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Priority Competition and Split Replication Protocol for Optimal File Searching Efficiency in Mobile Adhoc Networks

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ABSTRACT: Now a day's mobile computing is becoming more and more popular. The efficiency of file queryingsuffers from the properties of networks which include node mobility and limited communication range and resource. File sharing is one of the aspects which include peer to peer file sharing over MANET. Main advantages of P2P file sharing are files can be shared without base stations, overload on server can be avoided and it can exploit the otherwise wasted peer communication opportunities among mobile nodes. File replication which plays important role in enhancing file availability and reduce file querying delay. By creating replicas the probability of encountered requests can be improved. Random Way Point used for the normal MANET and Community-Based Mobility Model used for Disconnected MANETs. In RWP, nodes are moving with random speed to the randomly selected points, so the probability of meeting each node is similar for all the nodes Community-based mobility model used in some content dissemination or routing algorithms for disconnected MANETs. So both models contain idea of resource for file replication, which considers both node storage and meeting frequency

KEYWORDS: MANET, file sharing, routing algorithms, file availability.

I. INTRODUCTION

The MANET is a wide network. Different host nodes are present here. They are moving like routers and communicate with each other for transmission of data. There are two kinds of MANETs, normal MANETs and disconnected MANETs. First has a relatively dense node distribution in a local area while the latter has sparsely distributed nodes that opportunistically meet each other. The local P2P model provides three advantages. Firstly, it enables file sharing when no base stations are available (e.g., rural area). Secondly, with the P2P architecture, the bottleneck on overloaded servers in current client-server based file sharing systems can be avoided. Thirdly, it exploits the otherwise wasted peer to peer communication opportunities among mobile nodes. Because of which, nodes can freely and unremarkably access and share files in the distributed MANET environment, which can possibly support some interesting applications. However the distinctive properties of MANETs, including node mobility, limited communication range and resource, have rendered many difficulties in realizing such a P2P file sharing system. File replication is an effective way to enhance file availability and reduce file querying delay. It creates replicas for a file to improve its probability of being encountered by requests. Unfortunately, it is impractical and inefficient to enable every node to hold the replicas of all files in the system considering limited node resources. Also, file querying delay is always a main concern in a file sharing system. Users often desire to receive their requested files quickly no matter whether the files are popularorunpopular.

II. RELATED WORK

For maximizing fie availability in the mobile ad hoc network the replication can be used. If there is small number of replicas are used, file sharing can't be efficient. There is different file replication protocols used but they suffer from the problems like allocating limited resources to different files and second is storage as a resource for replicas. The solution provided for this is globally optimal file replication. Two models such as Random way point model and

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Community based models are used by Kang Chen [2]. In RWP, nodes are moving repeatedly at a selected point. So probability of meeting each node is similar. The randomly obtained speed is considered here. In case of community based mobility model the test area is taken which is split into different subareas called as caves. Each cave has onecommunity. One node belongs to one or more communities. When node moves into its home community it has a probability P_{in} and when a node visits foreign community it has a probability 1- P_{in} .In case of optimal file replication, the meeting ability of a node as the average number of nodes it meets in a unit time and use it to investigate the optimal file replication. The probability of being encountered by other node is proportional to the meeting ability of the node. It indicates that files residing in nodes with higher meeting ability have higher availability than files in node with lower meeting ability. While creating the replica the memory is occupied. The probability of being met by others is decided by the nodes meeting ability so replica consumes both storage resource and meeting ability of the node.

According to Yu-Chee-Tseng[3] the properties of MANETS can be dynamic changing topology, no base-station support, and multihop communication capability. For communication they use the hopping concept. When two nodes are within the radio range, they communicate with each other using single hop function. The problem discussed here is about the flooding of broadcasting .The problem with broadcasting is storm problem. For this rebroadcasting can be done which is done on timely basis. The problem with broadcasting was that lower reach ability, redundancy, contention and collision. These problems are considered in this paper which relives the broadcast problem and improves the reach ability and lowers the latency as compared to the flooding. The Probabilistic routing and file discovery protocols [4]–[6] are used to avoid broadcasting. They forward a query to a node with higher probability of meeting the destination. The other point of consideration will be the threshold. Threshold is the constant defined which gives the fixed host density. In this paper dynamic solutions to those problems are given which includes adaptive counter-based, adaptive location based, and neighbor coverage schemes. In adaptive counter based scheme each individual has capability to change or adjust its threshold based on neighborhood status. In adaptive location based scheme a host choose its threshold based on its current value of neighbor for determining whether to broadcast or not. Neighbor coverage scheme uses the accurate neighborhood information.

Liangzhong Yin [7] used concept collaborative caching in ad-hoc networks. Different collaborative techniques are used for accessing the data efficiently. The problem with MANET is infrastructure. So the data is transferred from node to node like routers. When mobile nodes works as request forwarding routers, bandwidth and power can be saved and delay can be reduced. In co-operative caching the sharing and co-ordination of the cached data is done among multiple nodes. So by using co-operative caching web performance is increased. The schemes such as CachePath, CacheData and HybridCache are used in this paper. In CacheData, popular items are cached locally. Intermediate node cache data and then serves this data for future requests. For caching the data space is required. The problem with CacheData is that same data item can be cached at two or more nodes. Because of which there is wastage of large amount of cache. To avoid this problem, the rule used is that, a node does not cache data if all requests for the data are from same node. In CachePath intermediate node knows that which node has requested which data because the path of the requesting node and destination is saved in the cache. So when other node request for particular data item, the intermediate node calculate number of hops (distance) and then data item present on nearest node is served. Which means that it cache the data path. Because of which bandwidth and query delay can be reduced. For saving the path, there is no need to save all node information as the path from current router to the destination can be found by underlying routing algorithm. In Hybridcache cache path and cache data schemes are combined means that when a data tem needs to be cached it uses CacheData and path for that data item can also be cache. According to Huang et al. [9], WiFi-based wireless networks based on node mobility pattern, AP topology and file popularity, caching files in servers is done for realizing the optimal file availability to mobile users. However, the file servers considered are fixed nodes connecting to APs.Pitkanen and Ott [10] proposed the DTN storage module to leverage the DTN store-carry-and-forward paradigmand make DTN nodes keep a copy of a message for a longer period of time required by forwarding. In ad-hoc network as the mobile hosts moves freely. The things to be considered are they are in a range & out of range because of which the network is partitioned. So the host from one network cannot access the date item from another network. It lowers the accessibility. The solution for this replication of the data items at mobile hosts which are not the owners the original data. The consideration of Hara [8] is that each host has limited memory space for improving data accessibility. Those are then extended by considering aperiodic data updates since, in a real environment assumed is mesoscale mobile ad-hoc network. Here sharing of the data items can be done. The number of hosts present in ad-hoc network access the data item hold by other hosts as the originals each mobile host creates the replica of each data item & maintains the replica in its memory space. No central server is present to determine the allocated replicas but mobile

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hosts asynchronously determine the allocation in a distributed manner as we know mobile hosts moves freely so some characteristics approaches need to be considered one is replicas are relocated in specific period, during every replications period replicas allocate is determined based on the access frequency from each mobile host to each data item & consideration of network topology is optional. Three replica allocation methods considered here are Static access frequency, DAFN Method, DAG. SAF allocates the replica of data items based on its own access. Frequently used item is replicated at host. The replica creation is done only when a data access to the data item is successful or the mobile host connected to other mobile host which host replica or original data. The problem with SAF is that every host has a replica which creates the memory problem is solved using DAFN.
In this method replica duplication is avoided or eliminated among the neighbors of mobile hosts. The change with this scheme is that when replica duplication created frequency to data item changes the replica to another replica. In DAG the replica sharing is done on the lager group of mobile hosts than DAFN. The need for this is that network or group should be stable.
Wei Gao [11] proposed schemes for NCL selection, created on a probabilistic selection metric, and coordinate multiple caching nodes for optimizing trade-off between data accessibility and caching overhead.

III. SCOPE OF WORK

The scope of the work can be extended to following:

1) To present literature review different methods Maximizing P2P File Access Availability in Mobile Ad hoc Networks Though Replication and Oriented Distributed Routing Protocol.
2) To present the new framework and methods.
3) To present the practical simulation of proposed algorithms and evaluate its performances.

To present the comparative analysis of existing and proposed algorithms in order to claim the efficiency

IV. PROBLEM DEFINITION

Though there are different file replication protocols available, the main problem with them is they lack a rule to allocate limited resource to different files for replica creation in order to achieve the minimum global average querying delay that is global search efficiency optimization under limited resource. They simply consider storage as the resource for replicas, but neglect that a node's frequency to meet other nodes also controls the availability of its files. Files in a node with a higher meeting ability have higher availability. So there is a problem of how to allocate the limited resource in the network to different files for replication so that the overall average file querying delay is minimized

V. PROPOSED SYSTEM

We can improve file sharing by creating the replicas so that the routing efficiency is increased. For replication node storage and node meeting ability is considered. The control of resource allocation is on the average querying delay and an optimal file replication rule that allocates resources to each file based on its popularity and size. So here a file replication protocol is based on the rule, which approximates the minimum global querying delay in a fully distributed manner. Two Node Movement Models such as Random Waypoint Model for Normal MANETs and Community-Based Mobility Model for Disconnected MANETs can be proposed to prorogue effective resource allocation. By this the effectiveness of P2P system can be grown.

A. OPTIMAL FILE REPLICATION WITH THE RWP MODEL

In the RWP model, we can assume that the inter-meeting time among nodes follows exponential distribution. Then, the probability of meeting a node is independent with the previous encountered node. Therefore, we define the meeting ability of a node as the average number of nodes it meets in a unit time and use it to investigate the optimal file replication. Specifically, if a node is able to meet more nodes, it has higher probability of being encountered by other nodes later on.

B. COMMUNITY-BASED MOBILITY MODEL

In this model, since nodes' file interests are stable during a certain time period, we assume that each node's file

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querying pattern (i.e., querying rates for different files) remains stable in the considered period of time. Then, the number of nodes in a community represents the number of queries for a given file generated in this community. As a result, a file holder has low ability to satisfy queries from a small community. Thus, we integrate each community's fraction of nodes into the calculation of the satisfying ability.

C. MEETING ABILITY DISTRIBUTION

For each trace, we measured the meeting abilities of all nodes and ranked them in decreasing order. We see that in all traces, node meeting ability is distributed in a wide range. This matches with our previous claim that nodes usually have different meeting abilities. Also, it verifies the necessity of considering node meeting ability as a resource in file replication since if all nodes have similar meeting ability, replicas on different nodes have similar probability to meet requesters, and hence there is no need to consider meeting ability in resource allocation.

D. DESIGN OF THE FILE REPLICATION PROTOCOL

We propose the priority competition and split file replication protocol (PCS). We first introduce how a node retrieves the parameters needed in PCS and then present the detail of PCS. In PCS, each node dynamically updates its meeting ability and the average meeting ability of all nodes in the system. Such information is exchanged among neighbor nodes. We introduce the process of the replication of a file in PCS. Based on OFRR, since a file with a higher P should receive more resources, a node should assign higher priority to its files with higher P to compete resource with other nodes. Thus, each node orders all of its files in descending order of their Ps and creates replicas for the files in a top-down manner periodically.

The file replication stops when the communication session of the two involved nodes ends. Then, each node continues the replication process for its files after excluding the disconnected node from the neighbor node list. Since file popularity, Ps, and available system resources change as time goes on, each node periodically executes PCS to dynamically handle these time-varying factors. Each node also periodically calculates the popularity of its files (qj) to reflect the changes on file popularity (due to node querying pattern and rate changes) in different time periods. The periodical file popularity update can automatically handle file dynamism.

VI. CONCLUSION AND FUTURE WORK

In this paper, we investigated the problem of how to allocate limited resources for file replication for the purpose of global optimal file searching efficiency in MANETs. Unlike previous protocols that only consider storage as resources, we also consider file holder's ability to meet nodes as available resources since it also affects the availability of files on the node. We first theoretically analyzed the influence of replica distribution on the average querying delay under constrained available resources with two mobility models, and then derived an optimal replication rule that can allocate resources to file replicas with minimal average querying delay. Finally, we designed the priority competition and split replication protocol (PCS) that realizes the optimal replication rule in a fully distributed manner. In this study, we focus on a static set of files in the network. In our future work, we will theoretically analyze a more complex environment including file dynamics (file addition and deletion, file timeout) and dynamic node querying pattern.

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