The Rise of SmartNICs

Offloading Dataplane Traffic to...Software

Andy Gospodarek
Principal Engineer, Broadcom
@gospo

BROADCOM®

Case Study: Open vSwitch Offload to a SmartNIC

- Datapath Acceleration User Experience
- Acceleration vs Offload Definition
- SmartNIC Software Datapath Configuration
- Forwarding Capabilities
- What's Next?

Why Accelerate Open vSwitch Datapath?

BROADCOM

Use Server Processor Cycles for *Actual* Work

BROADCOM

Datapath Acceleration User Experience

- Hardware and Software vendors have worked tirelessly to make sure flows can be accelerated by NIC hardware
- Broadcom supports acceleration on all TruFlow™ Hardware
- CPU Utilization often reduced significantly by offloading megaflows -- impact increases with 25/50/100 Gbps adapters.
- Acceleration capabilities are always going to trail software capabilities

~~Accelerate Datapath~~

BROADCOM

Offload All the Things

BROADCOM

Acceleration

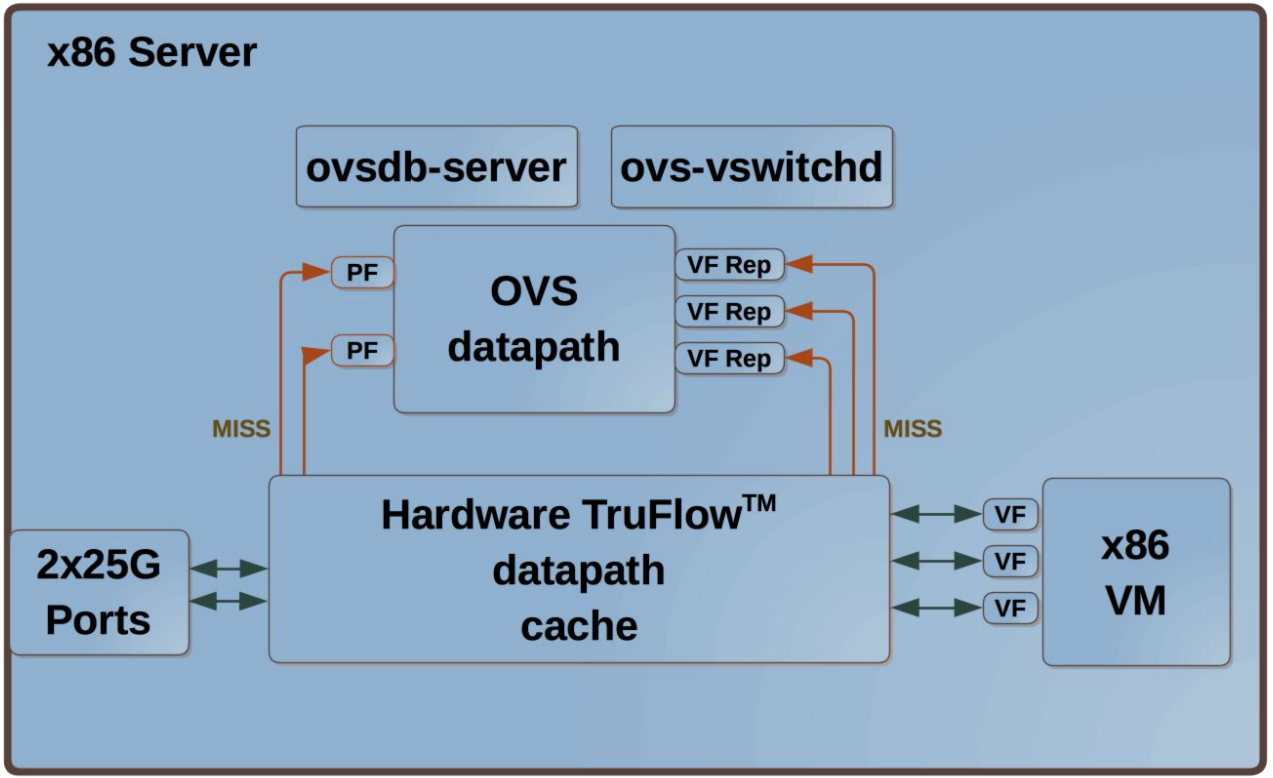
- VFs in Switchdev mode on server
- Program TruFlow™ hardware to forward traffic between PFs and VFs without sending that traffic to the software datapath
- Conntrack and friends not yet accelerated

Offload

- Neither flow programming nor datapath handled by server
- Open vSwitch applications and datapath handled by SmartNIC
- Traffic directed to VFs by SmartNIC
- All current software features of Open vSwitch supported by SmartNIC

BROADCOM

Acceleration Software Configuration



BROADCOM

SmartNIC Software Configuration

- **No Open vSwitch tools running on the Server**
  - Just install the Stingray SmartNIC and create VFs on Server!
- **Broadcom Stingray SmartNIC is responsible for forwarding traffic between VMs and rest of the network**
  - `ovsdb-server`, `ovs-vswitchd`, and friends all running on Stingray SmartNIC
  - Server VF forwarding policy controlled by Stingray SmartNIC

Open vSwitch running on x86 Server?

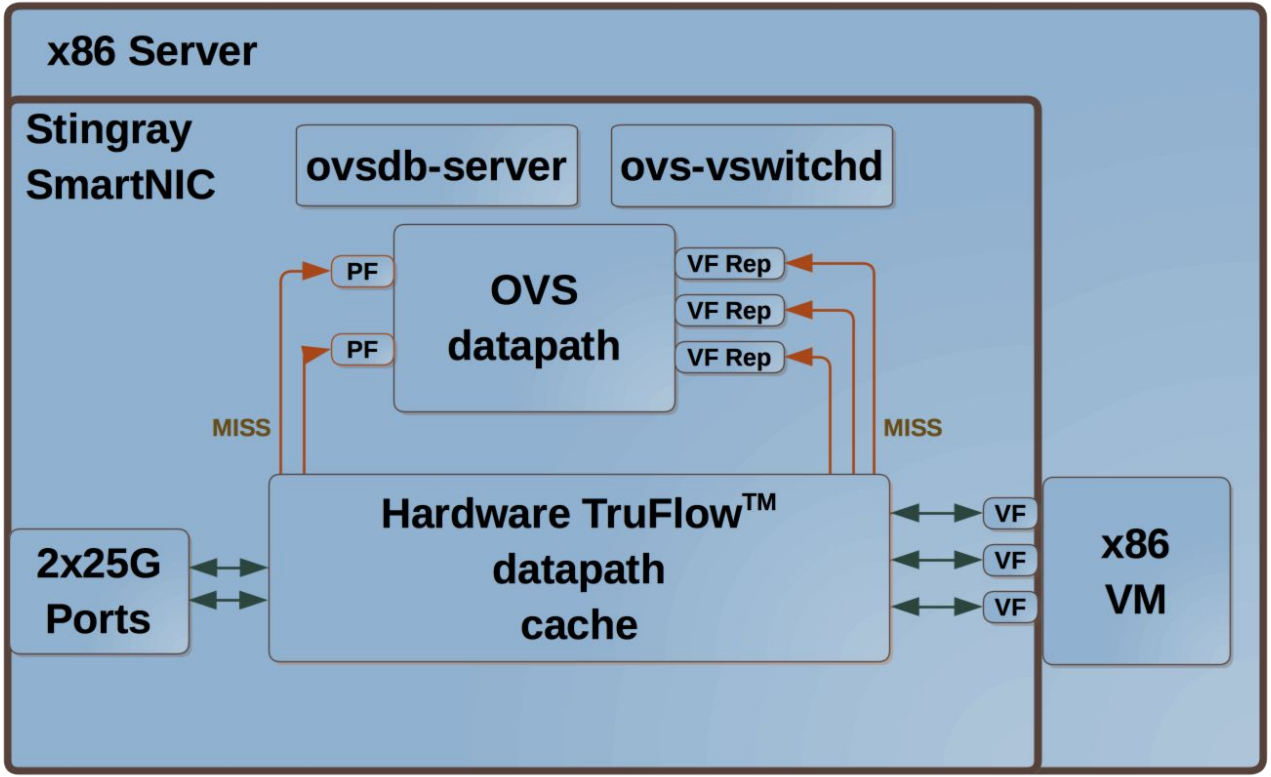
```
[root@dell-r740-01 ~]# pgrep -l ovs
[root@dell-r740-01 ~]#
```


Open vSwitch running on Stingray SmartNIC?

```
[root@stingray ~]# pgrep -l ovs
2425 ovsdb-server
3087 ovs-vswitchd
[root@stingray ~]#
```


BROADCOM

SmartNIC Software Configuration



BROADCOM

SmartNIC Hardware and OS Configuration

- **Broadcom Stingray SmartNIC**
  - Cortex-A72 (8 cores)
  - 8-16GB DDR
  - 2 x 25Gbps SFP+
  - Broadcom TruFlow™
  - Yocto Linux (4.13.0)
  - Open Programmable Platform -- users decide what applications or Linux distributions to use

Sounds great, but how well does it *actually* work?

BROADCOM

SmartNIC Forwarding Capabilities

- Performance and Power targets for Stingray SmartNIC was software forwarding of 25Gbps of bidirectional traffic using an Internet Mix
- Testing with Open vSwitch running Stingray SmartNIC confirms this is possible between x86 server (PF or VF) and remote host.
- Inclusion of Open vSwitch Acceleration Features on Stingray SmartNIC using TruFlow™ pushes this closer to 50Gbps of bi-directional traffic using an Internet Mix.

BROADCOM

What's Next?

- **Stingray SmartNIC Infrastructure**
  - Additional VF representor initialization and configuration
  - Complete Integration with Linux Distributions supporting ARMv8
- **Investigate OpenStack SmartNIC Integration**
  - Completed with standard NIC need to understand differences when Open vSwitch running on SmartNIC and if blueprint needed
- **Get Broadcom's Stingray SmartNIC in the hands of more users!**

BROADCOM

For More Information Visit:

https://www.broadcom.com/products/ethernet-connectivity/network-adapters/ps225

BROADCOM®