Proposal for a Demo at 4th P4 Workshop (May 17, 2017)

Demo Title

Using P4 to implement a Highly Scalable Broadband Remote Access Server (B-RAS) for a large ISP

Abstract

P4 is a powerful domain-specific language for implementing high-speed packet processing applications. It is a target independent language that facilitates deploying P4 and non-P4 programmable components and their interfaces on a large variety of target platforms, e.g., CPUs, FPGAs, ASICs, SOCs (system-on-chip), and network processors. However, real world applications require lot more than a control plane, data plane, and architecture descriptions expressed in P4 language.

xFlow Research is building a highly scalable broadband remote access server using off-the-shelf Linux computers in P4. It is implementing a 4-layer application architecture comprising of: a) P4 data plane, b) P4 control plane, c) non-P4 application client software, and d) non-P4 application server software.

Building efficient interfaces between these layers to guarantee scalability, high availability, and fast recovery from component failures is a big challenge. An equally important concern involves balancing a large ISP's workload using a cluster of stateful P4 and non-P4 components communicating and distributing state information between these components including the data about individual subscribers' virtual interfaces, lookup tables, buffers/queues for ensuring policy-based upload/download bandwidth capacity, and other data related to the monitoring, management and orchestration of all P4 and non-P4 components.

xFlow Research is using P4 to build its load balancers in addition to using it for allocating IP addresses and forwarding packets. Additionally, xFlow is also researching the possibility of splitting its data plane into more than one P4 data planes, e.g., a data plane optimized for authenticating subscribers and allocating IP addresses using PPPoE/RADIUS/DIAMETER/SRC protocols, and a separate data plane optimized for faster packet forwarding between the subscribers and routers connecting them with the Internet backbone.

xFlow Rsearch proposes to share its progress to date and demo the latest implementation of a highly scalable broadband remote access server at the upcoming 4th P4 Workshop.

Agenda

A 5-7 minute session that includes a brief slide presentation, a demo, and if required, a short Q&A.

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