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USER ASSISTED MULTIMEDIA CONTENT SHARING IN PEER TO PEER NETWORKS

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Abstract — **In a peer-to-peer (P2P) network, every machine plays the role of client and server at the same time. Although a P2P network has a number of advantages over the traditional client-server model in terms of efficiency and fault-tolerance, additional security threats can be introduced. Users and IT administrators need to be aware of the risks from propagation of malicious code, the legality of downloaded content, and vulnerabilities within peer-to-peer software. Security and preventative measures should be implemented to protect from any potential leakage of sensitive information and possible security breaches. Within corporate networks, system administrators need to ensure that peer-to-peer traffic complies with the corporate security policy. In addition, they should only open a minimal set of firewall ports to allow for such traffic. For end-users and/or home users, precautions must also be taken to avoid the possible spread of viruses over peer-to-peer networks.**

Index Terms— **distributed hash tables, forums, peer-to-peer networks, video on demand, User generated content.**

I. Introduction

Peer-to-peer (P2P) is an alternative network model to that provided by traditional client-server architecture. P2P networks use a decentralised model in which each machine, referred to as a peer, functions as a client with its own layer of server functionality. A peer plays the role of a client and a server at the same time. That is, the peer can initiate requests to other peers, and at the same time respond to incoming requests from other peers on the network. It differs from the traditional client-server model where a client can only send requests to a server and then wait for the server's response. With a client-server approach, the performance of the server will deteriorate as the number of clients requesting services from the server increase. However, in P2P networks overall network performance actually improves as an increasing number of peers are added to the network. These peers can organise themselves into ad-hoc groups as they communicate, collaborate and share bandwidth with each other to complete the tasks at hand (e.g. file sharing). Each peer can upload and download at the same time, and in a process like this, new peers can join the group while old peers leave at any time. This dynamic re-organisation of group peer members is transparent to end-users. Another characteristic of a P2P network is its capability in terms of fault-tolerance. When a peer goes down or is disconnected from the network, the P2P application will continue by using other peers. For example, in a Bit-Torrent system, any clients downloading a certain file are also serving as servers. When a client finds one of the peers is not responding, it searches for other peers, picks up parts of the file where the old peer was, and continues the download process. Compared to a client-server model, where all communication will stop if the server is down, a P2P network is more fault-tolerant.

II. Related Works

State management of multicast protocols involves timely updating of the multicast routing tables at the involved nodes to maintain the correctness of the multicast routing structure, tree or mesh, according to the current network topology. Even under moderate node mobility and multicast member size, state management incurs considerable amount of control traffic. When the group size grows, and/or number of groups increase, traditional tree or mesh based methods become inefficient. To address the scalability issues, they need to reduce the protocol states and constrain their distribution, or even use methods that do not need to have protocol state. A number of research efforts have adopted this method, which can be classified into the following categories: overlay multicasting, backbone-based multicasting and stateless multicasting. They study these different approaches for constraining protocol states, and their scalability issues. Once a virtual backbone is formed, the multicast operation is divided into two levels. The lower level multicast, which is within a cluster, is trivial. For the upper level multicast, the protocol uses a pure flooding approach within the backbone. MCEDAR builds a routing mesh, named as graphs, within the virtual backbone, to connect all CORE nodes [1]. A new layered resource allocation which fully utilizes the AMC and layered coding facilities in broadcast standards. Adapting a generalized performance metric to accommodate various quality measures, we will describe an algorithm which maximizes the quality of each video session, while guaranteeing a minimum video quality to all users; and this algorithm runs in polynomial time under any given resource budget. They show that a system-wide optimal resource allocation can be obtained with a simple two-step decomposition of allocation that deals with each video session and then with the system as a whole. They also present a sub-optimal system-wide allocation algorithm of reduced computational complexity, which is useful when the distribution of users' radio conditions changes frequently. These new broadcast standards specify a shared radio link implemented by a low bit-rate single modulation and coding scheme (MCS) to provide full area coverage regardless of users' radio conditions. This contrasts with unicast services, in which adaptive modulation and coding (AMC) selects MCS level that gives the best bit-rate for the radio condition at each receiver. Using AMC in broadcast and multicast services can allow increased throughput for those users who experience good radio conditions without much modification of user devices. However, this leads us to an open problem; how should radio resources be allocated to different MCS levels when users are experiencing a wide range of radio conditions [2]. In sight of this, existing literatures strive to provision guaranteed Quality of Service (QoS) to users1 in the dynamic CR networks describes a live video streaming system over the infrastructure-based CR networks, in which multiple video flows are delivered to different groups of users via the dynamic CR networks. To provide high-quality video streaming with the minimal video distortion, they propose a cross-layer optimizer of the network which exploits three dimensions of the system: coding rate, spectrum selection and spectrum sharing. It also studies the resource allocation for real-time streaming in CR networks .Unlike focuses on the uplink only where users competes for the channel for video upload. Based on the buffer storage of SUs and their channel status, the base station performs the channel scheduling and power allocation to minimize the packet loss of SUs due to buffer overflow. In, a game-theoretic framework is proposed to address the selfish behavior of users in the video streaming. It studies the QoS provision in a OFDMA network, where two groups of users, the best effort (BE) and the real-time (RT) users, compete for the channel access. As a result, an optimization framework is proposed to achieve the maximal throughput of the network while satisfying the specific QoS requirements of different users. With different packet storage in the play out buffer, we showed that video users have different QoS of download and tolerance to the network dynamics, characterized by the smoothness of media playback.[3]. For video multicast, the key issue is to design an optimum bandwidth allocation scheme that considers the overall user satisfaction over an entire mechanism. The adaptive modulation and coding is one of the most effective techniques to improve the average throughput or to reduce wireless resource consumption. An MP-AMC algorithm, which adjusts the number of time slots and modulation of each video layer of a scalable video. But this paper assumes that all slots are used in multicasting, without considering the condition of insufficient slots. It was shown that when the utility function is convex, the optimal utility problem can be formulated into a convex problem. However, it will be more complicated while more constrains are considered, such as the lower coding rate of modulation is necessary to be applied to the lower video layer. An adaptive modulation and coding scheme in order to achieve better usage efficiency of spectrum. This method separates data into hierarchical layers including one base layer and multiple enhancement layers according to its importance [4]. P2P-based video-on-demand (P2P-VoD) is a new challenge for the P2P technology. Unlike streaming live content, P2P-VoD has less synchrony in the users sharing video content, therefore it is much more difficult to alleviate the server loading and at the same time maintaining the streaming performance. To compensate, a small storage is contributed by every peer, and new mechanisms for coordinating content replication, content discovery, and peer scheduling are carefully designed. This paper, they describe and discuss the challenges and the architectural design issues of a large-scale P2P-VoD system based on the experiences of a real system deployed by PP Live. The system is also designed and instrumented with monitoring capability to measure both system and component specific performance metrics (for design improvements) as well as user satisfaction [5].

Similar to many P2P file sharing or streaming systems, a P2P-VoD system has the following major components: (a) a set of servers as the source of content (e.g., movies); (b) a set of trackers to help peers connect to other peers to share the same content; (c) a bootstrap server to help peers to find a suitable tracker (e.g. based on which geographical region the peer is located), and to perform other bootstrapping functions; (d) other servers such as log servers for logging significant events for data measurement, and transit servers for helping peers behind NAT boxes. These servers are typically provided by the P2P-VoD operator. P2P-VoD streaming service is an up and coming application for the Internet. As we prepare this paper, the P2P-VoD service in PPLive is already supporting up to over 150K simultaneous users, and we expect the number of users to grow further. This paper, they present a general architecture and important building blocks of realizing a P2P-VoD system [6].

III. OUTLINE OF THE WORK

A. UGC/FORUM Measurement

An in-depth quantitative analysis of nine popular websites that are based in different types of UGC . They found that UGC production follows “long-tail” distributions and is marked with a strong “participation inequality”. They found that not all UGC types follow the inverse power-law distribution, and that large content collections could be dominated by the presence of ultra productive users .A quantitative study of forum spamming using content-based analysis. They also proposed context-based analyses to detect spam automatically and ways to overcome the shortcomings of content-based analyses. To better understand the nature and impact of online content voting networks, analyzed and provided insight into the design of content promotion algorithms and recommendation-assisted content discovery.

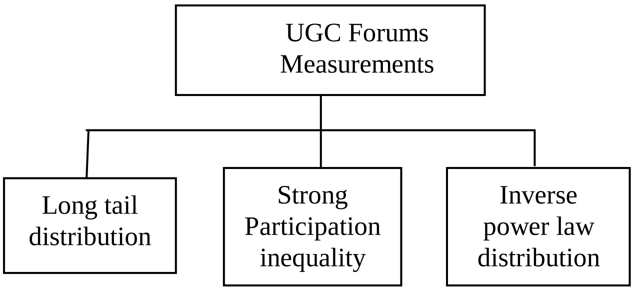

Fig.1. UGC Forum

B. Video on demand

There are several works on utilizing P2P video sharing to ameliorate the bandwidth cost of YouTube-like services. YouTube is a centralized video sharing service, and its operation depends on the support of a huge number of server clusters that cost millions of dollars per day in bandwidth. Some works focus on the structure of peers to enhance the performance of video sharing in VOD. P2VOD features a single multicast tree with the server at the root position. A source node that wishes to stream an ordered sequence of packets to a collection of receivers, which are distributed among a number of clusters. They studied two data communication schemes, one based on multitrees and the other based on hypercubes, for solving this question.

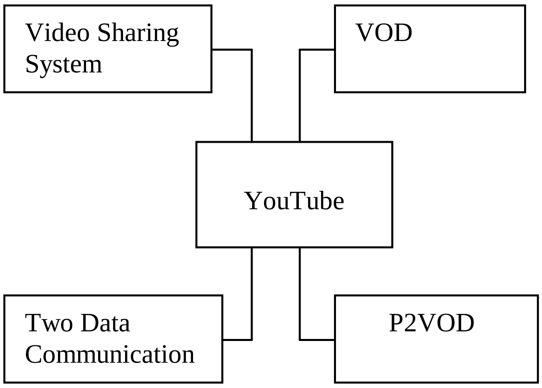

Fig.2. Video Communication

PeerSim offers a common platform for P2P networks.

Simulating Peer-to-Peer (P2P) overlay networks is a common problem for researchers and developers. First, P2P overlay networks need to be scalable. In addition, these networks are highly dynamic, because of the fact that nodes constantly join and leave the network. Thus creating a simulation for such a large dynamic network is difficult due to technical constraints even on the most powerful machines. Several solutions exist to solve this problem. The PeerSim P2P simulator is one of the most known among researchers and is the subject of our project.

IV. Experimental Setup

A. Introduction of Peersim

PeerSim is a Peer-to-Peer simulator. It has been designed to be both dynamic and scalable. The engines consist of components which may be 'plugged in' and use a simple ASCII file based configuration mechanism which helps reduce the overhead. The philosophy of PeerSim is to use a modular approach, as the preferred way of coding with it is to re-use existing modules. These modules can be of different kinds, for example there are modules which can construct and initialize the underlying network, modules which can handle the different protocols, modules to control and modify the network. PeerSim offers a lot of these modules in its sources, which ease greatly the coding of new applications.

PeerSim can also work in two different modes: cycle-based or event-based. The cycle based engine is based on a very simple time scheduling algorithm and is very efficient and scalable. However, it has some limitations. PeerSim can achieve a network consisting of 10^6nodes using the cycle-based engine. As an example it does not model the transport layer. The event-based engine is based on a more complex but more realistic approach. It is not very used. It is not well documented and its performances are quite unknown.

B. General Properties

PeerSim simulator is based on several components, which can be divided in basically in 4 types:

1) Protocols**:**

They are used to define the behaviour of the different peers. They can be of different uses, for example handling and simulating the overlay network, or implementing a distributed algorithm.

2) Nodes**:**

They represent the peer themselves in the P2P network. Every nodes has a stack of protocol which will define their behaviour

3) Controls:

As their name implies, controls can control the simulation, either at regular intervals or during the in initialization of the simulation.

C. Configurable parameters

There are four boxes to fill for both modes:

1) Global properties
2) Protocols
3) Initializers

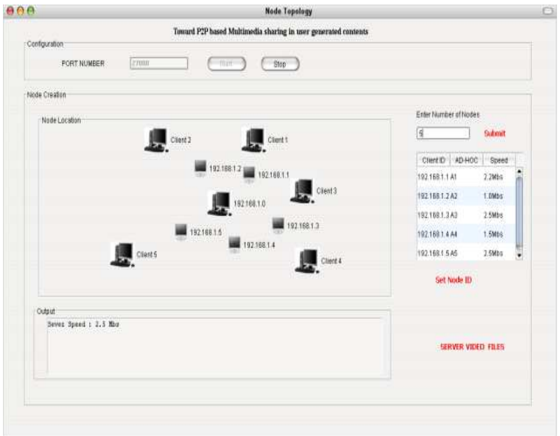

Fig.3 Node creation in server side

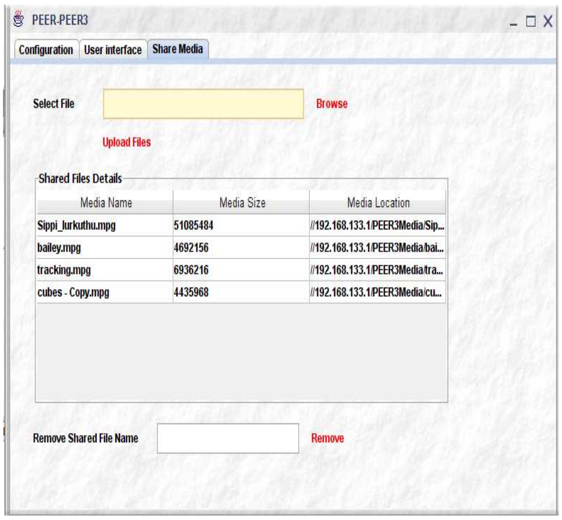

Fig.4 Maintenance share multimedia files in MBoard in from peer side.

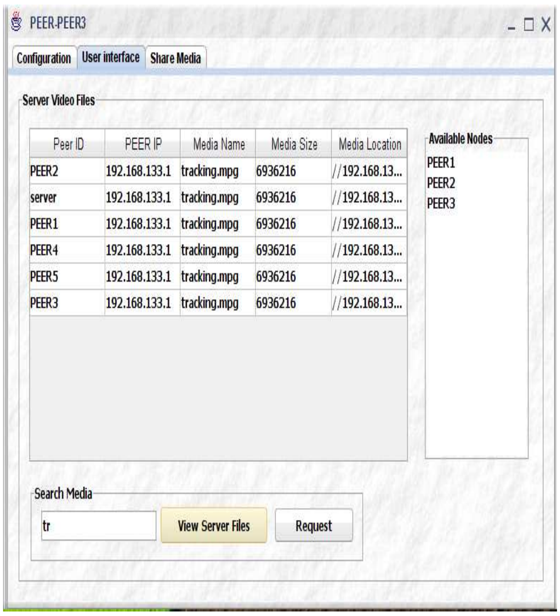

Fig.5 Display result for search in server side

Fig.6 Access media files from requesting node (peer)

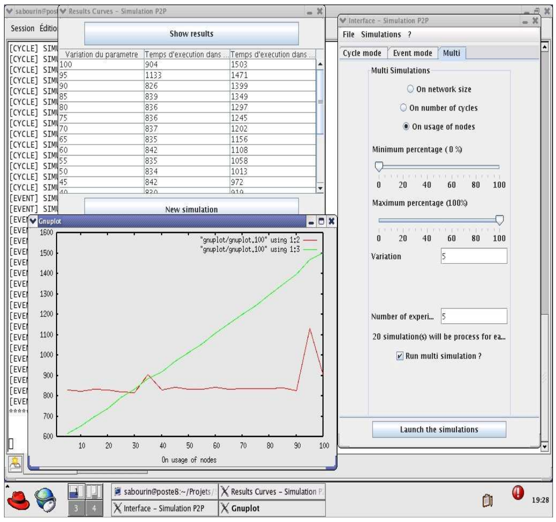

Fig.7 Simulation of peer to peer

V. CONCLUSION

Multimedia streaming of mostly user generated data is an ongoing trend, not only since the upcoming of Last.fm and YouTube. Future applications may support streaming of haptics as well. Due to the distributed creation of multimedia content we investigate in this paper, how to build architecture that is distributed, load-balanced and takes the heterogeneity of the participating nodes into account. The contribution of the paper is an architecture, which relies on a Distributed Hash Table, as it is common in today's P2P systems. We assume that the multimedia content is split up in content blocks. Our design is independent of any specific DHT; we assume that for any content block a peer in the DHT is responsible. This peer maintains a list of peers, which provide the content block, and responses to queries of peers asking for the specific content block. We propose to use a scoring function taking parameters for heterogeneity (bandwidth quality, online duration) and load balancing (active and local tasks) of the peers into account. This scoring function decides which peer to assign the streaming request to. We evaluate our solution in comparison to a stateless solution. Evaluation shows that our solution outperforms the reference solution by saving up to a profit of 109% and that load balancing in the system can be improved by 53%.

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