Packet Broker: A Network Appliance Based on P4

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Motivation: Netflow Export

- Unsampled Netflow: can’t use Netflow on routers
- Optical taps on external interfaces to copy packets
- “Packet Broker” to aggregate packets onto 2x100Gbps links
- Exporter creates and exports flows
Per-PoP Exporter Architecture

SWITCH border router

8-port splitter

Foreign BR1
Foreign BR2
Foreign BR3
Foreign BR8

Packet Broker
adds vlan for each “color“ so we know where packets came from

Netflow exporter
Functionality

• Flow-aware aggregation towards exporter (via hash over flow-fields)
• Add or rewrite VLAN tags on ingress to identify original links
• Rewrite source/destination MAC addresses
• Filter packets based on source address
• “Flow mirror”: mirror packets based on flow signatures
• Redirect dropped packets to arbitrary port (“deflect on drop”)

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Hardware

• P4-programmable, based on Tofino ASIC
• Device from Edgecore, 32xQSFP (WEDGE 100BF-32X), ~6k EUR
Implementation

• Tofino-specific P4 program: [https://github.com/alexandergall/packet-broker](https://github.com/alexandergall/packet-broker)
• Requires Tofino SDE from Intel to build (under NDA)
• Easy to extend
• Simple control-plane
  • Python script runs as daemon, talks to bf_switchd via gRPC to program the tables from a config file
  • SNMP agent provides ifMIB for Tofino ports
  • Command-line tool (brokerctl) to interact with daemon
Complete Appliance

• Packaging using the Nix package manager
  • Easy release management with rollback capability
• ONIE-based installer
  • Installation of fully functional system in a single step
• Not yet public due to legal constraints from Intel :( 