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Improving P2P File Access Availability in Mobile Ad Hoc Networks through Replication for Advanced File Sharing

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Abstract

Wireless communications are receiving more attention now days. In mobile Ad Hoc networks nodes are moving freely from one location to another. So in MANET disconnections occurs often. So there is a problem of file availability. For that purpose file replication can be used. With the help of access mechanisms, peer to peer (P2P) file sharing can be done over Mobile Ad hoc Network(MANET).The capability of file querying suffer from the properties of networks which include node mobility and limited communication range and resource .For these problems file replication can be used. File replication plays important role in enhancing file availability and reduce file querying delay. By creating replicas, the probability of encountered requests can be improved .Previously proposed model were considering node storage for the replication but lacks to consider the node mobility. In our system we have considered the mobility of the node. For that purpose we have considered Optimal File Replication Rule is which consider the priority of the files. In the proposed system we are going to consider two factors first is the peer mobility and second one is battery energy for identifying the best neighbor for replication of the file. So in this work we are going to improvise the efficiency of the file replication by considering these two factors

Keyword—MANETs, peer-to-peer, file sharing, file availability

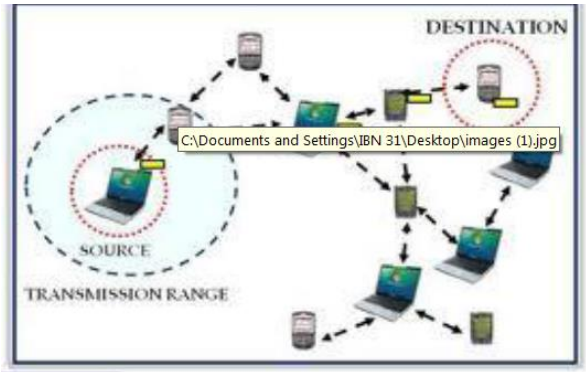
INTRODUCTION

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

Bottle neck 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 matterwhether the files are popular or unpopular.In this paper, we introduce a new concept of resource for file replication, which considers both node storage and node meeting ability. We theoretically study the influence of resource allocation on the average querying delay and derive an optimal file replication rule (OFRR) that allocates resources to each file based on its popularity and size. We then propose a file replication protocol based on the rule, which approximates the minimum global querying delay in a fully distributed manner. Our experiment and simulation results show the superior performance of the proposed protocol in comparison with other representative replication protocols



Structure of MANET

How MANET works?

The purpose of the MANET working group is to standardize IP routing protocol

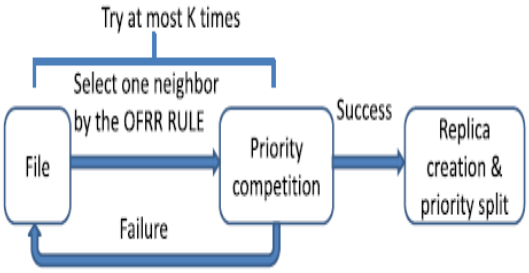
functionality suitable for wireless routing application within both static and dynamic topologies with increased dynamics due to node motion and other factors. Approaches are intended to be relatively lightweight in nature, suitable for multiple hardware and wireless environments, and address scenarios where MANETs are deployed at the edges of an IP infrastructure. Hybrid mesh infrastructures (e.g., a mixture of fixed and mobile routers) should also be supported by MANET specifications and management features.

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 Pin and when a node visits foreign community it has a probability 1- Pin .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 multi hop 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. Liangshan 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 Cache Data, 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 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], Wi-Fi-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.we propose a distributed file replication protocol that can approximately realize the optimal file replication rule with the two mobility models in a distributed manner.



As a result, the number of replicas of each file is proportional to the sum of the meeting abilities of its replica nodes, thereby realizing Formula (22), i.e., OFRR.

CONCLUSION

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 model, 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. Extensive experiments on both GENI tested, NS-2, and event-driven simulator with real traces and synthesized mobility confirm both the correctness of our theoretical analysis and the effectiveness of PCS in MANETs. 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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