simulator to compare the proposed algorithm with Weighted Cluster Algorithm (WCA) for cluster formation. This algorithm provides a better performance in terms of the number of formed clusters and average number of transition (state change) on cluster head compared with WCA.

Seyes-Amin Hosseini-Seno et al (2009) have proposed an energy efficient cluster based routing protocol for MANETs to increase the life time and decrease the energy consumption. The authors have carried out the simulation work using NS2 simulator to evaluate the energy consumption in the sending, receiving, idle and sleep modes of the operation. This protocol helps maximize the lifetime, stability, connectivity and saving energy by 2000mw in sleep mode.

Anita and Sebastian (2009) have proposed the Scenario Based Clustering Algorithm for MANET for the selection of the cluster head and gateway nodes. The authors have carried out the simulation work using NS 2 simulator to evaluate the performance for the proposed cluster network. SCAM uses techniques to maintain the cluster structure as stable as possible with less control messages.

Ha Dang and Hongyi Wu (2010) have proposed a Cluster based routing protocol for Delay Tolerant Mobile Networks to reduce overhead and end to end delay and the authors have carried out the simulation work using NS 2 simulator to evaluate the efficiency of the proposed Cluster based routing protocol. This protocol achieves a higher delivery ratio and significantly lower overhead and end to end delay compared with its non clustering counterpart.
Naveen Chauhan et al (2011) have proposed a distributed weighted cluster based routing protocol for MANETs to reduce the cluster head formation, control messages over head and energy utilization. The authors have carried out simulation work using Omnet++ simulator to compare the proposed protocol with the existing distributed weighted clustering algorithms. This protocol provides better results than the existing distributed clustering algorithms.

2.4 PROPOSED APPROACHES

The building of One Hop Dynamic Cluster Network converts a dense network to a simple one reducing the communication overhead of the whole network. The cluster structure is a simple infrastructure having only cluster head, gateway and members. The network structure is partitioned into a group of clusters, each cluster having one cluster head that dominates all other members in the cluster. Gateways are those non cluster head nodes that have at least one neighbor that belongs to other clusters.

The major contributions of this research are:

1. The study and Selection of Medium Access Control (MAC) protocol.
2. The investigation of constructing 3node dynamic cluster.
3. The investigation of a dynamic cluster routing protocol.

In this research, the MANET is partitioned into a group of one hop clusters. One hop cluster network consisting of one cluster head (lowest ID) and one gateway (forwarding node) and members (simple nodes). In the proposed Dynamic Cluster Routing Protocol (DCRP), the cluster is formed dynamically by means of the transmission range. The selection of the cluster head is based on the node connectivity, mobility and transmission range. In this
method, the gateway node forwards packets from one cluster network to another cluster when the transmission range is exceeded.

2.5 SUMMARY

Most of the existing works on broadcasting in MANET have focused on the performance measure of throughput. Even though throughput performance measure is important, other metrics such as Collision, Energy and Power Consumption, and End to End Delay are equally important for the broadcasting.

So far, there has been no research on performance analysis for the broadcasting metrics such as Collision, Energy and Power Consumption, End to End Delay and Throughput for Clustered MANETs.

From the literature review, it is observed that there are different types of broadcasting methods and cluster formation (using connected dominating set and weight calculation method). Most of the research on broadcasting is through static cluster methods, but there is none on dynamic cluster formation based on the transmission range for reducing collision. As the dynamic topology goes on changing, there is scope for investigating dynamic cluster in MANET.