Towards Scalable SDN Switches: Enabling Faster Flow Table Entries Installation

Roberto Bifulco, Anton Matsiuk

NEC Laboratories Europe, Germany – E-mail: firstname.lastname@neclab.eu

Motivation

- SDN Switches that use merchant silicon are slow in updating their forwarding tables
- Flexible lookups may require the writing of more than one entry in the memory:
  - this may increase the installation time even more

Key Observation – Table Updates

- Software tables are much faster to be updated than hardware ones
- A hybrid architecture can exploit the following logic:
  - Forwarding tables updates always happen in software first
  - Entries are eventually moved to the hardware forwarding tables, offloading the Software forwarder

Key Observation – Overlapping entries

- Overlapping entries may break the forwarding decisions in respect to their priorities
- Deleting entries from hardware tables is usually much faster than adding them:
  - Installation in hardware tables may require a reorganization of the previously installed Flow Table Entries
- A hybrid architecture can translate an entry installation into a mix of installation in software tables and deletion from hardware tables

ShadowSwitch’s Architecture

- High-performance software switching layer (SwSw)
- SwSw runs on a general purpose system including:
  - ShadowSwitch Logic (sSwLogic) manages the FTEs installation

Prototype

- Commercial hardware OpenFlow switch (HwSw)
- HP DL380G7 (Intel Xeon L5640 (6 cores @ 2.26 GHz)) contains:
  - OpenvSwitch (OVS)
  - 1Gbit/s ports between the server and the HwSw
  - sSwLogic as a user-level application
  - POX openflow controller

Evaluation – Forwarding Tables Updates

- Forwarding table updates when installing/deleting a variable number of entries

Future Work

- Evaluate the system behavior under various:
  - traffic patterns
  - software-to-hardware forwarding ratios
  - dependencies between flow entries
- Design smart offloading algorithms

Acknowledgment

This work has been partly funded by the EU in the context of the “BEBA” project (Grant Agreement: 644122).

References