

OFFRE de THÈSE

Sujet de thèse : Inter-domain and network neutrality debate

Description :

The economic stakes of communication networks are huge, and still increasing as evidenced by the exponential traffic growth and the appearance of new technologies observed in the last decade. This network evolution poses new economic challenges. Since networks involve several kinds of actors (users, Internet Service Providers (ISPs), content providers...) with possibly different interests, their interactions deserve to be carefully studied to guarantee that the maximum value is extracted from the network resource. We will focus during this thesis on the debate on net neutrality, about interactions between access and content providers. Indeed, access providers want to charge distant content providers for the traffic they create on their own network, with the threat of treating them differently or rejecting their traffic if they do not accept. This is in opposition to the current Internet business model, where ISPs charge both end-users and content providers directly connected to them, but generally have public peering or transit (i.e. customer-provider relation) agreements among them, and do not charge content providers that are associated with other ISPs. These current agreements structure the Internet in a Tiers architecture at the top of which "Tier 1" operators dominate the market. The reason why ISPs want a change is the increasing traffic asymmetry, mainly due to some prominent and resource consuming content providers. Also, the revenue arising from online advertising (meaning showing graphical ads on regular web pages) is estimated at approximately a \$24 billion in 2009 while textual ads on search pages has led to a combined revenue \$8.5 billion in 2007, those figures increasing every year. Meanwhile, transit prices - which constitutes the main source of revenues for transit ISPs - are decreasing and predicted to be under \$1 per Mbps by 2014.

We aim at comparing neutral and non-neutral networks with competitive ISPs, content providers and transit ISPs, and proposing relevant rules driving to an "optimal" network use. The last category of actors, transit ISPs, has generally been forgotten in most models dealing with network neutrality. The scientific challenges are to define the appropriate models to address those economical issues in telecommunication networks, thanks to mathematical tools that are (mostly non-cooperative) game theory and optimisation, and to make propositions to providers or to the regulators for a better use of the network.

Département :

D2 - Réseaux, télécommunication et services (Networks, Telecommunication and Services)

Equipe : DIONYSOS ; <http://www.irisa.fr/dionysos/home.html-fr>

Directeur de thèse et encadrant : Bruno TUFFIN

Contact : bruno.tuffin@inria.fr

Début des travaux : Septembre-Octobre 2012

Bibliographie :

F. Boussion, P. Maille and B. Tuffin. Net Neutrality Debate: Impact of Competition among ISPs. In the Proceedings of the Fourth International Conference on COMMunication Systems and NETWORKS (COMSNETS), Lecture Notes in Computer Science, Springer, Bangalore, India, January 3-7, 2012.

P. Coucheney, P. Maille and B. Tuffin. Network Neutrality Debate and ISP Inter-Relations: Traffic Exchange, Revenue Sharing, and Disconnection Threat. Submitted.

G. D'Acquisto, P. Maille, M. Naldi and B. Tuffin. Impact of non-neutral wholesale prices for content providers on retail prices. Submitted.

R.T.B. Ma, D.-M. Chiu, J.C.S. Lui, V. Misra, and D. Rubenstein. Interconnecting eyeballs to content: A Shapley value perspective on isp peering and settlement. In Proceedings of the International Workshop on Economics of Networked Systems (NetEcon) ,pages 61-66, 2008.

A. Odlyzko. Network neutrality, search neutrality, and the never-ending conflict between efficiency and fairness in markets. Review of Network Economics , 8(1):40-60, 2009.