VSPERF and Open vSwitch for OPNFV

Mark Gray, Thomas Herbert and Maryam Tahhan.
What is OPNFV?
OPNFV is a carrier-grade, integrated, open source platform to accelerate the introduction of new NFV products and services.
OPNFV Membership List

Platinum Members

Silver Members

*OPNFV*
What does OPNFV do?
OPNFV is a carrier-grade, integrated, open source reference platform.

Work with upstream projects to coordinate continuous integration and testing.

Fill development gaps.

Establish an ecosystem for NFV solutions based on open standards and software.
How does it do it?
Open Source Community Working with Upstream Communities
OPNFV Releases

NOW AVAILABLE

Learn More: opnfv.org/arno

Brahmaputra
Release

Coming Soon
OPNFV Project pipeline
OPNFV Project pipeline

Apex (TripleO-based platform deployment)

Fuel (Fuel-based platform deployment)

Compass (Compass-based deployment)

OpenSteak (Foreman-based deployment)

OSCAR (system configuration and reporting)

Pharos (Lab federation and management)

RelEng (software development automation & infrastructure)

Octopus (OPNFV CI pipeline project)

Genesis (deployment calibration project)

Qtip (platform performance testing)

Yardstick (infrastructure validation framework)

Dovetail (OPNFV qualification tests)

VSPERF (vSwitch performance testing)

STORPERF (storage performance testing)

FuncTest (platform functional testing)

 OSCAR (system configuration and reporting)

Osc (OpenStack controller)

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OVS and Independent Data Plane

- OVS Architecture Supports Independent Data Planes
  - DPDK
  - Linux Kernel Data Plane
- OVS with Accelerated Data Plane
  - OVS with DPDK
  - Currently the Most Widely Adopted
  - The Most Promise for the Near Future
Open vSwitch Architecture and DPDK
DPDK – Open vSwitch

- DPDK – Data Plane Development Kit
  - About 4 Years Old
  - First Integrated with OVS from 2013
  - Fast Packet Forwarding
  - Poll Mode Drivers
  - Uses Commodity Hardware
  - Multiple Threads and Cores
  - Up to 12X Speed Improvement for small packets
  - Over 15mpps Forwarding
  - Small Packets

- Disadvantages WRT Linux Kernel
  - Linux Data Plane Has
    - Complete TCP/IP Stack
    - 20 years of development
    - Rich Debugging Options
      - Promiscuous IFs
    - Access to Wide Variety of Network IF’s and VF’s
    - Tunnels and Endpoints
OVSNFV – Phase 1 (Build, Integrate, Deploy, Test)
OVSNFV Project

- Collaborative Development
  - Incubation Stage
- Overall goal:
  - provide Open vSwitch with user space accelerated data plane for deployment within the OPNFV ecosystem.
- Take OVS and DPDK from the upstream projects
- Deploy OVS/DPDK as Package for use by
  - VSPERF
  - SFC
  - General Use as Deployed OVS in OPNFV
- Test and Verify Assumption of DPDK Use Case in OPNFV
- Provide Alternative OVS-Linux Kernel for Comparison
OVSNFV Project

- Project Wiki Page
  - https://wiki.opnfv.org/ovsnfv
- Project Lead
  - Mark Gray (Intel)
- Committers
  - Mark Gray (Intel)
  - Joseph Gasparakis (Intel)
  - Billy O Mahony (Intel)
  - Hongbo Tianhongbo (Huawei)
  - Thomas F Herbert (Red Hat)
OVSNFV Project

- Fed by Two Upstream Projects
  - Open vSwitch
  - DPDK
- We are NOT Forking Either DPDK or OVS
- Strive For Upstream Enablement for Easier OPNFV Integration
  - Upstream: Maintain “Similar” Semantics for Both
  - Although We May Use Patches before They Are Merged Upstream
    - To Support Specific Required Use Cases
OVSNFV Project – Upstream Issues

• DPDK Device Management
  • Driverctl Utility Preferably with Systemd patch
  • http://dpdk.org/ml/archives/dev/2015-November/028121.html
• NSH patch from Intel (Danny Zhou)
• “Alternate” RPM Install
  • Separate Glance Images for Ironic Compute Node Install
• ML2 Mechanism Driver Update for DPDK/OVS
• OpenStack ODL change to add Vhost-User Port Names
  • https://review.openstack.org/#/c/215612/
OVSNFV – Looking Forward

- Discover Requirements and Needed Features
- Deployment of OVS/DPDK in OPNFV
- Get Feedback from OPNFV Ecosystem
  - Gather Missing Required Features
- Push Issues Upstream to Improve
  - DPDK
  - OVS
- Merged into DPDK and OVS
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Define, implement and execute an appropriate set of tests in order to objectively measure the current Telco characteristics of a virtual switch in the NFVI.
VSPERF Standardization and Open Source Projects

Driving the standard platform – by doing

Feedback
VSPERF Deliverables

**IETF Draft**

Network Working Group
B. Tahan
Internet-Draft
Developed by: Intel
Expires: April 16, 2016

Benchmarks Virtual Switches in OPMFV
draft-vsperv-benvg-vswwitch-operator-01

**Test Specification**

CHARACTERIZE VSWITCH PERFORMANCE FOR TELCO NFV
USE CASES LEVEL TEST DESIGN

<table>
<thead>
<tr>
<th>Test Case</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VNF(s)</td>
<td>vSwitch</td>
</tr>
<tr>
<td>DUT</td>
<td>VSPERF</td>
</tr>
</tbody>
</table>

**Modular Test Framework**

Consumable by:

- IETF
- OPNFV
- OvS

Traffic Gen

Client

vSwitch

DUT
## VSPERF 3x4 Matrix LTD Coverage

<table>
<thead>
<tr>
<th></th>
<th>SPEED</th>
<th>ACCURACY</th>
<th>RELIABILITY</th>
<th>SCALE</th>
</tr>
</thead>
</table>
| **Activation** | • RFC2889. AddressLearningRate  
• RFC2889. AddressCachingCapacity  
• InitialPacketProcessingLatency  
• LatencyAndLatencyVariation  | • CPDP.Coupling.Flow.Addition  | • RFC2544.SystemRecoveryTime  
• RFC2544.ResetTime  | • RFC2889.AddressCachingCapacity  |
| **Operation**  | • RFC2544.PacketLossRatio  
• RFC2544.PacketLossRateFrmMod  
• RFC2544.BackToBackFrames  
• RFC2889.MaxForwardingRate  
• RFC2889.ForwardPressure  
• RFC2889.BroadcastFrameForwarding  
• RFC2889.Broadcast Frame Latency test  
• CPU.RFC2544.0PacketLoss  
• RFC2544.WorstN-BestN  
• InterPacketDelayVariation.RFC5481  | • RFC2889.ErrorFramesFiltering  
• RFC2544.Profile  | • RFC2889.Soak  
• RFC2889.SoakFrameModification  
• PacketDelayVariation.RFC3393.Soak  | • Scalability.RFC2544.0PacketLoss  
• MemoryBandwidth.RFC2544.0PacketLoss.Scalability  |
| **De-Activation** |                                  |                              |                               |                                 |

RFC2544 Benchmarking Methodology for Network Interconnect Devices
RFC2889 Benchmarking Methodology for LAN switching Devices
Future Work

- Integrating multiple traffic gens: IXIA, Spirent, Moongen and Xena.
- Methodology extensions: iterations for the short trial tests.
- Prove out and refine methodology and tests through the framework.
- Add more tests to the LTD and the framework.
- Continuous Integration support.
OVS call to action

- So join us in OPNFV to help establish an Open Source, carrier grade, integrated platform that includes a carrier grade OVS.
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