AN ENHANCED ENERGY AWARE FEATURE SELECTION METHOD FOR SELFISH NODE DETECTION IN MANET

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ABSTRACT

Mobile ad-hoc networks are one of the most rapidly developing networks and they are used by most of the applications because of support for mobility and infrastructure less characteristics. Mobility has advantages and disadvantages. Data loss occurs in these networks because of mobility. Nodes move to another network in the middle of a transaction and the receiving nodes wait for the response from the sender and this causes delay in the network or unavailability of data. In order to avoid this delay in accessing the data in mobile networks data is replicated collaboratively in all nodes. Various algorithms are proposed in literature to replicate data among the nodes even with a concern on available battery power. In addition to the algorithms proposed for replication of data based on Access Frequency or popularity and available battery power over a path, we are considering replication of data that are more frequently updated and also with data of variable sizes compared to the previous approaches proposed in the literature. The proposed methodology offers a set of options that can be selected so that the desired objective for the underlying network can be achieved such as, allocation time, memory usage for replication, life time of a node, replication of large of volume of data block, replication with maximum throughput etc. It also considers the update frequency of data to propagate the updates to the peer nodes. A balance between availability of data and lifetime of a node with a facility to propagate the updates to the other nodes are the objectives of this paper.

KEY WORDS: ***Battery Power, Update Frequency***

I. INTRODUCTION

A mobile ad hoc networks (MANETs) are one of the fastest evolving networks because of its dynamic route discovering techniques. Communication for data sharing is done based on paths that are discovered dynamically using routing table of the node. Even though they are having disadvantages like operating at limited broadcast range and the nodes having minimum battery power still they are widely used in applications because of its collaborative nature in communication. MANETs do not have any infrastructure because of self-configuring nature, and these networks are multi-hop in nature. Mobile computing paradigm have evolved due to advancements from radio communication. In MANETs communication between nodes of different range of frequencies is free.If source and destination nodes are present in different locations data packets are forwarded by using other nodes in their network. Each mobile node is capable of finding the route between source and destination. As MANETs are infrastructure-less, so these networks are used in military and other fields where establishing the infrastructure is difficult. Nodes in MANETs are mobile in nature, they move frequently fromone network to the other which causes network partitions. Nodes that are participating in sharing data with other nodes may move to other network. When these nodes move to some other network causing incomplete transactions and receiving nodes keep on waiting for the data which causes performance degradation of network. In order to avoid such problems data is replicated collaboratively in all the nodes. Various algorithms are proposed to replicate the data items in mobile nodes.[1][2][3][4][5][6][7].some of them discussed about DREAM, CADRE, CLEAR, Expanding Ring Replications, DHTR, HARA's data replication schemes and ECOREP. In DREAM, data items are replicated more number of times, this problem is avoided in CADRE. In CLEAR, cluster heads are introduced to avoid the problems of load and data sizes, replica consistency and user scheduling.

II. EXISTING SYSTEM

In order to increase the network performance data items are replicated in all mobile node servers. But in real time all the nodes are not completely co-operative because of their selfishness nature [1], which may cause performance degradation. In order to avoid this problem with selfish nodes data is replicated in non-selfish

nodes [1]. Various algorithms have been introduced for replication. Each of them deals either with replication, replication with energy aware [3] and consistency management [6] during replication.

III. PROPOSED SYSTEM

In general Ad-hoc networks are established in places where establishing infrastructure is difficult such as disaster management, rescue operations, military operations and video conferencing etc. While offering easy to establish feature, ad-hoc network suffers from various constraints such Computational power of participating nodes such as size of memory, processor, battery power and range of communication etc. In addition to the challenges in the computational power, they face frequent network partition when a node from one network moves to another network as it is the basic characteristics of Mobile ad-hoc networks.

Several measures have been considered to optimize the performance of mobile ad-hoc networks, Replication is a technique that places the same data on several nodes of a network. It is performed to improve the availability of data. Since the nodes in a network often moves from one network to the other it causes the unavailability of data. In order to improve availability, data can be replicated on several other nodes. In case when a node that holds some data is not available, that data can be accessed from other node where it is replicated so that availability of data can be increased.

Replication improves availability at the cost of redundancy and it significantly increases the maintenance overhead of the system. Several techniques have been proposed in the literature to replicate data in distributed and Mobile ad-hoc network. [1][2][3][4][5][6][7][8].

A node that participates in replication are characterised by various parameters such as following.

1. Size of memory available.
2. Amount of memory availed for replication by each node.
3. Size of data unit i.e. variable sized data or fixed size data
4. Number of data units to be replicated in the network
5. Number of data to be replicated on a node
6. Access frequency of data by each node
7. Dissipation power of a node
8. Remaining battery power of a node.
9. Mobility rate of node

A Mobile ad-hoc network depending upon the locality or purpose of its deployment may seek any of the following as its characteristics.

1. Mobile nodes with faster data access
2. Mobile nodes with higher data availability
3. Network with longer node availability [Lesser node mobility]
4. Network with longer node availability [based on remaining battery power]
5. Network with frequent data update and update propagation
6. Network with higher data availability ,longer node life time, frequent data update and update propagation [all of above]

Based on the node specific features listed above any of the desired network characteristics can be achieved as stated above. The replication technique has to be varied to achieve any of the desired characteristics .But the complexity of replication algorithm increases as the demand for network increases. We propose a Replication technique that works on the specified node parameters to offer any of the network characteristics as an option. In

this paper we have illustrated the basic functionalities of the proposed algorithm and the descriptions of the same is provided.

We have considered the architecture proposed in [1] which determines the selfish and non-selfish nodes within the MANET and allocates data according to the measured selfish feature to improve the availability and efficiency with reduction in the communication cost in presence of selfish nodes. We have also considered the architecture proposed in [3] and [6] in order to deal with the remaining battery power measurement and consistency management.

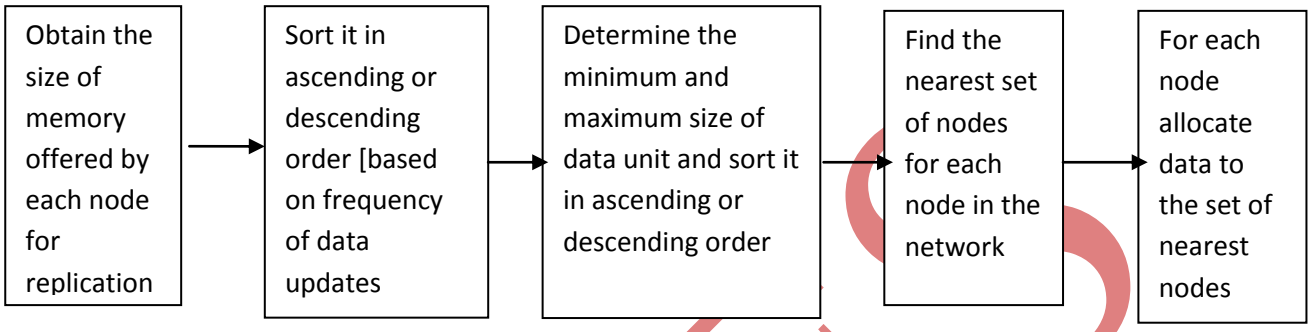

Fig 3.1 Replicating data of different sizes to achieve faster data access in the network [Characteristics 1]

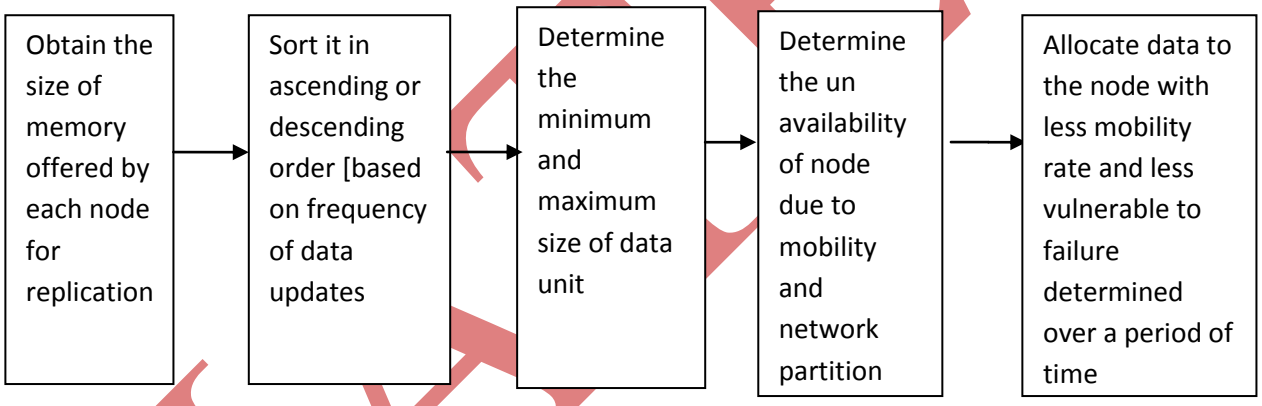

Fig 3.2 Replicating data of different sizes to achieve higher data availability in the network [Characteristics 2]

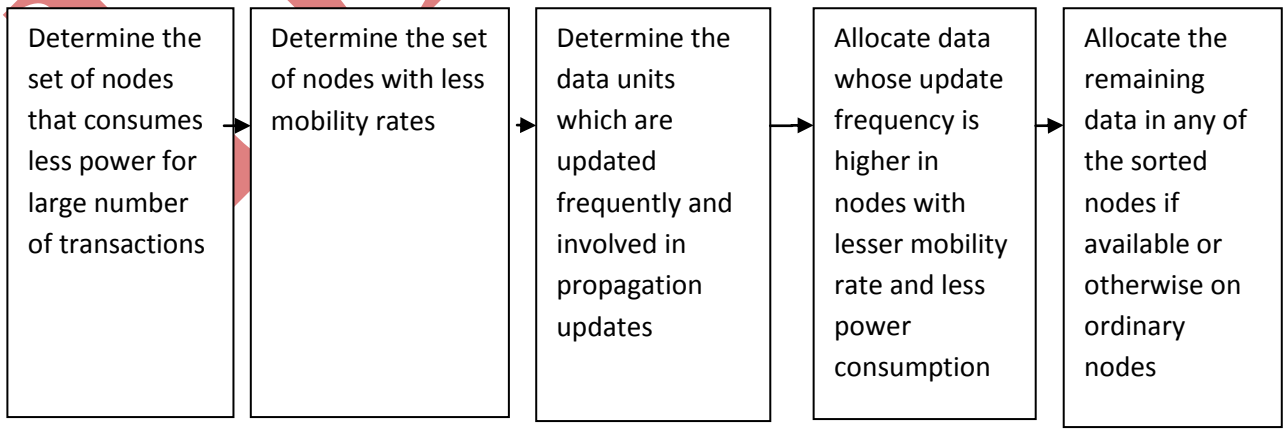

Fig 3.3 Replicating data of different sizes to achieve higher data availability, longer node lifetime, and frequent data update and update propagation in the network [Characteristics 5]

3.1 Replicating data of different sizes to achieve faster data access in the network

Though replication sounds simple at first sight, it has numerous impacts on the network performance if not properly designed. A simple replication technique considers the availability of data. It finds several viable nodes in the network and places copies of data items on it .While data availability is increased by replication, the access time of data must be ensure that it is within the limit. If the access time is increased, it leads to the degradation of overall performance of the system. i.e. .throughput will be reduced.

It is the responsibility of the replication technique that the placement of data items are performed so that the overall access time for a particular data by a node is within the threshold ,which will not lead to the degradation of overall system throughput. In order to do that a set of nodes should be detected for a given node from where the data can be accessed within a limit. The access time limit can be determined by the network. Data can be allocated to the determined nodes so that it can be accessed by the node later when a particular node is not available.

The size of the data unit that is being replicated is same. i.e .of equal sizes by most of the algorithms proposed in the literature. However the size of the data items are not same in reality. Data of variable sizes are accessed in the network and need to be replicated. The amount of memory contributed by each node for replication also varies. In this situation we need an algorithm that determines the size of each data item and the amount of memory contributed by each node. Once the size of the data and memory are determined, they can be organized as a list. Depending upon the importance of data they can be replicated on the available memory space in the network nodes.

3.2 Replicating data of different sizes to achieve higher data availability in the network

Replication has availability as its main objective. It allocate multiple copies of data to various nodes. If a node is not serving the requested data due to failure or network partition, the node can request some other node that contains a replica of the data. It is important to select nodes that does not fails often or having less mobility. Because when the data is replicated on a node that often fails or having more mobility it may not serve the requested data, thereby reducing the data availability in the network to which it belongs. Several measures have been proposed in the literature to determine the characteristics of network nodes.

In addition to the crash or failure that occurs to the node due to some software or hardware problem, the node may not be able to continue its operations when the battery power of the mobile node decreases below a threshold. Every transaction consists of request, response, data sending and data reception as part of it and certain amount of energy is consumed by the node to perform a particular transaction. The amount of energy consumed can also be considered while replicating data since a node with less dissipation power per transaction would be alive for longer period of time than the node with more dissipation power per transaction.

3.3 Replicating data of different sizes to achieve higher data availability, longer node lifetime and frequent data update and update propagation in the network

In addition to higher data availability by replicating data, achieving longer node lifetime and dealing with frequent data update and update propagation adds more complexity to replication algorithms. In the literature, algorithms have been proposed individually to achieve these characteristics of the ialgorithm for the underlying network. So depending upon the type of network .i.e. the place where the network is deployed, the replication can be performed to achieve a particular objective for the network such as higher availability or lesser accessibility time etc.

The algorithm can be explained in simple steps as following

1. For each node in the network determine the set of closer nodes. Closer nodes are located few hops from the source node .Maintain a list of closer nodes and periodically update it. [n_i CL]

2. For each node determine the set of nodes that establishes a path that consumes less power to perform a transaction to a particular destination node. [n_i to n_j]

3. Determine the set of nodes that contribute a large portion of memory for replication at a particular point of time.

4. Determine the size of each data unit.

5. For a given set of data items and nodes allocate data to the node which take participate in the entire list established in the beginning steps.

IV. CONCLUSION

Several approaches have been proposed in the literature in order to improve availability of data in mobile networks through replication. Since mobile networks suffer from network partition very often, it is important to replicate popular data over several nodes in the network. Recent algorithms consider the selfish behaviour of nodes in replication and perform data allocation based upon the measured selfishness of nodes. Since mobile nodes are equipped with battery power, the overall operations performed must be energy or power centric in order to retain power so that the life of the node in a network can be made longer. In addition to these features we have considered the update frequency of data and data with variable sizes, in order to optimize the replication further.

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