International Journal of Innovative Research and Advanced Studies (IJIRAS)
Volume 3 Issue 13, December 2016

ISSN: 2394-4404

Optimal Data Query Transmission Strategy In MANET

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Abstract: A Mobile Ad hoc Network (MANET) is an autonomous system of nodes (MSs). Nodes may contain routers or laptops or mobile users which are connected by wireless links. There is no any structure of network exists in a MANET. Node in the network can move freely it causes the changing in the network topology. The work addresses the problem how to transmit the query with an optimal solution in MANET, which is formed by mobile users who share similar data interest and which are connected with each other in the network. Data query which is transmitted in the network faces number of challenges like as inaccurate and unknown data providers, self-directed storage and opportunistic link connectivity. Our goal is to determine the query transmission strategy which supports data query and which minimizes the communication cost.

Keywords: Mobile adhoc networks, Data query, Routing technique, Branch and Bound technique.

I. INTRODUCTION

A mobile ad hoc network (MANET) is a self-organized multi-hop system includes number of mobile nodes. Node may act as both router and the host at the same time. It may changes in the network topologies because of moving the mobile networks within the network. For communication comparing with popular web based online networks which relay on the internet infrastructure which contains cellular system, here focuses on the mobile adhoc web based online networks, which formed by mobile users. These mobile users share the similar interest among themselves. On other hand mobile adhoc networks achieve significant value by serving as a supplement to online networks and it supports to the local community based adhoc networks. For example, it helps to discover the links in the network and allows the user to query for the localized data such as surrounding information, local knowledge, and other information that users cannot to report on to online website but may keep temporarily on their portable devices such as mobile users or laptops and which will generate upon the request which comes from the users.

This work addresses the problem of how to enable optimal data query transmission strategy [1] in mobile adhoc networks. For this consider a scenario which consist a network with N nodes. Each node can act as query issuer or query provider, or it may commonly act both roles for different query request. The queries have come into C categories. Each node in the network has capability to answer a query. Let E be the Expertise matrix, where E_i^C denotes the expertise of node i to answer a query that falls into the category c, which simply states that node i can provide appropriate or satisfactory answer to a query in category c. Query issuer created a query . It is forwarded to the nodes in the network which can successfully provide an answer to the respective query request. These nodes called as data providers. If the data provider receives the query request, it sends the query reply to that query issuer. Sometimes network contains the intercommunity communication [5] between the nodes, here a node moves frequently across the communities to carry the data efficiently.

Network is formed by mobile users who share similar interests and connect with one another with Wi-Fi connections of their mobile phones or portable devices. It is created for a local community [5] where the participants or user may have

frequent interactions with each other which helpful to share the data present on their portable devices e.g. people living in an urban neighbourhood, students studying in a college, or tourists/ visitors visiting an archaeological site. The size of the network varies from a large group to smaller group, e.g., all the students in a university to a small cluster such as members of a school band. Mobile user makes the community and it may available over a long span of years, or be temporary to last for as short as a few hours only.

Our goal is to determine the data query transmission strategy which supports the query rate and which minimizes the communication cost.

The rest of the paper is organized as follows. Section II enlists significance of proposed approach, Section III summarizes related work done previously, Section IV presents need of proposed work with problems, Section V presents objective of this work, Section VI presents methodology, Section VII presents the analysis and result part, Section VIII conclusion, and Section IX ends with future work.

II. SIGNIFICANCE

In MANET, data query forwarding performed by nodes themselves. Simply routing mechanism performed within the network. For these, security becomes very important issue in MANET. The goals to evaluate if mobile ad-hoc network is secure or not are as follows:

- ✓ Availability: It implies that network is accessible to authorized parties at appropriate times. Availability applies both to data and to services.
- ✓ Confidentiality: Confidentiality ensures that network services and data are accessed only by authorized parties. Protection of information which is exchanging through a MANET.
- ✓ Integrity: Data can be modified only by authorized parties or only in authorized way.
- ✓ Authentication: The recourses of network should be accessed by the authenticated nodes.
- ✓ Efficiency: Efficiency of mobile ad-hoc network depends on computation and energy consumption of resources that are available in network.

III. RELATED WORK

The Authors [2] proposed a new communication mechanism of packet switched networks called as Osmosis. As in increase in the variety of mobile communication devices which are carried out by people, it will predict new class network called packet switched network. Design of network protocols becomes challenging in PSN because nodes present in PSN having mobility nature means nodes are moving constantly in the network.

Osmosis is based on the biological phenomenon. This communication mechanism can be applied onto the file sharing. To lookup the file and achieving flooding mechanism for file transfer routing mechanism is used. This scheme uses epidemic routing to perform file lookup and achieves controlled flooding for file transfer. Here, focuses on to analyse the performance of Osmosis which is based on to the real mobility traces.

The Authors [3] proposed a scheme called DelQue i.e. delegation query, is a novel two-hop delegation query scheme. It considers a query and response to save network energy. To represent the capability of node to query new information and calculate with respond here in paper exploit the utility of neighbor in DelQue. Some other methods also presented which is based on a spatio-temporal prediction method of user mobility. Here DelQue allows maintaining constant information query ratio with low energy cost and short delays.

The Authors [4] summarized different controlled message flooding schemes over disconnected sparse mobile networks. Here focuses on to study the effect of these schemes on neighbor discovery overhead, message delay, resource consumption. Result analysis and simulation saves the network resources while gaining negligible increase in message delivery delay.

The Authors [5] referred an approach which has provided a new solution for DTN's. DTN's are nothing but sparse mobile adhoc networks where nodes are intermittently connected and there is no path exists between end-to-end communications. There is recent research area in data routing of DTN's. Numbers of DTN's routing strategies have been proposed they may have number of problems such as decentralised implementation, large and dynamic nature, blind spots etc. new solution of the DTN's may helpful for to overcome these difficulties which forces the mobility characteristics and social properties of users. Here first find out the three data sets which are collected from real DTN's that correlated to user locally and geographical locations. Based on this finding, here new technique is get proposed which is social and mobile aware routing strategy i.e. SMART. It exploits the partitioning algorithm to divide DTN into smaller communities based on user locations. For intercommunity communications, routing metric used to decide forwarding of node efficiently which helps for avoiding blind and dead end problems. For intercommunity communication, fringe nodes are choses which travel remotely and proposed routing decision through communities. SMART reduces the occurrences of blind and dead spot ends.

IV. NEED OF PROPOSED WORK

Need of present work is given as below:

- ✓ Increase the overall performance of the network.
- ✓ Ease of use
- ✓ Find out the optimal solution for the query which decrease the communication cost and increase the overall performance of the system.
- ✓ Provide the data from localized devices of the user. The data present on the localized devices of the user. Localized devices are mobile devices or personal devices

V. OBJECTIVE OF THIS WORK

Objective of work is to provide solution to the issue of discovering transmission of data query problem in MANET.

Where two or many nodes or users participate in to the network to share the data present on to their localized devices. The user can transmit the query or answer to that query. The users act as query issuer or data provider or both. Furthermore, two algorithms that perform query transmission efficiently in the network, driven by the proposed measures, are presented. We address the optimal solution to the query which fires into the network. For this develop model for which it gives a minimum communication cost. Reachable expertise guides the transmission of the query request and query answered by the expertise node or other users with minimizing the communication cost. So user gets the solution over to the his/her query with minimum cost with higher query rate in the network.

VI. METHODOLOGY

In MANET query is transmitted in the network using routing mechanism. Query is routed from one node to the other with maintain the node information. User can use the network to get an optimal solution for his/her data query. Sometimes user can act as both a query issuer and query provider.

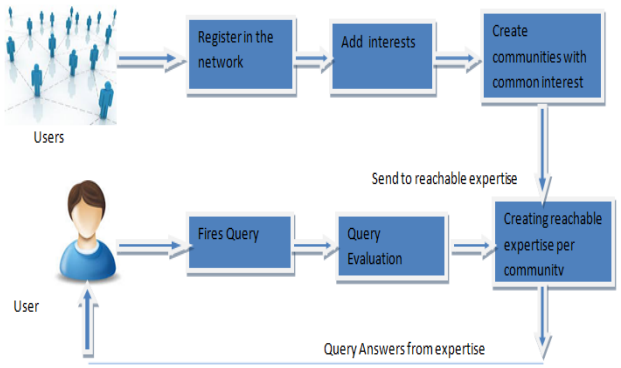

Figure 1: System Architecture

Proposed work consist various parts.

CREATION OF NETWORK

In this approach first network is created where number of users registered in the network. In registration process users fill the data; data contains general information about the user and also the other information like as their social interests. Based on this interest communities are created from which user can share common interests [2].

Here each community can provide a suitable or valuable data or information to the users whoever fired the data query in the network. It means each community has some social expertise in their interest.

QUERY TRANSMISSION TO REACHABLE EXPERTISE

For creating an expertise in each community is very important for this first choose the user as an expert randomly, after this when user (any user in the network) fired a data query in the network, an expert will answer this query as well as other users also will give an answer to that query. Based on this user can rate the expert and on the basis of rating user choose as particular expertise in that community.

When any user in the network fires a data query, query evaluation can be done. This evaluation helps to extract information from the fired query. As user may belong to more than one community this will helpful to understand that in which community the query belongs. Query is forwarded to the particular community where query relates that community [4]. Then community expert will give an answer to that fire data query.

Algorithm for help to delivery of the query or transmission of the query in the network:

Input: Query=q, Node=n

- ✓ Divide the query fired by user into words. (Say tokenized words)
- ✓ Store these tokenized words into an array.
- ✓ Fetch all categories and their related words.
- ✓ Store category related words into an array. (Say category words array)
- ✓ Put a loop on tokenized words array (say loop-1)
- ✓ Put another loop on category words array (say loop-2) inside loop-1.
- ✓ Compare each word from loop-1 with each word from loop-2.
- ✓ If match found, save this query in the respective category word from loop-2.
- ✓ Else, repeat step 7.
- ✓ If match do not found till the end of the both loop query will not save in database.

Routing metric helps to delivery of the query, this will updated using routing algorithm separately. At least one copy of query is answered by any other nodes in the network having same community in the network as that of query issuer.

QUERY ANSWERING

User will get and choose the answer from the expertise node [3]. This will help to reduce the communication cost.

While registering in the network each node has maintain the information related to the category he is expertise in. So based on this information can create a set of categories and nodes in each category

Routing algorithm helps to transmit the query in the network and branch and bound algorithm helps to minimise the total communication cost and discover the optimal transmission strategy while achieving a target query rate. Communication cost is directly proportional to the number of transmissions in the network.

Input: User queries and query answers

- ✓ Fetching user queries and responses related to respective queries from database.
- ✓ Dividing all queries and users responses related to respective query categories.
- ✓ Calculating query rate and communication cost
- ✓ Comparing query rate and communication cost of every query to others queries.
- ✓ Setting the priority to each query

✓ Branching all queries with low communication cost and query rate to get optimal transmission strategy.

QUERY FORWARDING

As we say routing algorithms helps to transmit the query some parts of it helps to forward the query to the nodes in the network. Node i and j be the nodes in the network who share the data in the network. Let q be the query in category c. When query is created by user in the network it transmits in to the network within the community the user belongs. On the basis of this communication is getting low it means transmission done in between two nodes only. If more than two nodes are within communication range then select one of them as sender. It means that node can fire a data query in the network. Node i can fetches the query having lowest communication cost from its queue. The queue holds the queries which are created by node i or it receives queries from other nodes in the network. The queue is sorted means the query having lowest communication cost is at the head of the queue. If node j be having high expertise for the queries in category in c. it directly sends the answer by creating and replying to the query issuer

VII. ANALYSIS OF THE RESULT

The program is implemented in JAVA. The experiment is carried out using NetBeans IDE 8.0 with windows operating system. The data is taken from user is manually and it stores into the database. We analysed the systems feasibility and efficiency, in terms of query rate and query delay on the dataset with number of variations. We compare several variations of the schemes like zero-hop, one-hop, two-hop, and three-hop, No Feedback, Flooding, Gossip, Willingness, Spray and Wait, Social-based. Our experiment involves twenty-five volunteers. They are marked as Nodes. In the experiment, we define three categories of queries, i.e., music, sport, technology. Figure a and figure b respectively relates to query rate and query delay by varying the schemes.

Figure a and b respectively report success query rate and query delay.

Table 1 shows the experimental result under query rate parameter. It shows the overall performance of different schemes.

Sr. No.	Schemes	Existing System	Proposed System
1	0- hop	0.34	1.44
2	1- hop	0.73	1.76
3	2- hop	0.96	1.50
4	3- hop	0.86	1.69
5	No feedback	0.83	1.90
6	Flooding	0.39	1.29
7	Gossip	0.52	1.38
8	Willingness	0.51	1.44
9	Spray and Wait	0.46	1.31
10	Social-based	0.68	2.01

Table 1: Experiment Result with Query Rate

Fig a shows the experiment result under success query rate parameter. The success query rate, defines the ratio of successfully answered queries to the total generated queries.

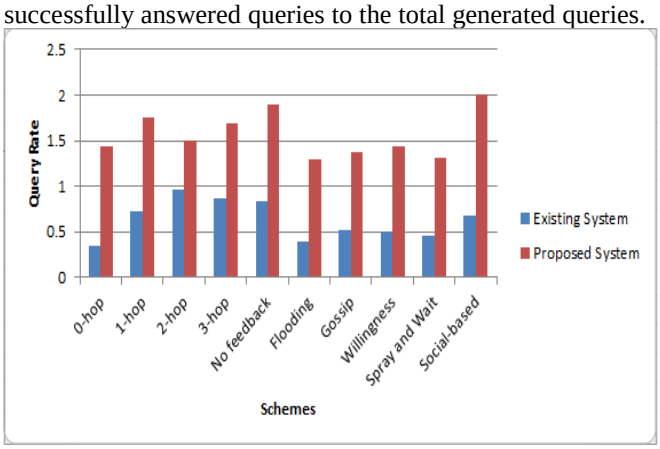

Figure a: Query Rate

Table 2 shows the experimental result under query delay parameter. It shows the overall performance of different schemes.

Sr. No.	Schemes	Existing System	Proposed System
1	0- hop	4.56	1.51
2	1- hop	7.52	1.74
3	2- hop	8.83	1.74
4	3- hop	9.42	2.10
5	No feedback	9.12	1.84
6	Flooding	4.68	1.1
7	Gossip	7.28	1.18
8	Willingness	6.23	0.84
9	Spray and Wait	5.67	1.13
10	Social-based	9.68	1.07

Table 2: Experiment Result with Query Delay

Figure b shows the result of Query delay over the number of variation schemes. Query delay which is the period from the time when a node generates the query to the time when it receives the answer.

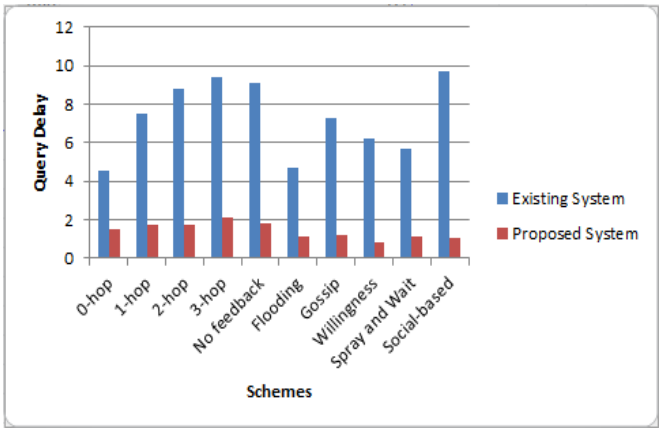

Figure b: Query Delay

ISSN: 2394-4404

Result analysis is compared with two parameter first one is the success query rate, i.e., the ratio of successfully answered queries to the total generated queries, and another last one is the query delay which is the period from the time when a node generates the query to the time when it receives the answer.

VIII. CONCLUSIONS

In this paper, we have presented an extension mechanism of query transmission strategy providing optimal query transmission in the network. This proposed method can help and supports the local community based adhoc network. It means it helps to discover and allows user to query a localized data such as surrounding news, local knowledge and other information that people cannot report to online website but that data may be on their portable devices or which it can be generate upon a user request. For analyzing systems feasibility and efficiency query rate and query delay studied. Branch and bound mechanism helps to transmit the query with minimum communication cost.

IX. FUTURE WORK

The proposed extension mechanism of query transmission strategy provides optimal query transmission in MANET. As future work, we plan to integrate the proposed approach to provide efficient result which supports large dataset. Furthermore, for further study we use different routing protocol for more efficient result also we can use the more efficient algorithm.

ACKNOWLEDGMENT

The author would like to thanks to department of Computer Science and Engg, Annasaheb dange college of engineering and Technology, Ashta, for suggesting the line of the research.

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