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Comparative Study on SPOON and SimBet Routing in Disconnected MANETs

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Abstract- Recent advances in portable computing and wireless technologies are opening up exciting possibilities for the future of wireless of wireless mobile networking. A mobile Ad hoc NETwork (MANET) consist of mobile platform which are free to move arbitrarily. They are mainly developed for connected MANETs, in which end-to-end connectivity among nodes is ensured. In this paper, we existing system and also used to a proposed of a P2P content based file sharing system, namely SPOON, for disconnected MANETs, we are used similarity and betweeness between the two nodes and we are calculating simbet utility by using the formula which used for centrality. The simbet routing is the algorithm which is used for calculating the destination nodes position as well the source position and which is also used for how or where we are stored the data in buffer. So this is the proposed algorithm compare to the spoon. Spoon is the existing algorithm which is used for just form community and assigns ambassador. We first tested our system on the GENI Orbit testbed with a real trace and then conducted event-driven experiment with two real traces and NS2 simulation with simulated disconnected and connected MANET scenarios. The test results show that our system significantly lowers transmission cost and improves file searching success rate compared to current methods.

Keywords:MANET,SPOON,SimBet,GENI.

1. INTRODUCTION

1.1 Introduction

Ad Hoc networks are instantly formed to serve a specific purpose and cease to exist after the network fulfills its purpose. MANET is a self-configuring network connected by wireless links[2]. Most Ad Hoc networks do not rely on any underlying fixed infrastructure such as base stations or access points. Instead, mobile hosts (or nodes) rely on each other to keep the network connected depicted in fig. 1. Each device in MANET is free to move independently in any direction, and will therefore change its links to other devices frequently. Each node must forward traffic to make the network consistent. Therefore, every node in MANET is treated as a router.

- Rapidly deployable, self configuring.
- No need for existing infrastructure.
- Wireless links.
- Nodes are *mobile*, topology can be very dynamic.
- Nodes must be able to *relay traffic* since communicating nodes might be out of range.
- A MANET can be a standalone network or it can be connected to external networks(Internet).

MANET ARCHITECTURE:

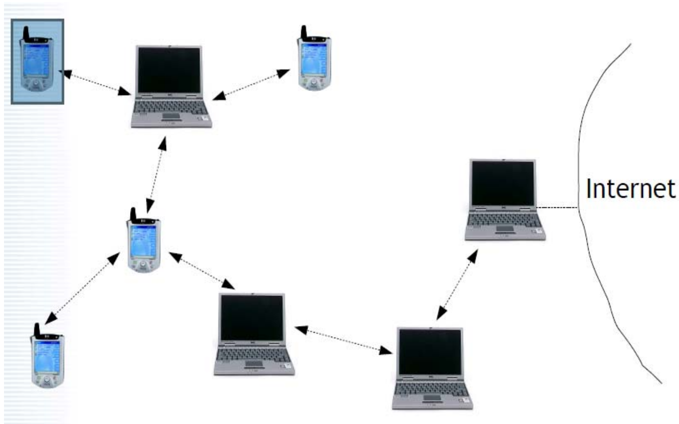

Fig.1 Structure Formation of MANET's.

Routing Protocol Requirements:

- Self starting and self organizing
- Multi-hop, loop-free paths
- Dynamic topology maintenance
- Rapid convergence
- Minimal network traffic overhead
- Scalable to large networks

The P2P file sharing model makes large-scale networks a blessing instead of a curse, in which nodes share files directly with each other without a centralized server. Wired P2P file sharing systems [4] and [5] have already become a popular and successful paradigm for file sharing among millions of users. The successful deployment of P2P file sharing systems and the aforementioned impediments to file sharing in MANETs make the P2P file sharing over MANETs (P2P MANETs in short) a promising complement to current infrastructure model to realize pervasive file sharing for mobile users.

The operation of most P2P systems in the wireline Internet depends on application layer connections among peers, forming an application layer overlay network. In general, these connections are static, i.e., a connection between two peers remains established as long as both peers dwell in the system.We identify the maintenance of static overlay connections as the major performance bottleneck for deploying a P2P file sharing system in a MANET.

ORION operation does not depend on the deployment or support of any MANET routing protocol. Note that some data structures and mechanisms used by ORION are also provided by reactive MANET routing protocols, ORION might induce some redundancy or even duplication when deployed on top of such protocol. However, we would like to point out that the basic concepts of ORION could be combined with routing protocol functionality to avoid duplication and make use of existing synergies.

We existing social network-based P2P content-based file sharing in disconnected mobile ad hoc Networks (SPOON) with four components as shown in Fig. 2:

1. Based on P2, we propose an interest extraction algorithm to derive a node's interests from its files.The interest facilitates queries in content-based file sharing and other components of SPOON.
2. We refer to a collective of nodes that share common interests and meet frequently as a community. According to P3, a node has high probability to find interested files in its community. If this fails, based on P1, the node can rely on nodes that frequently travel to other communities for file searching. Thus, we propose the community construction algorithm to build communities to enable efficient file retrieval.
3. According to P1, we propose a node role assignment algorithm that takes advantage of node mobility for efficient file searching. The algorithm designates a stable node that has the tightest connections with others in its community as the community coordinator to guide intracommunity searching. For each known foreign community, a node that frequently travels to it is designated as the community ambassador for intercommunity searching.
4. We propose an interest-oriented file searching and retrieval scheme that utilizes an interest-oriented routing algorithm (IRA) and above three components. Based on P3, IRA selects forwarding node by considering the probability of meeting interest keywords rather than nodes.

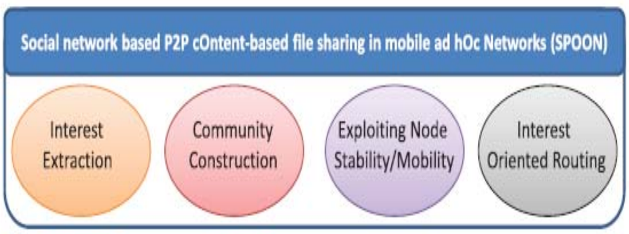

Fig.1.3 Components of SPOON

SimBet is a DTN routing protocol. Each node keeps a contact history vector consisting of the time of last encounter. On every contact, a contact history matrix is mutually updated with the contact history vector of the other node. Based on that individual matrix, SimBet nodes calculate two social network based metrics, similarity and betweenness.

Similarity is individually calculated by adding up the number of common nodes the node and the destination have met in the past, which makes a reasonable estimation of how socially connected the two nodes are.

Betweenness is a measurement for how interconnected a node is; its calculation is based on the number of nodes the specific node has met, that haven not met each other.

For the comparison, both values are averaged, and weighed by two parameters α and β. Forwarding decisions are made based on the comparison of the two SimBetUtil values.

1.2 Problem Definition

- If they are using SPOON Technique used to high Transmission overhead is more , Low scalability and outperforms in terms of hit rate, delay, and cost.
- SPOON utilizes IRA for intra communication and dedicated ambassadors for intercommunication.

2.RELATED WORK:

- **SPOON:**
  SPOON is novel in that it leverages social network properties of both node interest and movement pattern. First, it classifies common-interest and frequently encountered nodes into social communities. Second, it considers the frequency at which a node meets different interests rather than different nodes in file searching. Third, it chooses stable nodes in a community as coordinators and highly mobile nodes that travel frequently [5] to foreign communities as ambassadors. Such a structure ensures that a query can be forwarded to the community of the queried file quickly. SPOON also incorporates additional strategies for file prefetching, querying-completion and loop-prevention, and node churn consideration to further enhance file searching efficiency.
- **Interest Extraction**
  Without loss of generality, we assume that node contents can be classified to different interest categories. It was found that users usually have a few file categories that they query for files frequently in a file sharing system. Specifically, for the majority of users, 80 percent of their shared files fall into only 20 percent of total file categories. Like other file sharing systems, we consider that a node's stored files can reflect its file interests. Thus, SPOON derives the interests of a node from its files.
- **Community Construction**
  Social network theory reveals that people with the same interest tend to meet frequently. By exploiting this property, SPOON classifies nodes with common interests and frequent contacts into a community to facilitate interest-based file searching, as introduced latter in Section. Nodes with multiple interests belong to multiple communities. The community construction can easily be conducted in a centralized manner by collecting node interests and contact frequencies from all nodes to a central node. However, considering that the proposed system is for distributed disconnected MANETs, in which timely information collection and distribution is nontrivial, we further propose a decentralized method to ensure the adaptively of SPOON in real environment.
- **Interest-Oriented Routing Algorithm**
  In the interest oriented routing algorithm we are used two algorithm namely inter communication routing

algorithm and intra communication routing algorithm in the intra communication routing we are communicate with other communities node. In the intra communication routing algorithm we are using two node's namely co-ordinator, ambasodor.

- **Between's Calculation:**
  Betweenness centrality is calculated using an ego network representation of the nodes with which the ego node has come into contact. Mathematically, node contacts can be represented by an adjacency matrix A, which is an $n \times n$ symmetric matrix, where n is the number of contacts a given[7] node has encountered. The adjacency matrix has elements:
  A_{ij} ={1 if there is a contact between i and j
  0 otherwise
- **Similarity Calculation**
  Node similarity is calculated using the same $n \times n$ matrix discussed in section. The number of common neighbors between the current node i and destination node j is a simple count of the non-zero equivalent row entries in the matrix. Consider the example matrix representing the contacts of node $w8$ in section. Node $w8$ has a similarity with nodes $w6$, $w7$, $w9$ and $s4$ of and respectively. This example only allows for the calculation of similarity for nodes that have been met directly, but when nodes exchange a list of nodes it has encountered as described in section we may obtain useful information in regards to nodes that we have not yet encountered. As discussed in section 4 the number of common neighbors may be useful for ranking known contacts but also for predicting future contacts. It may also represent the possibility of routing to an indirect node through a contact. Hence we maintain a list of indirect encounters and maintain a separate $n \times m$ matrix where n is the number of nodes (e.g,Daly and Haahr[1])that have been met directly and m is the number of nodes that have not directly been encountered, but may be indirectly accessible through a direct contact.
- **SimBet Utility Calculation:**
  The SimBet utility is a value between 0 and 1 and is based on two components: similarity utility and betweenness utility. Selecting which node represents the best carrier for the message becomes a multiple attribute decision problem, where we wish to select the node that provides the maximum utility for carrying the message. This is achieved using a pairwise comparison matrix on the normalized relative weights of the attributes. The similarity utility $SimUtil_n$ and the betweenness utility $BetUtil_n$ of node n for delivering a message to destination node d compared to node m is given by: $SimBetUtil_n(d)$ is given by combining the normalised relative weights of the attributes given by: $SimBetUtil_n(d) = \alpha SimUtil_n(d) + \beta BetUtil_n$ where α and β are tunable parameters and $\alpha + \beta = 1$. Consequently these parameters allow for the adjustment of the relative importance of the two utility values.
- **SimBet Routing**
  SimBet is a DTN routing protocol. Each node keeps a contact history vector consisting of the time of last encounter. On every contact, a contact history matrix is mutually updated with the contact history vector of the other node. Based on that individual matrix, SimBet nodes calculate two social network based metrics, similarity and betweenness. Similarity is individually calculated by adding up the number of common nodes the node and the destination have met in the past, which makes a reasonable estimation of how socially connected the two nodes are used.

2.1 Performance Evaluation:

In the first test, all nodes are considered to be sending and receiving nodes. Each sending node generates a single message for all other nodes. We compare the three different routing protocols based on the following criteria.

- **Total Number of Messages Delivered:** The ultimate goal of the SimBet Routing design is to achieve delivery performance as close to Epidemic Routing as possible. This is because Epidemic Routing always finds the best possible path to the destination and therefore represents the baseline for the best possible delivery performance.
- **Average End-to-End Delay:** End-to-End delay is an important concern in SimBet Routing design. Long end-to-end delays means the message must occupy valuable buffer space for longer, and consequently a low end-to-end delay is desirable. Again Epidemic Routing presents a good baseline for the minimum end-to-end delay possible.

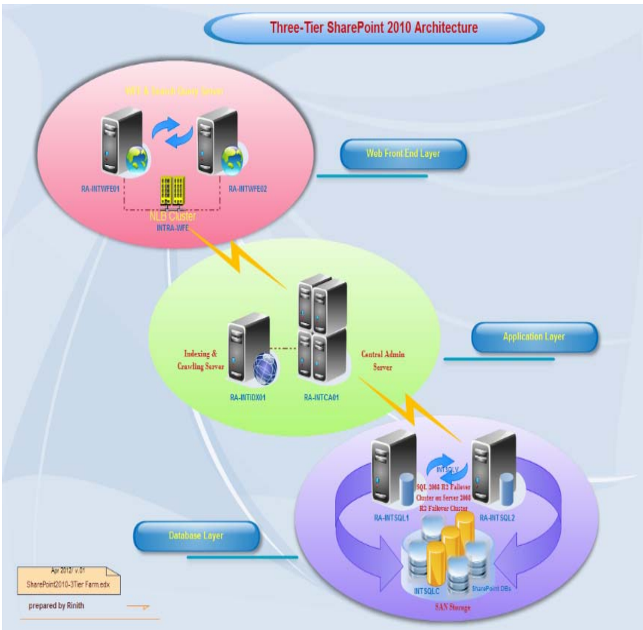

Fig 2.1 Structure for describe in the SimBet Routing Architecture

- **Average Number of Hops per Message:** It is desirable to minimize the number of hops a message must take in order to reach the destination. Wireless communication is costly in terms of battery power and as a result minimising the number of hops also minimizes the battery power expended in forwarding the message.

- **Total Number of Forwards:** This value represents the overhead in the network in terms of how many times a message forward occurs in the network. PRoPHET and SimBet are expected to perform similarly in this respect, as both only assume the existence of one copy of the message on the network. Epidemic Routing, however, assumes the existence of multiple copies and continues forwarding a given message until each node is carrying a copy. This means Epidemic Routing is costly in terms of the number of transmissions required along with the amount of buffer space required on each node.

3. ARCHITECTURE DESIGN:

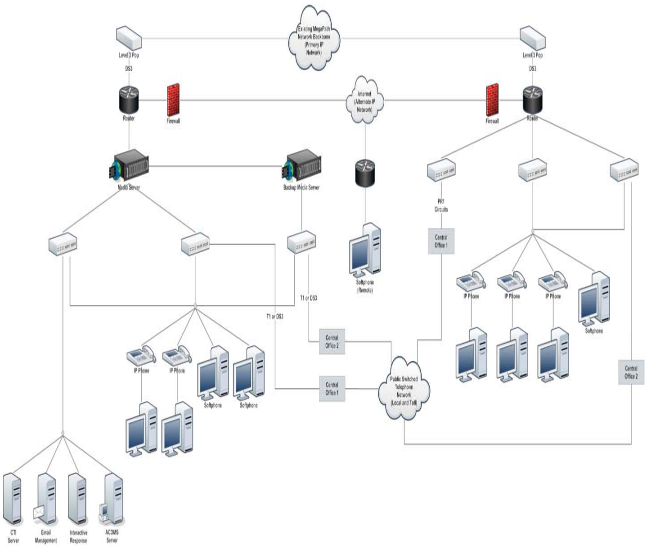

Fig.3.1 MANET's using Telecommunications Network Architecture

3.1Sensitivity study

Some improvement potential clearly lies in the aging of the contact history matrix. The authors of SimBet don't age the values at all, but that is an important factor to the success of any social routing protocol. If a simulation runs for an arbitrary long time, most nodes (in realistic scenarios) have encountered each other at least once, so if no aging is done on the contact history matrix, eventually all benefits from social based routing is lost. On the other hand, if aging is done too fast, contact history is based more on chance, than actual social contacts.

First we want to show the effects of different values for a simple aging algorithm: After an aging threshold Ω, a value is deleted from the contact history matrix scenarios are too sparse and short to feel the effect of too long aging that much. In scenario 1, the effect starts towards the end, but in a scenario as social as scenario2, it will take quite some time until the effect becomes big. To be able to get more consistent results in different scenarios, there need to be a way to age the contact matrix dynamically, depending on individual factors like density and contact rate.

3.2 Feasibility study for improvement approaches:

Instead of just deleting an entry after a certain time, we let them degrade slowly. Before every access to the contact history matrix, we decreased all values by an aging constant (which we set to 1/Ω) multiplied by the time of last access. This resulted in a contact matrix, which had values slowly degrading from 1 to 0. To keep SimBet working, the Similarity Calculation was adapted, in order not to compare integers, but adding up the multiplication of every pair values that
was above a certain threshold δ (δ=0.1).

$Sim_{new} = \sum(X_{me,n} * X_{other,n} \mid X_{me,n} > \delta \ \& \ X_{other,n} > \delta)$
with $X_{y,z}$ = Entry in contact history matrix at position (y; z) (1.1)

Instead of
$Sim = \sum (1 \mid X_{me,n} = 1 \ \& \ X_{other,n} = 1$ (1.2)

The simple aging algorithm had slightly higher peaks than ours, but we managed
to get slightly more consistent results with the new aging algorithm. Especially in scenario 2, the new algorithm performed better at short aging intervals than the simple one.

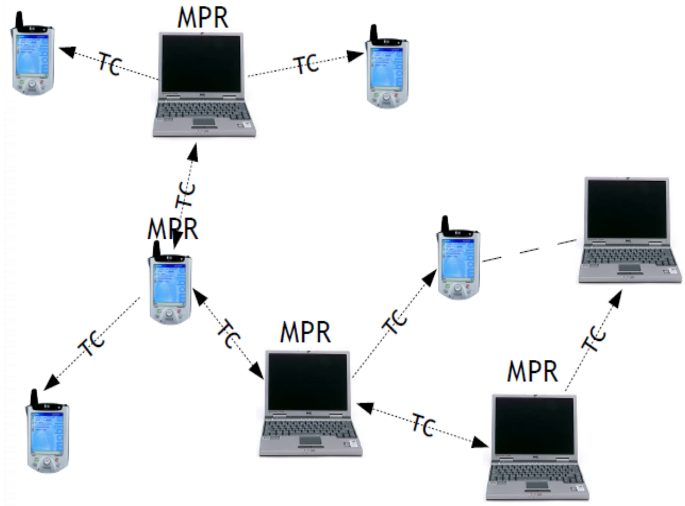

Fig.3.2 System Link using SimBet Structure

4.CONCLUSION

In this paper a new approach is used as SimBet routing protocol will provide the between's calculation and similarity calculation are used to provide more efficiency and low time consumption for data owner whose who upload the data and data user efficiently will reduce the packet delay from the analysis results shown above and also provide the security for packet transmission in MANET's, performance calculated and results are analyzed

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