

Real-time Network Measurement for High-Speed Networks

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10 Gbps is a widely used network technology, but it is being replaced by faster technologies like 100 Gbps Ethernet. Motivations for this technology replacement are services like Video-On-Demand, websites with video and audio content and growing number of embedded devices with IP connectivity. Moreover, the IEEE report [1] shows that half of the backbone network lines will be using speeds of 40 Gbps and 100 Gbps at the end of year 2013.

As the network speed, size and complexity rises, the network security and monitoring must follow this trend. Accurate and real-time network traffic analysis itself is very important in many other networking fields. It becomes increasingly critical for large variety of applications like account management, network security, bandwidth management, anomaly detection, etc. Implementation platforms also will be available. One of them was described in [2] and it is being developed by CESNET.

With increasing network speeds, device design becomes harder, because the time for packet analysis is forced to be decreased. So, we need to deal with many design challenges and one of them is real-time traffic measuring. The classical measurement approach is based on per-flow statistics collection. Sampled traffic is then processed off-line on collector. New architecture for real-time measuring are using lookup directly programmed in hardware. This new approach is called Query-driven measurement and it is described in detail in [3].

The main goal of this presentation is to introduce an alternative way of high-speed network monitoring device implementation. The main goal of my work is to provide formalism and usable tool for monitoring system generated from HLL (high-level language) description to support network speeds above 40 Gbps. The main problem we need to deal with is to define a general description of measurement process which could be used for subsequent transformations (to HDL for use in FPGA/ASIC for example).

References

[1] IEEE 802.3 Ethernet Working Group: IEEE 802.3 Industry Connections Ethernet Bandwidth Assessment (2012), http://www.ieee802.org/3/ad_hoc/bwa/BWA_Report.pdf

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[3] Khan, F., Yuan, L., Chuah, C.N., Ghiasi, S.: A programmable architecture for scalable and real-time network traffic measurements. In: Proceedings of the 4th ACM/IEEE Symposium on Architectures for Networking and Communications Systems. pp. 109–118. ANCS '08, ACM, New York, NY, USA (2008), <http://doi.acm.org/10.1145/1477942.1477958>