

The Switching System Vendor Viewpoint: Opportunities and Challenges

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The availability of P4-programmable switching chips offers new opportunities to various players in the networking arena, from switching system vendors, to end users (service providers, enterprise networks, data centers), to third party developers. This talk focuses on the viewpoint of the former, reviewing how they can benefit from commercializing devices with a programmable data plane, but also analyzing the challenges they must overcome to enjoy such benefits. Data plane programmability enables vendors to address the needs of their customers in novel ways, but they must go through a non-negligible effort and transformation to ensure that such a potential does not remain unrealized.

New opportunities are organized in the following four categories.

- *Accelerated release of established features*: as new protocols are standardized and new features are requested by a large customer base, the traditional process followed by switching system vendors encompasses designing and fabricating a new ASIC that provides necessary data plane support, as well as porting the switch operating system on it and implementing the necessary control plane support. Programmable switching chips allow substituting the first lengthy hardware production step with a leaner P4 programming effort.
- *Timely productization of unique, novel features*: when a vendor comes up with a new way of solving a known issue or addressing a critical use case in the data plane, this cannot be leveraged right away with traditional ASICs. The decision of going ahead and implementing such solution in the next generation of ASIC without a prior comprehensive validation carries a significant risk and it is difficult to substantiate. A P4 implementation of the solution involves a significantly shorter time and more limited risk. However, the decision-making criteria must be adapted to this new, leaner implementation; sticking to the traditional criteria would eliminate most of reduction of the time to market enabled by a programmable data plane.
- *Fast implementation of new features requested by specific customers*: according to the traditional product management model, vendors include a feature in their roadmap only when there is good confidence that there is a significant market interest. The prospect of a programmable data plane simplifying the productization of a feature potentially enables vendors to relax the requirement on market interest size.
- *Customers or third parties implementing their own features*: when features are very specific and customized, end users might want to implement them by themselves or engage third party developers to do it. Data plane programmability makes this in principle possible because it removes the critical mass and skill barrier previously set by hardware design and fabrication.

For each one of the above categories the talk (i) presents representative real-world use cases, (ii) discusses the challenges that vendors face to take advantage of the specific opportunity, and (iii) outlines possible measures vendors could put in place to address such challenges. Ultimately, we can conclude that from the point of view switching system vendors, although programmable switches are factual reality, fully benefitting from them is still a promise contingent to a non-trivial transformation process.