Handling Dynamic Flow State in P4: a case study

When a data plane functionality requires to dynamically create and remove per-flow state with very short response time (i.e., orders of magnitude smaller than what can be achieved by relying on the control plane), there is no obvious way of implementing it in P4. In this talk we present the case study of an algorithm to provide deduplication in a packet broker network: packets captured on a production network through various probes and SPAN ports are delivered to a collector making sure that if a packet is captured more than once (e.g., by two different probes), only one copy gets to the collector. The algorithm has been implemented in P4 in four different ways: three of them using registers, and one using a combination of registers and tables. The various implementations have relative advantages and disadvantages, each resulting in a different tradeoff between the number of duplicates not eliminated and the number of packets lost (i.e., none of the captured copies is delivered to the collector). In order to decide which implementation is most suitable to different deployment scenarios, we ran an extensive performance evaluation assessing the duplicate and loss rate for multiple combinations of the parameters of the algorithm and in various network scenarios. The talk presents such results reflecting on how implementation choices affect the performance metrics.

In-Network Deduplication for Packet Broker Deployments

We propose (either in addition or alternatively to the talk) also a demo of the deduplication feature operating in a realistic deployment scenario. The relevance of the demo stems from showing how a functionality that usually requires very expensive dedicated hardware (with large memory and powerful processors) can be offered on a switch that would anyway be required to implement the packet broker network by just adding a few lines of P4 code, hence at a negligible cost.

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