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Efficient File Resource Allocation Protocol for Lowest Average Query Delay in Mobile Adhoc Networks

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ABSTRACT: File sharing applications are recently widely used in MANET. Because of limited communication range and node mobility, the file availability for sharing becomes tedious task. Peer To Peer over MANET is the most commonly used method for file sharing in MANET. In P2P file sharing system, File replication technology is mostly used to improve the file query efficiency. Most of the current file replication methods replicate files in all nodes or two end points on a cli ent-server query path. Thus, these methods either have low effectiveness or have highly over headed cost. File replication in server side enhances replica hit rate, hence, look up efficiency but produces overloaded nodes and cannot significantly reduce query path length. An intuitive method to alleviate this problem is to create file replicas in the network. Actually, a node that has a higher meeting frequency with others provides higher availability to its files. This becomes even more evident in sparsely distributed MANETs, in which nodes meet disruptively. In this paper, we introduce a new concept of resource for file replication, which considers both node storage and meeting frequency. And also this paper presents an efficient file replication algorithm that achieves high query efficiency and high replica utilization at a significantly low cost. Simulation results demonstrate the efficiency and effectiveness of distributed replication protocol in comparison with other approaches in both static and dynamic environments. It dramatically reduces the overhead of file replication and yields significant improvements on the efficiency and effectiveness of file replication in terms of query efficiency, replica hit rate, and overloaded nodes reduction.

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

I. INTRODUCTION

Mobile ad hoc network (MANETs) is a mobile, dynamically and self-organizing wireless networks in absence of a fixed infrastructure, which is usually used in emergency environment such as disaster recovery, military battlefields etc. Recent years, the personal mobile devices such as smart phone, PDA,
ipad are increasing rapidly. And with the rapid development in the field of wireless communication technologies, e.g., WLAN, WiMax, 3G, 3.5G and emerging 4G, mobile users now want to have access to applications and data whenever and wherever through mobil e handheld devices. The mobile user would like to generate personal content, store useful information, search content from Internet or other mobile devices and share content with their friends all in handheld mobile platforms However, the limited communication capacity of the base station is not easy to satisfy the big requirement. MANETs consisted by the mobile devices which are sufficient with wireless technologies such as WIFI or Bluetooth, are effective and important supplement to the application betwee n mobile users. The mobile devices bring new application scenario to MANETs.

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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 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 one community. 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 Cache Path, Cache Data and Hybrid Cache 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 Cache Data 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 Cache Path 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 Hybrid cache cache path and cache data schemes are combined means that when a data tem needs to be cached it uses Cache Data 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 paradigm and 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

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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 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. EXISTING SYSTEM

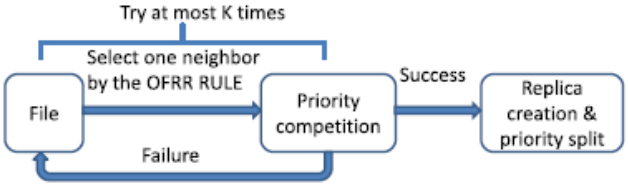
Within the former, redundant replicas are easily created in the machine, thereby losing sources. inside the latter, although redundant replicas are reduced by institution based totally cooperation, neighboring nodes may cut loose each other due to node mobility, main to large query postpone.

There also are a few works addressing content material caching in disconnected MANETs/ DTNs for green statistics retrieval or message routing. They basically cache information which are often queried on locations which can be visited frequently by using cellular nodes. each the 2 categories of replication techniques fail to very well consider that a node's mobility impacts the availability of its documents.

IV. PROPOSED SYSTEM

In this paper, we introduce a new concept of resource for file replication, which considers both node storage and node meeting potential. We theoretically observe the impact of useful resource allocation at the common querying delay and derive an premiere document replication rule (OFRR) that allocates assets to each document based totally on its reputation and length. We then recommend a report replication protocol based totally on the guideline, which approximates the minimal global querying postpone in a totally disbursed manner. We suggest a distributed record replication protocol that could approximately recognize the highest quality record replication rule with the two mobility models in a distributed way.

SYSTEM ARACHITECTURE



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IMPLEMENTATION

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 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.

V. CONCLUSION AND FUTURE WORK

In this paper, we investigated the obstacle of how to allocate constrained assets for file replication for the purpose of worldwide choicest file looking effectivity in MANETs. Unlike earlier protocols that only take into account storage as assets, we also don't forget file holder's capacity to meet nodes as available assets considering that it additionally influences the provision of files on the node. We first theoretically analyzed the affect of duplicate distribution on the natural querying prolong under constrained on hand resources with two mobility items, and then derived an superior replication rule that can allocate assets to file replicas with minimal average querying prolong. Eventually, we designed the precedence competitors and break up replication protocol (PCS) that realizes the superior replication rule in a completely allotted method.. 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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