

Semester thesis proposal:

Improving the scalability of Software-Defined Internet Exchange Points

Given their central role in interconnecting many networks and their growing importance in bringing popular content closer to end users, Internet exchange points (IXPs) are a compelling place to kick start the deployment of Software-Defined Networking (SDN).

In a recent paper, Gupta et al. [1] introduced the platform for the first Software-Defined Internet eXchange Point (SDX) along with a running implementation [2]. At his core, the SDX platform is based on Pyretic as SDN controller and ExaBGP as Route Server. Pyretic is responsible for producing forwarding policies, while ExaBGP is responsible for maintaining BGP reachability information.

In practice, large IXPs such as AMS-IX [3] can host several hundreds of participants, each of them announcing thousands of prefixes. The current IXP platform, more particularly, ExaBGP, was not designed to handle such a load. Consequently, IXPs operators are reluctant to deploy the SDX platform as is.

This project will aim at changing this fact by replacing ExaBGP with a production-grade Route Server, in this case, BIRD [4,5]. As a first step, the student will get acquainted to BIRD and the existing SDX platform, in isolation. For this, virtual environments will be used. Then, ExaBGP routing functionalities will be removed from the SDX platform, and replaced with BIRD. Since the SDX platform requires the SDN part (Pyretic) and the routing part (BIRD) to be in synch, an interface between the two will be developed.

Related work:

[1] http://vanbever.eu/pdfs/vanbever_sdx_sigcomm_2014.pdf

[2] <https://github.com/sdn-ixp/sdx>

[3] <https://ams-ix.net/>

[4] <http://bird.network.cz/>

[5] <https://ams-ix.net/technical/specifications-descriptions/ams-ix-route-servers>