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An Experimental Distributed Protocol to Serve Dynamic Groups for Peer-to-Peer Streaming

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Abstract: Peer-to-peer (P2P) streaming has been widely deployed over the Internet. A streaming system usually has multiple channels, and peers may form multiple groups for content distribution. In this paper, we propose a distributed overlay framework (called SMesh) for dynamic groups where users may frequently hop from one group to another while the total pool of users remain stable. SMesh first builds a relatively stable mesh consisting of all hosts for control messaging. The mesh supports dynamic host joining and leaving, and will guide the construction of delivery trees. Using the Delaunay Triangulation (DT) protocol as an example, we show how to construct an efficient mesh with low maintenance cost. We further study various tree construction mechanisms based on the mesh, including embedded, bypass, and intermediate trees. Through simulations on Internet-like topologies, we show that SMesh achieves low delay and low link stress.

Key words: Shared overlay mesh for peer to peer network, Delivery trees, Delaunay triangulation

I. INTRODUCTION

Peer-to-peer streaming has emerged as viable business model and systems architecture for Internet-scale applications [1]. It is an effective way to build applications that connect millions of users across the globe without reliance on specially deployed (centralized) servers. Peer-to-peer (P2P) streaming has been widely deployed over the Internet. With the penetration of broadband Internet access, there has been an increasing interest in media streaming services.

Recently, P2P streaming has been proposed and developed to overcome the limitations of traditional server-based streaming. P2P streaming system cooperative peers self-organize themselves into an overlay network via uncast connections and adapt to changing peer population. In these applications, as peers may dynamically hop from one group to another, it becomes an important issue to efficiently deliver specific contents to peers. One obvious approach is to broadcast all contents to all hosts and let them select the contents. Clearly, this is not efficient in terms of bandwidth and end-to-end delay; especially for unpopular channels. Maintaining a separate and distinct delivery overlay for each channel appears to be another solution. However, this approach introduces high control overhead to maintain multiple dynamic overlays. When users frequently hop from one channel to another, overlay reformation becomes costly and may lead to high packet loss. Most of the literatures on peer-to-peer (P2P) live streaming focuses on how to provide best-effort streaming quality by efficiently using the system bandwidth; however, there is no guarantee about the provided streaming quality. The issues mentioned in above two paragraphs are sorted out in this paper. In section 2, we propose a single shared overlay mesh construction for streaming process and in section 3, we propose algorithms which guarantees streaming quality statistically. A Single Shared Overlay Mesh For Peer To Peer Streaming In Dynamic Groups In this application, we consider building a data delivery tree for each group. To reduce tree construction and maintenance costs, we build a single shared overlay mesh. The mesh is formed by all peers in the system and is, hence, independent of joining and leaving events in any group. This relatively stable mesh is used for control messaging and guiding the construction of overlay trees. With the help of the mesh, trees can be efficiently constructed with no need of loop detection and elimination. Since an overlay tree serves only a subset of peers in the network, we term this framework Subset-Mesh, or SMesh. Our framework may use any existing mesh based overlay network. In this application, we use Delaunay Triangulation (DT) [2].

The traditional DT protocol has the following limitations: Inaccuracy in estimating host locations, Single point of failure, Message looping. We propose several techniques to improve the DT mesh, e.g., for accurately estimating host locations and distributed partition detection. The two important issues in construction SMesh: *Mesh* formation and maintenance, Construction of data delivery trees. SMesh does not rely on a static mesh. In the case of host joining or leaving, the underlying DTmesh can automatically adjust itself to form a new mesh. The trees on top of it will then accordingly adjust tree nodes and tree edges. Also note that in SMesh a host may join as many groups as its local resource allows. If a host joins multiple groups, its operations in different groups are independent of each other.

II. GLOBAL NETWORK POSITIONING (GNP)

GNP estimates host coordinates in a multidimensional Euclidean space such that the distance between two hosts in the Euclidean space correlates well with the measured roundtrip time between them [3]. In GNP, a few hosts are used as landmarks. Landmarks first measure the round-trip time between each other and forward results to one of them. The landmark receiving results uses the results to compute the landmark coordinates in Euclidean space. He coordinates are then disseminated back to the respective landmarks. More specifically, to estimate landmark coordinates, he following objective function is minimized.

$$J_{landmark}(L_1, L_2, \ldots, L_M) = \sum_{L_i, L_j \in \{L_1, \ldots, L_M\} | i>j} \left(\|L_i - L_j\| - RTT(i,j) \right)^2$$

Where M is the number of landmarks, Li and Lj are the coordinates of landmarks i and j in the Euclidean space, and RTT (i,j) is the round-trip time between i and j. As shown, Jlandmark is the sum of the estimation error between the measured round-trip time and the logical distances in the Euclidean space among the landmarks. Therefore, we seek a set of landmark coordinates such that the sum is minimized. If there are multiple sets of {L1; L2; . . . ; LM} to minimize Jlandmark, any one set can be used. Given the landmark coordinates, a normal host estimates its coordinates by minimizing a similar objective function:

$$J_{host}(H_u) = \sum_{L_i \in \{L_1, \ldots, L_M\}} \left(\|H_u - L_i\| - RTT(u,i) \right)^2$$

Where Hu is the coordinates of host u, and RTT (u,i) is the measured round-trip time between host u and landmark i. Note that landmarks do not have to be permanent. It is easy to modify to remove a failed landmark or add a new landmark. Each host can obtain its coordinates by pinging *O* (1) landmarks and using *O* (1) messages. It is highly efficient and scalable.

III. IMPLEMENTATION

Implementation is the stage of the project when the theoretical design is turned out into a working system. Thus it can be considered to be the most critical stage in achieving a successful new system and in giving the user, confidence that the new system will work and be effective.

The implementation stage involves careful planning, investigation of the existing system and it's constraints on implementation, designing of methods to achieve changeover and evaluation of changeover methods.

A. Peer to Peer Network Module:

P2P streaming system, the server (or a set of servers) usually provides multiple channels. A peer can freely switch from one channel to another, Peers in the same group share and relay the same streaming content for each other

B. Distributed partition detection Module:

We use Delaunay Triangulation (DT) as an example. We propose several techniques to improve the DT mesh, e.g., for accurately estimating host locations and distributed partition detection. Based on the mesh, we study several tree construction mechanisms to trade off delay and network resource consumption automatically Adjust itself to form anew mesh. The trees on top of it will then accordingly adjust tree nodes and tree edges. Also note that in SMesh a host may join as many groups as its local resource allows. If a host joins multiple groups, its operations in different groups are independent of each other.

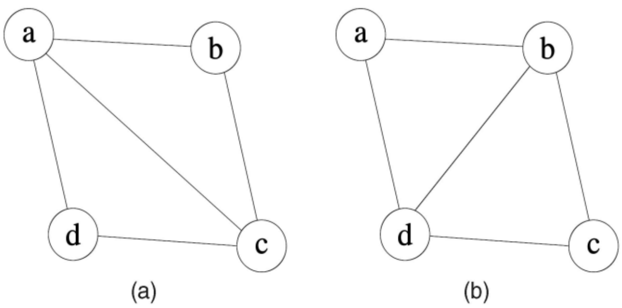
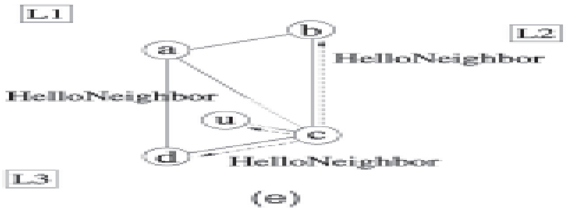


Fig : Distributed detection peer to peer two adjacent triangles nodes

C. Dynamic Joining Host Module:

A joining host, after obtaining its coordinates, sends a Mesh Join message with its coordinates to any host in the system. Mesh Join is then sent back to the joining host along the DT mesh based on compass routing. Since the joining host is not a member of the mesh yet, it can be considered as a partitioned mesh consisting of a single host. The Mesh Join message finally 0+triggers the partition recovery mechanism at a particular host in the mesh, which helps the new host join the mesh.

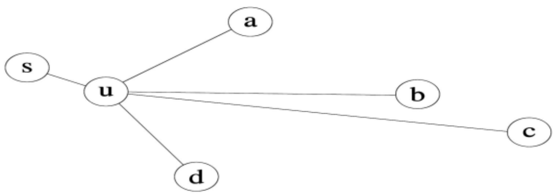


(e)

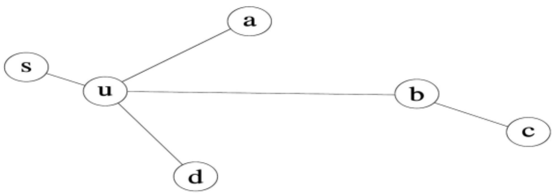
D. Path Aggregation for QoS Provisioning Module:

Two independent connections across domains A and B are set up, which leads to high usage of long paths and hence high network resource consumption. Furthermore, in the traditional DT protocol, a host may have many children. However, a host often has a node stress threshold K for each group depending on its resource. To address these problems, we require that the minimum adjacent angle between two children of a host should exceed a certain threshold T

Consider a source s and a host u in the network. Once u accepts a child, u checks whether its node stress exceeds K or whether the minimum adjacent angle between its children is less than T It selects a pair of children with the minimum adjacent angle and delegates the child farther from the source to the other. Note that after aggregation, the overlay tree is still loop free because hosts are still topologically sorted according to their distances from the source



(a)



(b)

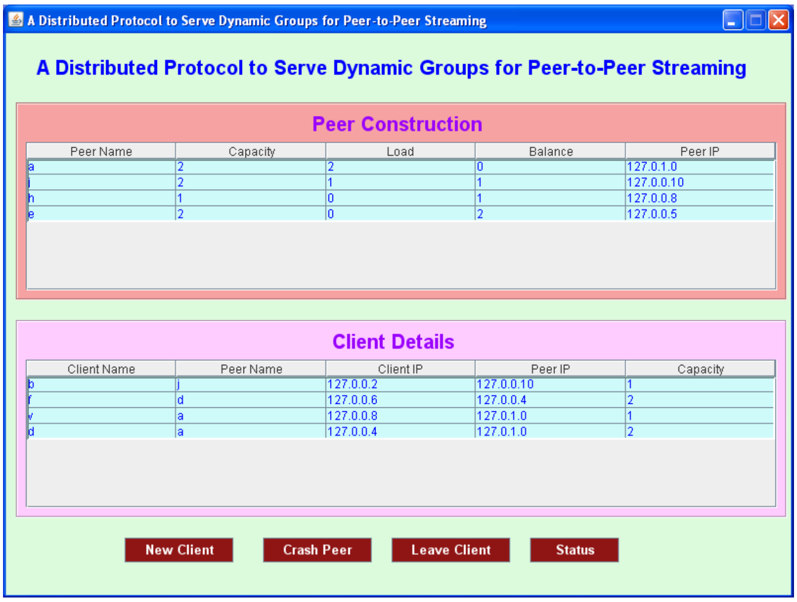


Fig 1: Peer Connection Diagram

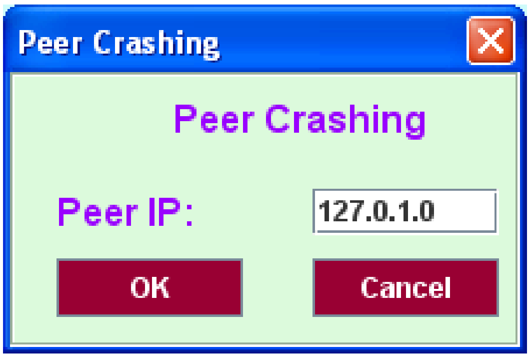


Fig 2: Peer Crashing Diagram

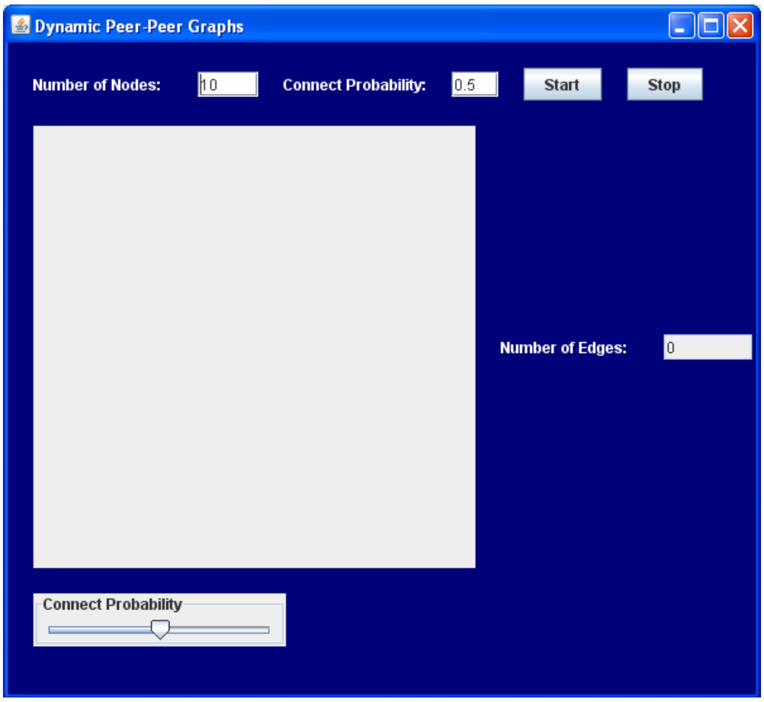


Fig 3: Dynamic peer graph probability

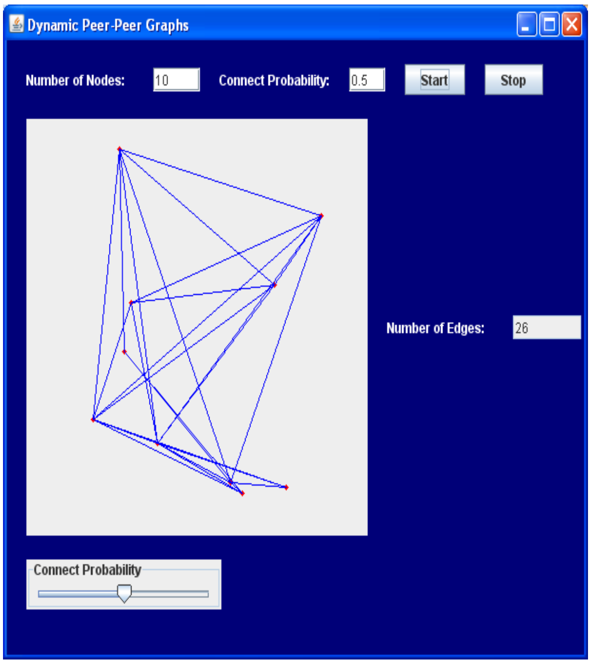


Fig 4: Dynamic peer graph

IV. CONCLUSION

In P2P streaming networks, users may frequently hop from one group to another. In this paper, we propose a novel framework called SMesh to serve dynamic groups for Internet streaming. SMesh supports multiple groups and can efficiently distribute data to these dynamic groups. It first builds a shared overlay mesh for all hosts in the system. The stable mesh is then used to guide the construction of data delivery trees for each group. We study three ways to construct a tree, i.e., embedded, bypass, and intermediate trees. We also propose and study an aggregation and delegation algorithm to balance the load among hosts, which trades off end-to-end delay with lower Network resource usage. Through simulations on Internet-like topologies, we show that SMesh achieves low RDP and low link stress as compared to traditional tree-based protocols. In our simulations, a bypass tree performs better than an embedded tree in terms of RDP but not so for link stress. By Adjusting message threshold, an intermediate tree can achieve performance between bypass and embedded trees.

REFERNCES

1. X. Zhang, J. Liu, B. Li, and T.-S.P. Yum, "CoolStreaming/DONet: A Data-Driven Overlay Network for Peer-to-Peer Live Media Streaming," Proc. IEEE INFOCOM '05, pp. 2102-2111, Mar. 2005.
2. X. Liao, H. Jin, Y. Liu, L.M. Ni, and D. Deng, "Anysee: Peer-to- Peer Live Streaming," Proc. IEEE INFOCOM '06, Apr. 2006.
3. Y. Tang, J.-G. Luo, Q. Zhang, M. Zhang, and S.-Q. Yang, "Deploying P2P Networks for Large-Scale Live Video-Streaming Service," IEEE Comm. Magazine, vol. 45, no. 6, pp. 100-106, June 2007.
4. X. Hei, Y. Liu, and K.W. Ross, "Inferring Network-Wide Quality in P2P Live Streaming Systems," IEEE J. Selected Areas in Comm., vol. 25, no. 9, pp. 1640-1654, Dec. 2007.
5. X. Hei, C. Liang, J. Liang, Y. Liu, and K.W. Ross, "A Measurement Study of a Large-Scale P2P IPTV System," IEEE Trans. Multimedia, vol. 9, no. 8, pp. 1672-1687, Dec. 2007.
6. M. Cha, P. Rodriguez, J. Crowcroft, S. Moon, and X. Amatriain, "Watching Television over an IP Network," Proc. ACM Internet Measurement Conf. (IMC '08), pp. 71-83, Oct. 2008.
7. Rossi, M. Mellia, and M. Meo, "A Detailed Measurement of Skype Network Traffic," Proc. Int'l Workshop Peer-To-Peer Systems (IPTPS '08), Feb. 2008.
8. J. Liebeherr, M. Nahas, and W. Si, "Application-Layer Multicasting with Delaunay Triangulation Overlays," IEEE J. Selected Areas in Comm., vol. 20, no. 8, pp. 1472-1488, Oct. 2002.
9. T.S.E. Ng and H. Zhang, "Predicting Internet Network Distance with Coordinates-Based Approaches," Proc. IEEE INFOCOM '02, pp. 170 179, June 2002.
10. L. Tang and M. Crovella, "Virtual Landmarks for the Internet," Proc. ACM Internet Measurement Conf. (IMC '03), pp. 143-152, Oct. 2003.

