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SmoothIT – Incentive-based Models For Peer-to-peer Networks

ScienceDaily (Dec. 5, 2008) — The largest share of data traffic on the Internet is attributable to peer-to-peer networks which are independent of defined Internet Service Providers. The EU project SmoothIT under the leadership of Burkhard Stiller from the University of Zurich now aims to develop economic incentive schemes with which providers should more efficiently adapt their networks to peer-to-peer use and therefore be able to offer cheaper and simultaneously better services.

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Data traffic on the Internet doubles every 18 months. The weight of so much data is borne by networks of telecommunication companies and Internet Service Providers (ISP). They are orientated to a type of data traffic in which the end-user pays for services – and thus also the corresponding data traffic – from a central service provider.

However, most of the data traffic on the Internet – namely 80 percent – is attributable to so-called peer-to-peer applications. These are applications such as the download network BitTorrent, with which computers belonging to end-users exchange huge volumes of data between each other without the flow of data being steered by the central server of a service provider. With the increasing bandwidth of Internet connections, the significance of peer-to-peer applications is going to increase even more strongly.

The peer-to-peer networks, also known as "overlay networks", overlay those network infrastructures made available and maintained by ISPs. This means for operators that the distribution of data and data flows on their networks is being defined more and more by applications of that kind, over which ISPs no longer have any direct influence. Therefore, a decisive question for ISPs is how, on one hand, they influence the structure of such overlay networks and, on the other hand, how they can adapt their own network better to them.

The SmoothIT project (Simple Economic Management Approaches of Overlay Traffic in Heterogeneous Internet Topologies) from Professor Burkhard Stiller, Communication Systems, from the University of Zurich now aims at developing suitable mechanisms which enable overlay networks to be

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structured in such a way that it is as inexpensive as possible for both the users and for ISPs. This should be achieved by creating economic incentives which encourage cooperation between ISPs and operators of overlay networks.

An example is that ISPs normally provide a list of peers to the overlay network who have a specific file for downloading. The list is created as if at random in many instances. The user has a vested interest in downloading the file from the nearest peer because this speeds up downloading by many times. For the ISP, it means that the data can be provided for the user in the most efficient way. In order to be able to reduce the distances between peers, ISPs and overlay networks have to work together with operators of overlay networks connected with other ISPs, because the overlay networks cover the peer networks of various ISPs.

In order to conceptualise and implement the incentive systems for this cooperation, Professor Stiller's team initially want to measure data traffic over peer-to-peer networks. The effect of incentive systems is shown by way of simulation models. On the basis of this simulation, protocols will be designed and tested for their practical usefulness. For the implementation of incentive systems it is especially necessary to create suitable protocols, in order to enable the measurement, calculation and comparison of data traffic generated by overlay networks.

In order to measure the practical usefulness of networks, ISPs and telecommunication providers are participating in this research project. The researchers are working with Telefónica in Spain, the European research institute of Germany, and the ISP PrimeTel. They have formulated requirements of the solutions that are necessary from the point of view of industry.

SmoothIT, which is being financed by the seventh framework programme of the EU, should enable the ISPs to attune their networks to peer-to-peer data traffic, and to reduce infrastructure investments and maintenance costs. «SmoothIT will enable ISPs to manage most of the peer-to-peer data traffic more precisely than in the past and to charge for it financially in an appropriate manner», says Burkhard Stiller. «This will mean that they will be able to plan their capacities more efficiently and inexpensively, and maximise their income for minimised data traffic.» As the data traffic will also be more efficiently localised and transported over the right ISP data lines, users will also benefit simultaneously from more reliable and qualitatively improved services.
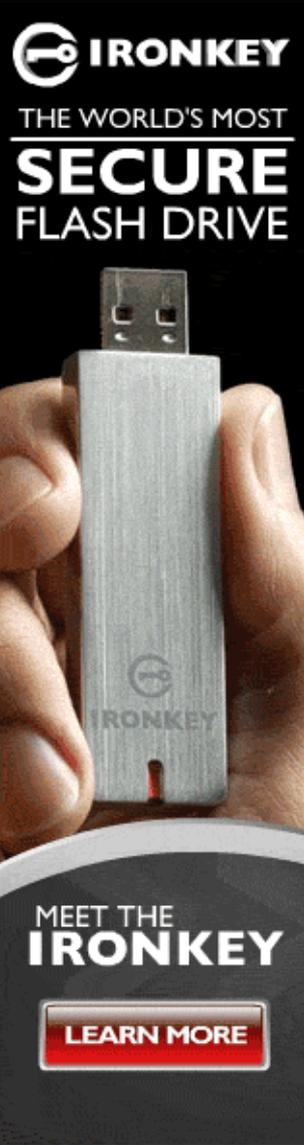
The programme is being financed by 3 million Euro from the 7th framework programme of the EU and is running until the end of 2010.

Adapted from materials provided by University of Zurich.

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