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Measurements to check network neutrality

The Internet is historically neutral, in the sense that all data packet are supposed to be treated the same at each node of the network, without any distinction of their type, terminal, origin or destination. This equality principle has been questioned by network service providers expecting content providers to participate to infrastructure investments; if not paying they could be blocked or slowed down. It initiated the so-called network neutrality debate, still very vivid worldwide. Neutrality has been imposed in Europe, but has recently been repealed in the USA.
The goal of this PhD thesis is to develop measurement tools allowing to detect if a non-neutral behavior can be highlighted, this for the various actors of the Internet network: network access providers first, the main target of the debate, but not only. Indeed, we have emphasized in previous works that a packet-focused neutrality can be circumvented by applying a service differentiation at another level: it could for example be the case by choosing the data cached at the edge of the network to provide a better quality of service. An implicit goal will then be to define a neutral (or fair) behavior for each actor, to define the associated metrics, and to set up corresponding measurement techniques.

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Bibliography :

[1] P. Maillé and B. Tuffin. Telecommunication Network Economics: From Theory to Applications. Cambridge University Press, 2014.

[2] P. Maillé, G. Simon and B. Tuffin. Toward a Net Neutrality Debate that Conforms to the 2010s . **IEEE Communications Magazine**. Vol. 54, Num. 3, Pages 94-99, March 2016.

[3] P. Maillé, P. Reichl, B. Tuffin. Internet governance and economics of network neutrality. In: *Hadjiantonis, A., Stiller, B. (eds.) Telecommunications Economics - Selected Results of the COST Action IS0605 EconTel*, pp. 108-116. Lecture Notes in Computer Science 7216, Springer Verlag, 2012.

[4] T. Garrett, S. Dustdar, L.C.E. Bona, E.P. Duarte Jr. Ensuring Network Neutrality for Future Distributed Systems. *IEEE 37th International Conference on Distributed Computing Systems*, 2017.

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[5] D. Miorandi, I. Carreras, E. Gregori, I. Graham, J. Stewart. Measuring Net Neutrality in Mobile Internet: Towards a Crowdsensing-based Citizen Observatory. *IEEE ICC*, 2013.

[6] A. Maltinsky, R. Giladi, Y. Shavitt. On Network Neutrality Measurements. **ACM Transactions on Intelligent Systems and Technology**, Vol. 8, No. 4, Article 56, 2017.

[7] BEREC Report. Net neutrality measurement tool specification*s*, BoR (17) 179, 2017.