**Computer Networking (CN) – 2013/14**

**Assignment 1**

*Survey Paper*

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1. ***Introduction***

This survey paper considers the topic of end-host based measurement of Internet performance. The field of networking has seen a lot of interest in recent years and many advances have been made in it. This is all thanks to the dedicated people that continue to research and suggest new and novel ideas how to improve and provide better service to the users. More and more users start subscribing to an ISP to get their own home broadband to work study and enjoy their free time on the internet. We live in a world that technologies are advancing in a tremendous pace and fast advances comes demands to support all the innovations. An example of that is the throughput of internet connections has been increasing and on parallel a demand for more stable and faster connections is paring with that increase. But in order to achieve more advances there is need to measure and find the faults of the current performance. More and more ways are developed to measure the current performance in order to please the end users and their demands. In this paper I will discuss other papers that have done such measurements with their strengths and weaknesses. These papers are:

* S. Sundaresan et al., “Broadband Internet Performance: A View From the Gateway,” in
* Proceedings of ACM SIGCOMM, 2011. [1]
* I. Canadi, P. Barford and J. Sommers, “Revisiting Broadband Performance,” in
* Proceedings of Internet Measurement Conference, 2012. [2]
* M. Dhawan et al., “Fathom: A Browser­based Network Measurement Platform,” in
* Proceedings of Internet Measurement Conference, 2012. [3]
* Y. Xu et al., “Video Telephony for End­consumers: Measurement Study of Google+,
* iChat, and Skype,” in Proceedings of Internet Measurement Conference, 2012. [4]
* S. Sundaresan et al., “Measuring and Mitigating Web Performance Bottlenecks in
* Broadband Access Networks,” in Proceedings of Internet Measurement Conference,
* 2013. [5]

1. ***Research Challenges***

This field despite of the spiking interest in it has many challenges to overcome in order to get and appropriate measures. One of the hardest problems to overcome is that there is no right way to benchmark home internet performance. The users require a stable and fast connection but in the end every user has a different setup at home and is on a different geographic location than others. All these things and more are factors to be considered when measuring broadband connections. Other such factors are the scale of the demand. In order to achieve a global measurement for all users a method needs to be invented that is not invading their personal space or hinders their connectivity in the process of measuring. Such tasks are challenging and many people try to tackle them but one solution raises other problems. Like the cost of such an endeavor would be very high and time consuming to install something that can monitor their broadband individually. Another thing to consider is that different ISP has different strengths when talking to broadband throughput or latency or page loading. The user has his own priorities and therefore if not informed about the strengths and weaknesses of the ISPs he might choose the one that does not suit him. This raises the problem of user individuality and personal demands. Another problem is that the actual connectivity provides different results (DSL, fiber, wireless). The modems, routers, personal computers are all factors that need to be accounted for when doing an accurate measurement. And another factor affecting the user experience is the applications that are used by him. They provide require different protocols, can hinder network’s performance etc.

1. ***Paper Surveys***

Let’s start with the first paper [1]. It concerns the problem that an appropriate measure of the internet service users receive can be hindered by their home environment, hardware, geographic location and connection type. The research introduces a method of home gateway measurement, which consists of a box that is between the router and modem. This eliminates factors like cross-traffic within the home, end-host configurations etc. It is a good approach to get the broadband’s throughput and latency measures without those relative factors that hinder the results a lot. It takes into account their direct broadband connection and geographic location. Another good thing that is considered in the paper is the time of day, which is important since networks have peak hours when they are not performing at their best because of bottlenecks. In the paper a good notion of the relativity of throughput and latency are considered amongst different ISP’s, modems and peak hours. Overall the paper is very significant and provides good ideas and raises problems about the proper measuring of end-host internet connections. The thing the paper lacks is that it is not on a global scale but that is due to the high costs of such an endeavor. It also does not emphasize well enough on the importance of the research which in my opinion has great potential.

The second paper [2] is addressing the problem of end-user measurement on a global scale, which is good. Many experiments are done with the data and some conclusions are drawn but the paper lacks proof. The authors of this paper are also unsure of most of the results which lead them to speculations and inaccuracy. Most of the paper is explanation and comparisons to other approaches which does not introduce anything new and novel. Despite all that an attempt to look at the problem of benchmarking Internet’s performance on a global scale is made and useful statistics are drawn.

The third paper [3] introduces a browser extension based approach for the measuring and also troubleshooting connections. It is a very good suggestion and although it is not something that has never been done before it has features that are novel and are very helpful in getting an unbiased measure of the performance of end-users. The overhead of this extension is also not that much so that the user’s would not need to worry about it. The extension has good security and personal policies so that it does not breach user’s privacy. The idea is portable, useful and easy to implement but is limited to a browser so if the user uses another that does not support the extension he would not be reached. Another weakness of this suggestion is that it does not take into account people that don’t want to be bothered to install such extensions or don’t use their platform.

Paper four [4] is an attempt to study the already existing telephony technologies of Skype, Google plus, and iChat. Good observations are made in the paper of these technologies’ architecture and how they work. The negative thing is that it is mostly speculations and there is no concrete proof of whether or not the assumptions made are correct or not. Despite that many experiments are conducted and hence some useful conclusions can be drawn from them. That might give good insight of how a similar technology works and many test results in the research paper might be useful for people that want to further develop, improve or troubleshoot a product in that area.

The fifth paper [5] considers a router-based web measurement tool – mirage. The ideas in the paper are thoroughly investigated and experiments and conclusions are drawn accordingly. A good thing about this paper is that it considers web-page loading time in details and a good conclusion is drawn that after 16Mbit/s of throughput there is more need of reducing latency than increasing throughput in order to achieve optimal performance. A good model of home caching is introduced to reduce latency. It considers caching and prefetching DNS and TCP within the home environment. It supplements already existing cache policies in browsers, computers, ISPs which is good and proves that it is useful.

1. ***Conclusion***

As a conclusion I would like to say that when considering the papers discussed above (section 3) and the problems stated in section 2 we can see that there is no optimal way of measuring end-host internet performance but if we want optimal results then the above mentioned papers’ strengths should be considered to be implemented in a single system and the results from that should be weighed internally in order to get a more appropriate measure. Even then there is no certainty that it will yield the best results since other problems or factors that that affect the measurements and are not discussed in the papers might arise.