'FUTURIZM-2014, (14TH & 15TH March 2014), 'P.D.E.As College of Engineering, Manjari[Bk]', 'IIP Cell,'Manjari Road, Hadapsar, Pune-412307. India.', 'Chief Editor:Dr.K.R.Harne', Editors: Prof R V Patil, Prof Niraja Jain

International Journal of Innovative Technology & Adaptive Management (IJITAM)
ISSN: 2347-3622, Volume-1, Issue-11, August, 2014

Multipath Routing in Delay Tolerant Networks Using Hypercube Based Social Feature

Prajakta B. Bhosale
Jaywantrao Sawant college of Engineering, Pune University, Pune, India
Department of Computer Engineering, JSCOE, Hadapsar, Pune, India.
prajaktab064@gmail.com

***Abstract* - In our day to day life it has now become very important to send or receive data over large distance within limited time and to process this for further use. The delay tolerant networks gives facility for this type data sending and receiving methods using different protocols and various types of networks using various routing strategies. This consist study of existing methods for routing in delay tolerant networks. We propose the algorithm for routing which obtains confidence and reliability of nodes in network. Formulating confidence the best nodes are chosen to send data from source to destination in order to reduce delay, delivery rate and latency.**

***Keywords* – Delay tolerant network, delay, delivery rate, latency.**

I. INTRODUCTION

In day to day life is now very important to send or receive data correctly and within time to destination or from source. Therefore to transfer it through network it can be some time erroneous or may introduce with some useless part to damage it. Recently the data can be send through delay tolerant networks using various different approaches and using different routing methods. The recent work in sending data consist of various results considering various parameters like delay , throughput, latency, number of nodes in a network, types of networks used, topology, algorithms to send on networks, etc. A delay tolerant network is communication network designed to withstand long delays. It is capable of storing packets in intermediate nodes until such time as an end-to-end route can be established. There is no end-to-end path between some or all of the nodes in Delay Tolerant Networks, which makes routing quite different from other types of wireless networks. In a delay-tolerant network, traffic can be classified in three ways, as expedited, normal and bulk. The need of delay tolerant or disturbance tolerant networks came in picture from 1970's, where in 1980 the use of ad hoc networking is and in 1990's the use of MANET was started for routing.

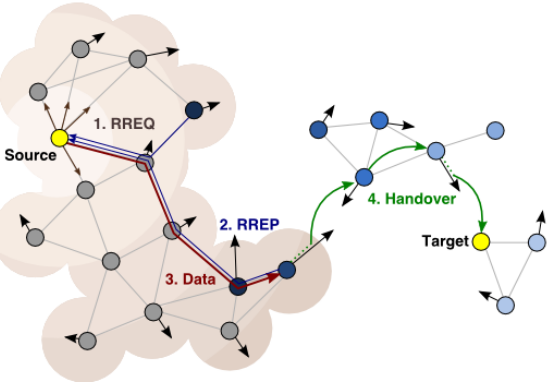

Fig: 1 Delay Tolerant Networks.

1. RELATED WORK

The routing in delay tolerant networks has many protocols among them some can be named as Epidemic routing and two-hop forwarding routing , Spray and Wait routing , Spray-and-Focus , efficient adaptive routing etc. And also considering them in different networks such fully cooperative, non-cooperative, and probabilistic cooperative. The Uichin Lee, Soon Young Oh, Kang-Won Lee, Gerla analyzed Delay tolerant networks for impact of various parameters like buffer size, multi-user diversity among multicast receivers, and delay constraints on the throughput [1]. In case of routing performance in cooperative networks the delivery delay and communication cost observed and expressed in terms of numbers of copies of a packet

International Journal of Innovative Technology & Adaptive Management (IJITAM)
ISSN: 2347-3622, Volume-1, Issue-6 , March, 2014

circulating in the network at the time of delivery. These characteristics of routing process applied to stateless delay tolerant protocols such as epidemic, two-hops, and spray and wait. Resta, G. Santi, consider fully cooperative, non-cooperative, and probabilistic cooperative scenarios, and derive expressions of the packet delivery rate (PDR) under certain framework. [3] In delay tolerant networks one concept was introduced which defines social feature of a node. These social features are considered to be very important which compares node with human's social feature that people come into contact more frequently they have more social features in common [9]. The efficient adaptive routing (EAR) allocates bandwidth (or forwarding opportunities) between its multi-hop forwarding component and its mobility-assisted routing component dynamically to improve bandwidth utility [5].The method to proposed by Yong-Pyo Kim, Ja-Il Koo, Euihyun Jung, can resolve the disadvantages of Spray and Wait routing protocol with the use of the an ACK message and message forwarding based on the delivery probability to improve a forwarding decision and the buffer management scheme [7]. Sarbazi-Azad H., Karlsson G. investigated a class of mobile wireless sensor networks that are consist of combination of delay tolerate networks (DTN) and wireless sensor networks which consult about terms of Routing, data gathering, and neighbor discovery[10]. In large space where nodes are in sparse network and are separated into different zones and where finding mobility is difficult to find communication path for sending data, can be achieved using two parameters History contact between the mobile nodes and the frequency of visiting different zones of the network, given by Sammou [11].

2. EXISITING WORK

Chen I., Bao F., Chang M design and validate a dynamic trust management protocol for secure routing optimization in DTN environments in the presence of well-behaved, selfish and malicious nodes for dynamically changing network conditions to minimize trust bias and to maximize the routing application performance. The routing protocol was checked against trust-based and non-trust based routing protocol which shows new proposed trust-based routing protocol can effectively trade off message overhead and message delay for a significant gain in delivery ratio[12]. In case of loaded network it is necessary to decide which message is to be forwarded & which is to be stored in buffer or dropped in case of buffer is full. Thus in this case the forwarding/dropping decision can be made at a node during each contact for either optimal message delivery ratio or message delivery delay [13]. Some work in area of use of social features of node in routing was done to improve delivery rate and latency by using hypercube-based routing. And these factors are also considered under different path conditions like single/multipath and difference resolutions with/without shortcuts. Some work to overcome disadvantages of frequent network disconnection in mobile ad hoc network with group mobility model the routing method based on epidemic routing group-epidemic routing was improved to perform more effectively for group mobility model, in which the whole group is behaved as a single node. While in changing or a frequent network partitioning it is was challenging to maintain end-to-end path between source and destination nodes.

3. PERFORMANCE IMPORVING WORK

The various routing protocols such as epidemic routing where data replication techniques used over multiple paths for reliable data delivery, which creates a large number of duplicated packets in the network. Thus Hyunwoo Kang makes use of vector routing using the vector of node movements [14]. In vector routing, the direction and velocity of nodes are calculated from the location information of nodes, and then nodes efficiently decide which nodes should take replicated packets as well as the number of packets to replicate. For Delay-Tolerant Mobile Networks (DTMNs) a cluster-based routing which groups nodes with similar mobility pattern into a cluster, which can then share their resources such as buffer space for overhead reduction and load balancing, to achieve efficient and scalable routing in DTMN. In distributed clustering due lack of continuous communications among mobile nodes and possible errors in the estimation of nodal contact probability, convergence and stability one scheme named exponentially weighted moving average employed for on-line updating nodal contact probability, with its mean proven to converge to the true contact probability. Considering energy of node Energy-Efficient n-Epidemic Routing Protocol was introduced by Xiaofeng Lu, Pan Hui. They proposed n-epidemic routing protocol which transmit only when the number of neighbors reaching a certain threshold and shows that this routing protocol can increase the delivery performance of basic epidemic-routing by some extents. Articulation nodes are the articulation points or cut vertices of this local sub-graph, and are the nodes whose removal will disconnect the graph.

International Journal of Innovative Technology & Adaptive Management (IJITAM)
ISSN: 2347-3622, Volume-1, Issue-6 , March, 2014

Thus, these articulation nodes are more likely to be able to deliver messages outside the local cluster. Packets will be buffered in these nodes and forwarded to other articulation nodes when they meet. The process repeats until messages reach their destinations. The simulation results by Li Ding, Bo Gu, Xiaoyan Hong, Dixon B show that Articulation Node Based Routing algorithm performs better than related protocols in terms of delivery rate and efficiency [21].The node cooperation shows effect on performance of routing protocols for delay tolerant networks. The epidemic and two-hops routing perform under the fully cooperative node behavior and shows some results in terms of packet delivery rate under some standard conditions. Resta G., Santi, P.Sensor shows results that epidemic routing provides the better packet delivery rate under all degrees of network cooperation, binary SW routing can achieve comparable performance, with the potential of significantly reducing message overhead. According to Yi Xian, Chin-Tser Huang, Cobb J. a Look-Ahead Routing and Message Scheduling approach (ALARMS) using a variation of the well-known ferry model, showing results for existing routing protocols as epidemic routing, spray-and-wait, and spray-and-focus, in terms of delay time, delivery ratio, and overhead.

II. ORIGINAL WORK

A. Idea of Proposed System

The proposed system will consist of number of nodes in networks where there will source node and destination node from which data will be send and other side data will received. Thus to find better path among all available connections between various nodes and to transfer data one should check for reliability and power of node to transfer data to its neighbor node and thus forwarding capacity of node in terms of confidence of a node. The table consisting of confidence of nodes obtained by formula using probability of successful transmission or failed in transmission.

B. Proposed Algorithm

Finding dependable and reliable paths in delay tolerant networks using mathematical model design as:
Let N be total number of nodes in the delay tolerant network.
Let a be single node where

$N = \{1, 2, 3 \ldots n\}$

Let $P = \{P1, P_2, P_3 \ldots P_n\}$ be the total paths from source n_s to destination node n_d .

We formulate our problem as given multiple paths in delay tolerant network. Find the least dependable and reliable path.

Step 1. Using hypercube based multipath routing obtain multiple paths between n_s source node & destination node n_d.

Step 2. For every node n_i in the path obtain confidence $Conf(n_i, n_{i+1})$ by using following equation

$$Conf(n_i, n_{i+1})_r = \frac{a_r s_r^{i,i+1} + b_r f_r^{i,i+1}}{c_r s_r^{i,i+1} + d_r f_r^{i,i+1}}$$

Where $s_r^{i,i+1}$ is the number of successful r events that n_i has measured for n_i, n_{i+1}.
$f_r^{i,i+1}$ is the number of failed type n_i events that n_i has measured for n_{i+1} & a, b, c, d weights for successful & failed events.

Step 3. Nodes calculate their confidence value with their neighbor node and store the value.

Step 4. These values are updated by nodes periodically.

Step 5. Once the node table filled with confidence value, source nodes select hypercube based path having nodes with maximum confidence value with its neighbor.

III. EXPECTED RESULTS

The results that we expects from this system is best routing path selecting best confidence nodes to consume less time and less power in the system. Thus selected path will able to send data through nodes with maximum confidence to reduce latency, delivery rate and delay.

ACKNOWLEDGMENT

I would like to extend my sincere thanks to my guide Prof. H.A. Hingoliwala for his guidance, encouragement and continuous support for work. I also would like to thank all the staff members for their support. Last but not the least I would like to thank my

International Journal of Innovative Technology & Adaptive Management (IJITAM)
ISSN: 2347-3622, Volume-1, Issue-6 , March, 2014

family members for their love, support and belief in me & my studies.

REFERENCES

[1] *Uichin Lee; Soon Young Oh; Kang-Won Lee; Gerla, M.Network Protocols, 2008. ICNP 2008. IEEE International Conference on2008*

[2] Puri, P.; Singh, M.P.Information Systems and Computer Networks (ISCON), 2013 International Conference on2013.

[3] Resta, G.; Santi, P.Parallel and Distributed Systems, IEEE Transactions on232012.

[4] LongxiangGao; Ming Li; Bonti, A.; Wanlei Zhou; ShuiYuMobile Computing, IEEE Transactions on122013.

[5] Cong Liu; JieWuCommunications, 2009. ICC '09. IEEE International Conference on2009.

[6] Ing-Ray Chen; FenyeBao; MoonJeong Chang; Jin-HeeChoGlobal Telecommunications Conference (GLOBECOM 2010), 2010 IEEE2010.

[7] Yong-Pyo Kim; Ja-Il Koo; Euihyun Jung; Nakano, K.; Sengoku, M.; Yong-Jin ParkCommunications and Information Technologies (ISCIT), 2010 International Symposium on2010.

[8] Amantea, G.; Rivano, H.; Goldman, A.Network Computing and Applications (NCA), 2013 12th IEEE International Symposium on2013.

[9] Jie Wu; YunshengWangINFOCOM, 2012 Proceedings IEEE2012.

[10] Nayebi, A.; Sarbazi-Azad, H.; Karlsson, G.Parallel & Distributed Processing, 2009. IPDPS 2009. IEEE International Symposium on2009.

[11] Sammou, E.M.Multimedia Computing and Systems (ICMCS), 2012 International Conference on2012

[12] Qiao Fu; Lin Zhang; Wei Feng; Yixin Zheng Communication, Control, and Computing (Allerton),2011 49th Annual Allerton Conference on2011.

[13] Chen, I.; Bao, F.; Chang, M.; Cho, J.Parallel and Distributed Systems, IEEE Transactions onPP2013.

[14] Elwhishi, Ahmed; Ho, Pin-Han; Naik, K.; Shihada, BasemParallel and Distributed Systems, IEEE Transactions on242013.

[15] Yunsheng Wang; Wei-Shih Yang; JieWuParallel and Distributed Systems, IEEE Transactions on242013.