ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Distributed
Computing

Bachelor Thesis:
"Skirting ISP Traffic Shaping in P2P Systems and Countermeasures"

This document describes the subject and the general time schedule of Pascal Studerus' bachelor thesis in the spring term 2011. Adaptations or changes can be agreed upon by the advisers.

Subject

In contrast to classical client-server protocols, where clients only consume services offered by the server, the peer-to-peer (p2p) paradigm introduced the idea to have systems in which all participants are clients and servers at the same time, in a p2p file sharing system, each peer downloads content from other peers, and uploads content to requesting peers at the same time. Due to the popularity of certain p2p applications like BitTorrent, or Skype for instance, p2p traffic amounts to a large share of the overall Internet traffic. With the increasing popularity of bandwidth intensive p2p applications, many Internet Service Providers (ISPs) have started to shape the traffic that is routed through their network, i.e., they classify network flows in terms of their usage and assign different priorities accordingly. If the network contention is high the traffic with lower priority is delayed in order to keep the bandwidth of high priority traffic high. Typically, p2p traffic is treated with low priority, and client-server traffic with high priority. The ISP's motivation to employ traffic shaping is not completely evident, but probably of economic nature. The question whether it is the ISP's right to do so, and thereby infringe on the network neutrality, is widely discussed and criticized. Obviously, users and developers of p2p applications have made efforts to circumvent traffic shaping, e.g., by trying to disguise p2p traffic as client-server traffic, or other type of traffic with higher priority. Many bittorrent clients, for instance, have started to use public key encryption for exchanging data packets. Due to this increase of tunneled communication some ISPs have initiated the additional use of *per-client shaping*, which profiles single users, and employs different contention policies based on the IP of the sender or receiver of a network flow.

The task of this thesis is to investigate into the traffic shaping policies employed by ISPs by researching existing literature, scientific papers as well as other resources available on the Internet. As a hands-on task the student should implement the tunneling protocol used by the major Bittorrent clients into our own BitTorrent client, *BitThief* (http://bitthief.ethz.ch/). With the experience gained, Pascal should evaluate existing techniques of skirting ISP traffic shaping, and ideally come up with other, more effective ways of circumventing traffic shaping. To take it even further, he should adopt the ISPs point of view in the last part of the thesis, and discuss potential countermeasures that could be taken by the ISPs in response.

Outline of Work Plan

- Investigate the traffic shaping policies employed by ISPs.
- Study the BitTorrent protocol, and the architecture of the BitThief client.
- Track down the public key encryption protocol employed by other BitTorrent clients, and implement it into the BitThief client.
- Test the implementation.
- Discuss other existing techniques of avoiding traffic shaping, and propose novel techniques.
- (If enough time) discuss potential countermeasures available to the ISPs.
- Write the report, and prepare the final presentation.

Duties of the Student

- Regular meetings with the advisers. Ideally, there will be a meeting every week, but the frequency of meetings can be adapted.
- There will be one presentation given by the student in front of the research group at the end of the thesis.
- Finally, the student has to write a report (10 to 20 pages, English or German), presenting his work and results. This report should also include a critical review of the work.

General

- Independent working is expected.
- A possibility to work in our building (ETZ) is provided. It is also possible to work at home.

Contacts/Advisers

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