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SURVEY ARTICLE

A Survey on Routing Mechanism Using Degree of Contact in DTN

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Abstract- The previous routing algorithms that were deployed in the DTNs lacked in the global view of the network that limited the efficiency of the network. An enhanced SMART which is a lightweight routing algorithm in delay-tolerant network that utilizes the social mapping technique on mobile nodes where it enables each nodes to build social map to record the information about its surrounding social structure. This social map consist of the delivery abilities of the nodes which is been frequently met and their social closeness .Based on this contact frequencies the nodes with higher degree of contact is chosen to be the stable forwarder node for forwarding the packet to the destination and due to this construction of social map the global view of the network can be achieved .The problems such as blind spot ,dead end and loops which occur in DTNs can be eliminated by the usage of enhanced SMART algorithm where it adapts to the changing community structure by enhancing the performance for the inter-community communication

Key terms: delay tolerant network, social map, blind spot, dead end

I. INTRODUCTION

In many applications in which the data has to be transmitted over a network where an end-to-end path between source and destination does not exist i.e. in wireless network, the data or the message has to be secured from the unauthorized users. An end-to-end path between a source and a destination pair may not always exist where the links between intermediate nodes may be opportunistic, predictably connectable, or periodically connected. To allow the nodes to communicate with each other in

these extreme networking environments, the research community has proposed a new architecture called the disruption tolerant network (DTN). Several DTN routing schemes have been proposed. Typically, the source node's message may need to wait in the intermediate nodes for substantial amount of time when there is no connection to the final destination. After the connection is eventually established, the message is delivered to the destination node.

Disruption-tolerant network (DTN) technologies are the successful solutions that allow wireless devices carried by soldiers to communicate with each other and access the confidential information or command reliably by exploiting external storage nodes. Three categories of forwarding schemes have been proposed for DTNs. In the first category is to use message ferries to gather data from stationary sources and deliver them to their destinations. For example, assume that traffic demand between two nodes can be estimated. Then, they design routes for multiple ferries that can minimize the average data delivery latency. They also consider how nodes can be assigned to ferries based on different assumptions about ferry interactions. In the second category, using history-based routing where each node maintains a utility value for every other node in the network, based on a timer indicating the time elapsed since the two nodes last encountered each other. These utility values which carry indirect information about relative node locations, get diffused through nodes' mobility. In the third category, using a 2-hop relay forwarding scheme where the source sends multiple copies to different relaying nodes and the relaying nodes will deliver the copies they have to the destination node when they encounter the destination node.

II. LITERATURE REVIEW

In the delay tolerant network where routing packets to the destination efficiently is very challenging task. In such network where the environment changes are very dynamic in nature, several methods have been proposed in the past to deliver the packets to the destination reliably. In the broader prospective when the epidemic routing [1] is considered wherein each nodes which is encountered duplicates the packets from the encountered nodes which was previously not present in the database. And the flooding nature of the epidemic routing method gives the higher efficiency to the network but consumes lot of storage resources which is inappropriate to the system where there is scarcity of resources i.e. in the DTN's.

Probabilistic Routing and priority routing

Probabilistic algorithms [2]-[5] which used the nodes past encountered records to predict the node's future probability of reliable delivery towards the destination. In the PROPHET[2] algorithm where it used both the direct probability and the indirect probability of the nodes to route the packets toward the destination. Here the packet was delivered to the node which had the higher delivery ability. The other algorithms such as the MaxProp[3],RAPID[4] and MaxContribution[5] extended the theory of the PROPHET[2] with the extension of including priorities assigned to the forwarding and storage functions which affected on their delivery abilities of nodes. Each of the algorithm aims at the different aspects to increase the efficiency i.e. the RAPID and MaxContribution algorithms proposed different priority calculation methods for different goals such as minimal delays and maximal hit rate.

One of the key challenge in the DTN is to find a route that can provide good delivery performance and low end-to-end delay in a disconnected network graph where nodes may move freely. To bridge the gap between the performance of the network and the delays which occurred in the network the SimBet[7] Routing is proposed which exploits the exchange of pre-estimated 'betweeness' centrality metrics and locally determined social 'similarity' to the destination node. The simulations

using real trace data to demonstrate that SimBet Routing results in delivery performance close to Epidemic Routing but with significantly reduced overhead. Additionally, it is shown that SimBet Routing outperforms PROPHET Routing, particularly when the sending and receiving nodes have low connectivity.

Social Network Property

Social-network based delay tolerant network routing algorithms[6]-[9] which utilizes the social network properties of the DTN's to make the routing decisions . MOPS[6] algorithm which builds a publish-subscribe system that groups the frequently encountered nodes which facilitates for the intra-community communication and selects the fringe node which is used for the intercommunity communication . The BUBBLE[7] algorithm assigns ranks for each node i.e. the global and the local ranks which are used for the inter and intra community communication. Similarly the [8] algorithm ranks the stability of the nodes and chooses the nodes based on their stabilized ranks for routing the packets towards the destination. The publish and subscribe system in the [10] describes the method for forwarding the packet based the utility value which is calculated based the node's encountered frequency.

Limited Resource Consumption

The another problem in the DTN are of the limited resources which are available to the system so that the process of routing is done with the less usage of resources so that the lifespan of the network is increased , but most of the algorithms proposed previously gives the performance but consumes more amount of resources . With this in account the single-copy [12] solution was proposed, where only one copy of message is to be bubbled in the network so that the resources are conserved and it upgrades the performance of the system compared to the flooding method where it consumes lot of resources. The optimization problems in the DTN's are usually solved by adopting the dynamic resource allocation but here the system lacks in the broader view of the network so the decisions are made by using contemporarily available information which leads to the inefficient decision making. A new efficient approximation algorithm, called Distributed Max-Contribution (DMC) that performs greedy scheduling, routing and replication based only on locally and contemporarily available information.

Inter and Intra Community Communication

However, social network properties are observed in many DTNs and tend to be stable over time. To utilize the social network properties to facilitate packet forwarding, a LocalCom[11] is presented, a community-based epidemic forwarding scheme that efficiently detects the community structure using limited local information and improves the forwarding efficiency based on the community structure. It defines similarity metrics according to nodes' encounter history to depict the neighbouring relationship between each pair of nodes. A distributed algorithm[11] which only utilizes local information is then applied to detect communities, and the formed communities have strong intra-community connections. We also present two schemes to mark and prune gateways that connect communities to control redundancy and facilitate intercommunity packet forwarding.

Social Mapping Property

Here with the above mentioned methods which describe the various problems in the DTN and various methods which were proposed to overcome these problems in different ways where each method tries to deduce the delays occurring in the network and increase the nodes probability to deliver the packet to the destination. All the above method dealt with the issue of

the local view and the high communication cost. By adopting the advantages of the above method a algorithm was proposed which uses the property of the social closeness of the node, degree of the contact. Here in this a distributed lightweight social map is constructed by each and every node which only stores the information of the most contacted nodes rather than storing the information about each and every node. This leads to save the storage cost and to maximum extent grantees the packet delivery to the destination by using only the most encountered nodes. Thus this method provides the broader view and high efficiency. But the other aspects of the routing i.e. the security which is a crucial point is not clearly described.

III. CONCLUSION

In the DTNs where the nodes are intermittent and are constantly moving and the communication between them are opportunistic. Herein the DTN where the routing is a crucial task the property such as the social closeness, the dynamic nature and the resources are to be exploited efficiency by adopting the suitable method so that the efficiency and other performance parameters can be effectively achieved.

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