Efficient Peer-to-Peer File Sharing based on Network Coding

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***Abstract*— Network coding is a promising improvement of routing to enhance network throughput and give high dependability. It permits a hub to create yield messages by encoding its gotten messages. Peer-to-peer systems are a flawless spot to apply system coding because of two reasons: the topology of a peer-to-peer system is built discretionarily, accordingly it is anything but difficult to tailor the topology to encourage network coding; the hubs in a peer-to-peer system are end has which can perform more unpredictable operations, for example, decoding and encoding than basically storing and sending messages. In this paper, we propose a plan to apply network coding to peer-to-peer file imparting which utilizes a peer-to-peer system to appropriate files lived in a web server or a file server. The plan abuses an exceptional sort of system topology called combination network. It was demonstrated that combination network can accomplish unbounded system coding addition measured by the proportion of system throughput with network coding to that without network coding. Our plan encodes a file into various**
messages and partitions peers into numerous gatherings with every gathering in charge of handing-off one of the messages. The encoding plan is intended to fulfill the property that any subset of the messages can be utilized to interpret the first file the length of the measure of the subset is sufficiently extensive. To meet this prerequisite, we first characterize a deterministic direct system coding plan which fulfills the sought property, then we interface peers in the same gathering to surge the relating message, and associate peers in diverse gatherings to appropriate messages for decoding. In addition, the plan can be promptly reached out to bolster join heterogeneity and topology attention to further enhance framework execution as far as throughput, dependability and connection stress. Our reproduction results demonstrate that the new plan can accomplish 15%–20% higher throughput than another peer-to-peer multicast framework, Narada, which does not utilize network coding. In expansion, it accomplishes great dependability and robustness to connection disappointment or agitate.

Key Words — Network coding, throughput, peer-to-peer network, robustness

I. INTRODUCTION

In the most recent quite a long while, the Internet has seen enormous increment of diverse sorts of web-based applications, extending from web-based record offering to feature television/conferencing. Web-based applications have increased more and more hobbies because of the adaptability and simple availability. Numerous such applications include one source (server) and different destinations (beneficiaries). Then again, because of absence of multicast bolster over the Internet, these applications more often than not experience the ill effects of the scalability issue, which restrains the number
of collectors included. Peer-to-peer is a promising technology that can execute multicast at the application layer, where collectors (peers get information, as well as forward information. By joining peer-to-peer technology into web-based applications, the scalability issue can be disposed of, i.e., the framework execution (throughput, inertness, and so on.) won't be impeded when there are more clients in the framework.

In this paper, we consider applying peer-to-peer technology to file sharing administrations, in which a web server or a file server holds a file that is asked for by different customers (beneficiaries). In most peer-to-peer frameworks, peers generally are end users' close to home PCs which may have constrained assets or even be precarious. It is discriminating for the file sharing framework to be dependable also, flexible while attaining to great throughput at the same
time. Network coding is another promising technology that can be utilized to enhance framework throughput and reliability. Here we give a brief presentation on network coding. In today's network, messages are for the most part exchanged by routing through middle hubs between the source and the destination, i.e., by having middle hubs store and forward messages. Actually, routing is not by any means the only operation that can be performed at a hub. As of late, network coding has risen as a promising improvement of routing to progress network throughput and give high reliability. Network coding alludes to a plan where a hub is permitted to create yield messages by encoding (i.e., registering certain capacities of) it is gotten messages. In this way, network coding permits data to blend, as opposed to the conventional routing approach where every hub basically advances got messages.

II. RELATED WORK

In [1], M. Yang et al, demonstrated A hybrid peer-to-peer framework for disseminated information sharing which consolidates the structured and unstructured peer-to-peer systems. In the proposed hybrid framework, an organized ring-based center system structures the backbone of the framework and different unstructured peer-to-peer systems are appended to the backbone and

correspond with one another through the backbone. Information is created and conveyed among the peers. The center organized system gives an exact approach to thin down the questioned information inside a certain unstructured system, while the unstructured systems give a low cost instrument to peers to join or leave the framework openly. In [2], M. Kim et al, demonstrated a developmental way to deal with the issue of minimizing the measure of assets utilized for network coding and contrasted its execution and other existing negligible methodologies. Our outcomes demonstrate that the proposed methodology attains to better execution over the negligible methodologies. All the more imperatively, the proposed methodology sums up effortlessly to a mixture of optimization situations. There are a few themes for further research. GA components of the proposed methodology, for example, the technique for developing the initial population, can be further specific for the issue close by to enhance the calculation's execution. The structure of the proposed methodology may be modified to work with cyclic diagrams or to take into consideration semi-decentralized operation with just a restricted measure of input. Likewise, later GA procedures, e.g., linkage learning GA which offers enhanced adaptability by misusing the connections between variables that are to be adapted as the calculation advances, merit exploring for their materialness in the setting of network coding.

Peer-to-peer (overlay) networks are a flawless spot to apply network coding because of two reasons: the topology of a peer-to-peer network is built discretionarily. It is anything but difficult to tailor the topology to encourage network coding; the hubs in a peer-to-peer network are end has which can perform more intricate operations, for example, decoding and encoding than basically storing what's more, sending messages. In [8], straight network coding was connected to application layer multicast, in which a simple cross section chart is initially built, and on top of it a simple tree is shaped. At that point a multicast chart is built, which is a subgraph of the simple cross section and a super graph of the simple tree. The multicast chart built along these lines is 2-repetitive, which implies that each recipient has two disjoint ways to the source. By taking preference of the 2-repetition property of the multicast chart, a light-weight calculation produces a succession of 2-dimensional change vectors which are straightly free. These vectors are doled out to the edges as their edge capacities. Be that as it may, the paper did not examine how to process dynamic joining or leaving of peers, while dynamic participation is a typical marvel in peer-to-peer networks. Also, the 2-excess property restrains the base cut of the multicast diagram, which thus breaking points network throughput.

III. PROPOSED SYSTEM

The inspiration of the paper is to plan an efficient and reliable file sharing administration over peer-to-peer networks by exploiting the great properties of network coding and applying it to peer-to-peer networks in a fitting manner. A new peer-to-peer file sharing scheme is proposed, which is called Peer-to-Peer FilE sharing in light of nEtwork coDing, or PPFEED for short. We use a unique kind of network with a regular topology called combination network. When the network size increases this type of network can achieve an unbounded network coding addition measured by the degree of network throughput with network coding to that without network coding. The fundamental thought of PPFEED is to develop an overlay network over the source, i.e., the file server, and the collectors such that it can be disintegrated into numerous combination networks. Our methodology can oblige dynamic enrollment and build a much less difficult overlay network topology in different values. Our network coding scheme is deterministic, which means that the validity of the coding plan is ensured. The information traffic is then minimized so that the same messages are transmitted through an overlay join at most once. Additionally, framework unwavering quality is enhanced significantly with minimal overhead. Also, PPFEED can be stretched out to bolster join heterogeneity and topology awareness.

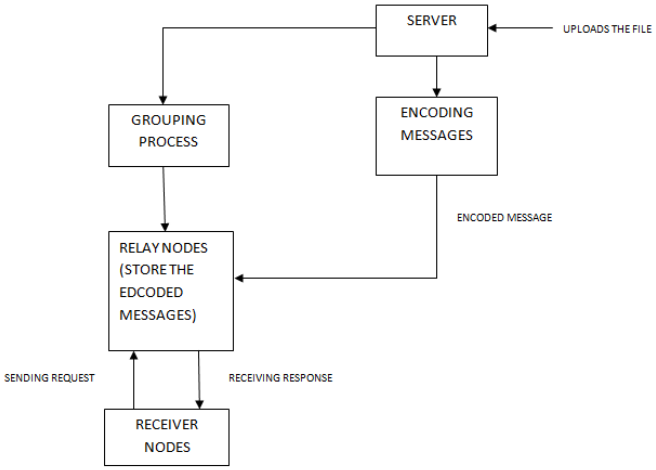

Fig 1.System Architecture

To further improve the service, once a sender sends a file to multiple receivers, the nodes on the path followed, checks for the same file in its node. If it has the same file it takes the responsibilities of the transmission i.e. the intermediate peer sends the file to the receiver. And sends a stop message to the original sender and the sender stops the transmission.

IV. ALGORITHM

Peer Joining Algorithm

INPUT: joining peer v
OUTPUT: updated overlay network
BEGIN
  //Suppose the cluster corresponding to peer v is C_i
  if $|cl_i| < k$
    S_i = the set of groups not in cl_i;
  else
    S_i = the set of groups in cl_i;
  pick a group g_i in S such that gl_i is the smallest;
  if multiple groups have the same smallest gl, pick a group g_i with less gc_i;
  peer v is assigned to group g_i.
END

V. RESULTS

A. Throughput

It can be defined as ratio of total number of packets received by the destination from the source to the time it takes for the destination to receive the last packet. When compared with existing schemes, throughput is higher in proposed method (see Fig. 5).

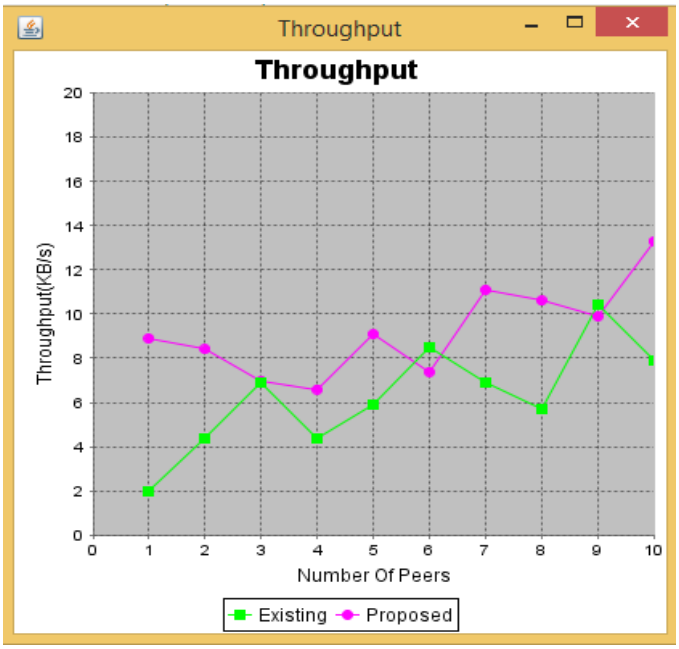

Fig 2. Throughput

B. End to End Delay

With the proposed peer to peer system the end to end delay is less compared to the existing system. (see Fig. 3).

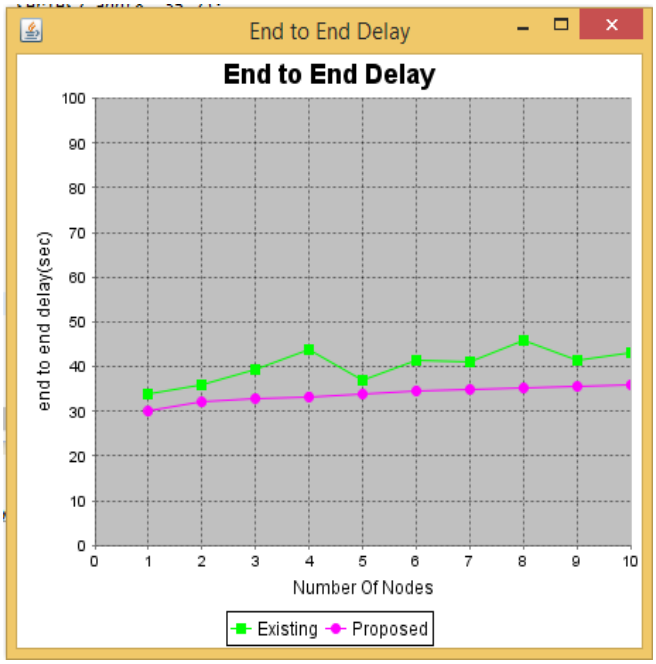

Fig 3. End-to-End delay

C. Packet Delivery Ratio

In existing system, the number of packet drops in the network is still more. The peer drops the packets as the peers need to depend on the content server completely. Hence the total number of packets sent by the source may not reach the destination. As a result packet delivery ratio is lower. With the proposed scheme, the packet delivery ratio is increased significantly. So the rate of packet delivery is greater when compared to the existing scheme (see Fig. 4).

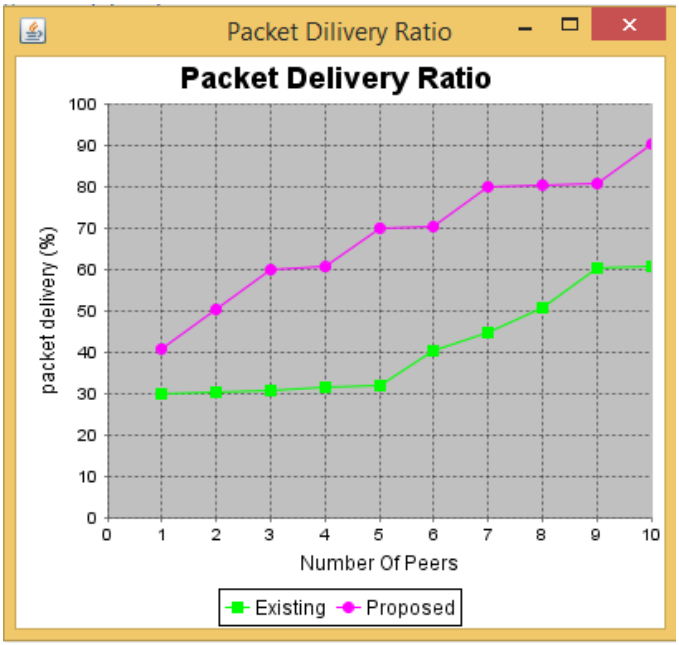

Fig 4. Packet Delivery Ratio

VI. CONCLUSION

In this paper, we have proposed a peer-to-peer file sharing plan based on network coding, PPFEED. The plan can serve as a peer-to-peer middleware made inside the web administrations structure for web-based file sharing applications.

REFERENCES

[1] M. Yang and Y. Yang, "An efficient hybrid peer-to-peer system for distributed data sharing," IEEE Trans. Comput., vol. 59, no. 9, pp. 1158–1171, Sep. 2010.
[2] M. Kim, C. W. Ahn, M. Medard, and M. Effros, "On minimizing network coding resources: An evolutionary approach," in Proc. NetCod, 2006
[3] R. Ahlswede, N. Cai, S.-Y. R. Li, and R. W. Yeung, "Network information flow," IEEETrans. Inf. Theory,vol. 46, no. 4,pp. 1204–1216, Jul. 2000.
[4] S.-Y. R. Li, R. W. Yeung, and N. Cai, "Linear network coding," IEEE Trans. Inf. Theory, vol. 49, no. 2, pp. 371–381, Feb. 2003.
[5] R. Koetter and M. Medard, "An algebraic approach to network coding,"IEEE/ACMTrans.Netw., vol.11,no.5,pp.782–795,Oct.2003.
[6] T. Ho, M. Medard, J. Shi, M. Effros, and D. R. Karger, "On randomized network coding," in Proc. Annu. Allerton Conf. Commun. Control Comput., 2003, pp. 4413–4430.
[7] [5] T. Ho, M. Medard, R. Koetter, D. Karger, M. Effros, J. Shi et al., "A random linear network coding approach to multicast," IEEE Trans. Inf. Theory, vol. 52, no. 10, pp. 4413–4430, Oct. 2006.
[8] D. S. Lun, N. Ratnakar, R. Koetter, M. Medard, E. Ahmed, and H. Lee, "Achieving minimum-cost multicast: A decentralized approach based on network coding," in Proc. IEEE INFOCOM'05, Mar. 2005, pp. 1607–1617.
[9] D. S. Lun, M.Medard, T. Ho, and R. Koetter, "Network coding with a cost criterion," in Proc. Int. Symp. Inf. Theory Appl. (ISITA'04) Oct. 2004, pp. 1232–1237.
[10] Y. Zhu, B. C. Li, and J. Guo, "Multicast with network coding in application-layer overlay networks," IEEE J. Sel. Areas Commun., vol. 22, no. 1, pp. 107–120, Sep. 2004. BitTorrent. (2004) [Online]. Available: http://bittorrent.com
[11] J. W. Byers, M. Luby, and M. Mitzenmacher, "A digital fountain approach to asynchronous reliable multicast," IEEE J. Sel. Areas Commun., vol. 20, no. 3, pp. 1528–1540, Oct. 2002.
[12] A. G. Dimakis, P. B. Godfrey, M. J. Wainwright, and K. Ramchandran, "Network coding for distributed storage systems," in Proc. IEEE INFOCOM'07, May. 2007, pp. 4359–4551.