Proposal for presentation for P4 Workshop, May 1st 2019

Presenter: Simon Capper representing Arista Networks

Title: “Building a Network Appliance using P4 and Tofino”.

The presentation will focus how P4 and tofino gave us flexibility and programmability of the pipeline and how it has allowed Arista to build a switch with multiple network roles, something not possible to the same extent with existing merchant silicon today.

I will explain how P4 gave the Arista software team the ability to design the pipeline to fit how EOS works, adapting the pipeline data structures and control flow to better map to the platform independent code in EOS.
The benefits include automated code generation for the control plane (far beyond what Barefoot provides with the SDE) and the resulting reduction in hand written code (< bugs than traditional dev models) and faster development.

I will discuss the way we have structured our p4 code to generate multiple p4 programs for the Arista 7170.
This will highlight the advantages of having the pipeline be part of the software stack instead of something the software stack has to work around and reverse engineer.
I will provide examples of hard coded pipeline features that are very difficult to work around with on traditional silicon (no vendor names will be mentioned) and how p4 makes a it possible to fundamentally change how a pipeline works with minimal effort.

I will describe the different network roles we have developed or have in development for the Arista 7170 including the ability to run a custom 3rd party pipelines.

I will discuss how we extended the p4-16 compiler to build in obfuscation and how moving to the p4-16 language is going to allow us to build better pipelines in future software releases.
I’ll probably have a slide discussing the reality of writing p4 code and why it isn’t seamlessly portable due to having to use custom extensions and tailoring the pipeline to make best use of the hardware resources.