Toward Awareness Locality Algorithms of Peer-to-Peer File Sharing Network

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ABSTRACT

In this work, we attempt to investigate the impact of locality awareness algorithm implemented in P2P file sharing application. BitTorrent has dominated in the field of P2P file sharing application. It selects node randomly from content swarm. Developers constructed a new version of BitTorrent that implemented locality awareness. This version is called TopBT. We will investigate the locality in TopBT and we will measure the QoS of TopBT and compare it to the QoS of the pure and original BitTorrent client. To facilitate our work, we constructed an AS hops count extractor tool to extract the AS hops count path between any two IP addresses. We utilized a network packet sniffer to harvest packets from TopBT and BitTorrent swarms and we used the collected data as input to our tool to extract average AS hops count paths in these swarms. This method is used to investigate the implemented locality awareness algorithm and its efficiency. Our results demonstrated that TopBT locality method reduced the average AS hops count paths. In addition, we noticed that QoS may be affected by implementing locality awareness especially for unpopular files.

CCS Concepts

Network → Network performance evaluation→ Network measurement

Keywords

Peer-to-Peer (P2P); BitTorrent; TopBT; Locality Awareness; AS Hops Count Path; Network Measurement

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1. INTRODUCTION

The path from the client to the server is called upload link. On the other hand, the path from the server to the clients is known as the download link. Servers are tailored to server massive amount of client requests. Nevertheless, the last years witnessed a boomed age of digital content. Video on demand (VoD), online gaming, live streaming, Internet TV, file sharing and social networks have emerged. These massive content networks receives vast amount of request per second. Users of these networks consume the bandwidth of these networks in greedy way [1].

Moreover, the quality of experience (QoE) that users require from these networks has put more pressure on content providers and enforced them to seek new model and architectures that may replace the original client/server architecture of the Internet. Three main architectures have emerged that may relive the overloaded providers' server and reduce the load on congested links; cloud computing, P2P and content delivery networks (CDN).

CDN was the first paradigm in tackling the issue of overloaded servers [2]. In this paradigm, thousands of servers are added to the provider network. Moreover, provider network separate these servers across the globe. However, more users requires more servers, this may lead to an endless addition. Cloud computing as in CDN requires construction of huge data centers to reduce traffic load. These two paradigms have focused on improving the server side of the client/server architecture of the Internet and neglected the resources of the client side.

P2P networks on the other hand, attempted to improve the network through facilitating the resources of their clients. P2P as its name is not a client/server architecture. In this architecture, each node acts as a client and a server simultaneously. Nodes explode their upload and download links to enhance the bandwidth of the network. In P2P paradigm, applications QoS and QoE increases with the addition of new users. In addition, peers do not only share their upload/download bandwidth, they share all of their resources, such as, CPU and storage capacity.