An efficient message passing technique using route path information in unstructured peer to peer network

M. Kavitha[1]

[1]Assistant Professor,
Department of Computer Science and Engineering,
SNS College of Engineering,
Coimbatore-641107, Tamilnadu, India

B. Chellaprabha[2]

[2]Professor & Head,
Department of Computer Science and Engineering (UG &PG),
SNS College of Engineering,
Coimbatore-641107, Tamilnadu, India

***Abstract*-- Peer-to-Peer overlay systems offer a substrate for the construction of large scale and distributed applications. The Peer-to-Peer technique is differentiated in to two major forms, Structured P2P and Unstructured P2P. In structured peer-to-peer networks, connections in the overlay are fixed. They typically use distributed hash table-based (DHT) indexing, such as in the Chord system. Unstructured peer-to-peer networks do not provide any algorithm for organization or optimization of network connections. Hence the functions like searching, querying etc. are mostly flooded. In this paper we propose a novel message passing technique in which each peer maintains the route path of the destination with in itself which uses this route path to send and receive messages. This method minimizes the packet flow in the unstructured P2P which occur during flooding technique.**

***Keywords*-- Peer-to-Peer, Unstructured P2P, Routing.**

I. INTRODUCTION

Peer-to-Peer overlay systems offer a substrate for the construction of large scale and distributed applications. There are two major types of P2P networks. They are Structured P2P and Unstructured P2P. In structured peer-to-peer networks, connections in the overlay are fixed. They typically use distributed hash table-based (DHT) indexing, in which a variant of consistent hashing is used to assign ownership of each file to a particular peer, in a way analogous to a traditional hash table's assignment of each key to a particular array slot. An unstructured P2P network is formed when the overlay links are established arbitrarily. Such networks can be easily constructed as a new peer that wants to join the network can copy existing links of another node and then form its own links over time.

In an unstructured P2P network, if a peer wants to find a desired piece of data in the network, the query has to be flooded through the network to find as many peers as possible that share the data. To establish a communication between peers the message has to be forwarded through flooding. i.e. the message will be forwarded to the neighbour peers and that message is forwarded by the neighbour peers to its neighbours until the destination is reached.

The unstructured Peer-to-Peer uses this method to search, message exchange, transfer files etc. The main disadvantage of flooding is that it causes a high amount of signaling traffic in the network. Hence such networks typically have very poor search efficiency. But its advantage of construction of huge network with out stringent constraint disallows to over throw this concept.

Hence to improve routing mechanism in Unstructured P2P we propose a novel routing technique in which we are going to maintain a route information table in each peer which maintains the route path towards the peers to which it communicates. Using the route path information the peer forwards messages to the destination through the selected path. This significantly reduces the packet forwarded to peers that does not correspond to the communication.

II. RELATED WORK

In [7] it is proposed that the peers maintains routing table to keep track of the information about the searched files and the information about peer that has the file. The information about the peer refers to the peer id associated with the peer.

In [4] we find that to cluster a certain group of peers there used a peer's interest identical table which gives information about the peers of specific cluster.

In [8] we find an efficient message routing technique implemented in structured Peer-to-Peer which can be used in our proposal.

III. PROPOSED METHODOLOGY

A. Outline

The proposed method flows through three steps.

1. Floods message from sender to receiver to obtain the route path.
2. Create a table which saves the information about the route path.
3. Send the other messages with help of route path saved in the peer.

B. Methodology

In Unstructured Peer-to-Peer the peers does not have any route information to route message to other peer. Hence we flood the message in the network. In the flooding mechanism the source forward the message to its neighbours. The neighbours the forward the message to their neighbours until the destination is reached or until the TTL value of the message query ends. In our approach when the message packet travels between the peers it keeps track of the peer ids of the peers it crosses over. Once when the message is received by the destination peer it sends acknowledgement message to the receiver. The acknowledgement message consists of the route path information. The acknowledgement is send as soon as the message is received by the receiver. The other similar message packets are dropped by the receiver. During the next communication with the same destination, the peer checks its route information table. If the route path is found then it uses the route path to forward the message packet in the selected path.

For example: The message has to be transferred from Peer A to Peer D. The message will be transferred at first through flooding mechanism ie, Peer A forwards packet to peers B, E, F. Now B, E and F forwards to its neighbours until it reaches the destination.

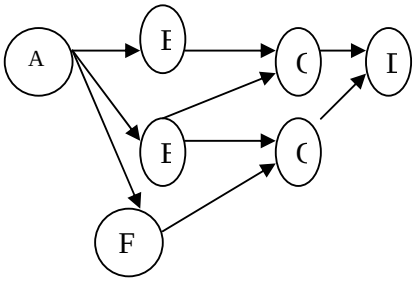

Fig. 1 Flooding Message between peers.

Here we assume that the message transfer between the A->B->C->D reaches first rather than the other messages. The acknowledgement message keeps track of this route path and replies it to the source.

Now in the source peer we maintain a table which saves the routing information.

TABLE 1
ROUTE INFORMATION TABLE

Peer Name	Peer address	Path
D	202.121.10.5	B,C

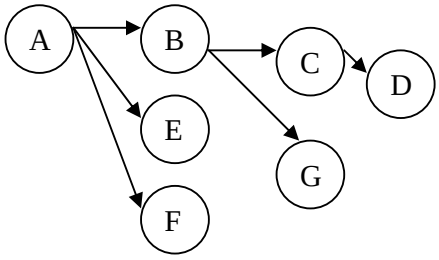

Fig. 2 Routing After the Route Path Information Known

Now the Peer A wants to send message again to Peer D then it will use the route path information from the route information table to forward the next packet ie., Peer A floods the message to its neighbours. Since the packet has its intermediate peer information it searches for its next neighbour B. When B receives the packet it acknowledges to A. The other neighbours discard the packet. Then B forwards packet to its neighbours. If Packet reaches C it then forwards the packet to D. Also C acknowledges to B. The other peers discard the packet. When message reaches D, it acknowledges the source in the reverse order. The proposed routing is shown in Fig 2. Now we see that in the proposed method the message forwarding from E, F and G are discarded.

C. Constraint in the proposed method

1) Size of the Routing Information Table: We should take care in keeping the routing information to be minimal. We keep the recently used information at the top and least recently used at the bottom. When the table fills up we discard information from the bottom.

2) Probability that the intermediate to be alive during communication: If any intermediate peer is not available during communication the former peer selects it's another neighbour and continues the communication. The new information will be updated during acknowledgement.

3) Wait for Acknowledgement during Failure: Consider if any intermediate fails the message will not be forwarded. The sender has to wait for acknowledgement for long time and resends the packet in the same path. To over come this we use the Tracer Routing mechanism [8] which acknowledges once the packet reaches its neighbour. Then the

neighbour forwards the packet. From this we can keep track of failure in communication.

IV. IMPLEMENTATION

We use the NS2 simulator to implement the proposed method. Our method is compared with the existing flooding technique. We use the number of peers accessed during communication as the comparison parameter. We consider the communication between the boundary peers in the simulation. i.e. the source at one end and destination at the other. We prove that the node accessed during our proposed method is significantly less compared to that of flooding technique. This proves that packet travels through few peers when compared to flooding. This significantly reduces the network traffic that occurs due flooding technique. Fig 3. Shows the comparison graph between the proposed and flooding techniques.

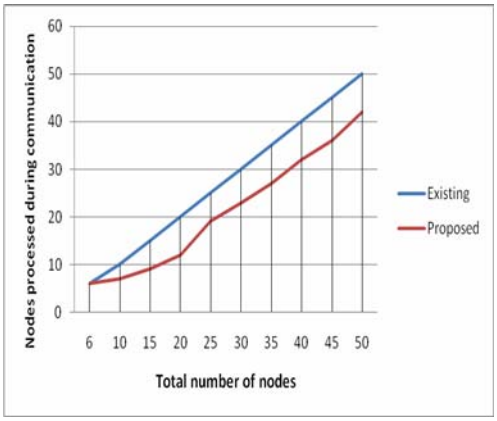

Fig. 3 Comparison graph between Flooding and Proposed method

V. CONCLUSION

An unstructured P2P network is formed when the overlay links are established arbitrarily. To establish a communication between peers the message has to be forwarded through flooding. The main disadvantage of flooding is that it causes a high amount of signaling traffic in the network. To overcome this we have to find a efficient routing technique. In this paper we have concentrated on message routing in Unstructured Peer-to-Peer. We provide a novel technique which saves the route path between the peers in each peer which helps to reduce the message broadcasting which is in use now a day. Each peer uses the route path, which shows a unique path to the receiver, to transfer the message.

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AUTHORS BIOGRAPHY

M. Kavitha received her Bachelor of Engineering degree in computer science and engineering stream from Anna University Chennai and M.E. Degree in computer science and engineering stream from Anna University Coimbatore. Her research interests accumulate traffic analysis and routing in the area of Peer to Peer computing.

B.Chellaprabha has completed her B.Sc degree from Bharathidasan University in 1993, Master of Computer Applications from Bharathidasan University in 1996, M.E in Computer Science and Engineering Anna University Chennai in 2007 and pursing Ph.D from Anna University of Technology,Coimbatore. She has more than 15 years of teaching experience in the teaching field. Currently, she is working as a Professor and Head of the Department of Computer Science and Engineering, SNS College of Engineering, Coimbatore,Tamil Nadu. Her areas of interest include Wireless sensor networks, Routing protocols, Congestion control and detection and Network Security. She has published 21 papers in reputed international, national level conferences and International journals.