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PFT Testing criteria

Goal

Define a technical requirement for the forwarding throughput measured on our products (RHEL and OVS+DPDK), to reduce the risk of customers claiming degradation in the forwarding performance when the same applications (typically NFVs) run on different PFs (i.e. NICs provided by different vendors).

Assumptions

- different NIC models can negotiate different link speeds (10/25/40/50/100 Gb/s)
- when the traffic is limited by CPU resources on the host, the forwarding throughput is (much) lower than the theoretical frame rate that can be obtained at a given link speed.
- the maximum forwarding rate that can be obtained on the SW datapath (OVS+DPDK or OVS+Kernel SW) depends mostly on the driver implementation, and on computing resources in the host CPU.
- when HW offload is used, the maximum forwarding traffic is limited by computing resources on the NICs.

Methodology

The PVP script [1] is used to benchmark the forwarding performance of a NIC model. The following configurations are tested:

```
throughput               | component being tested
-------------------------+------------------------
OVS+DPDK, L2 and L3      | poll-mode driver
OVS+Kernel SW, L2 and L3 | kernel driver
OVS+Kernel HW, L2 and L3 | kernel driver + hardware (TC Flower)
```

With the aim of increasing the test coverage and underline potential limitations in the NIC hardware or in the NIC driver, tests are run using multiple frame sizes (64B to 1514B) and multiple simultaneous flows (10 to 1000000). Resulting values (in pps) are compared to the maximum theoretical rate for the given speed, or with values measured on a reference architecture under the same test conditions.

Requirements

Each test is run on y-stream RHEL kernels, with latest FDB OVS+DPDK, following the instructions available at [1]

Requirements for non HW offload (sw only path) datapath

VSPerf DPDK
- 64 bytes PVP OVS-DPDK will achieve 3 Mpps at 0 loss for 10 minutes
- 1500 bytes PVP OVS-DPDK will achieve 1.5 Mpps at 0 loss for 10 minutes
- 64 bytes PVP OVS-DPDK multi-queue 2 Queue 4 PMD will achieve 6 Mpps at 0 loss for 10 minutes
- 1500 bytes PVP OVS-DPDK multi-queue 2 Queue 4 PMD will achieve 1.5 Mpps at 0 loss for 10 minutes
- 2000 byte jumbo frames PVP OVS-DPDK will achieve 1.1 Mpps at 0 loss for 10 minutes
- 9000 byte jumbo frames PVP OVS-DPDK will achieve 250 Kpps at 0 loss for 10 minutes

VSPERF Kernel
- 64 bytes PVP OVS kernel will achieve 100 Kpps at 0.002 loss for 10 minutes
- 1500 bytes PVP OVS kernel will achieve 100 Kpps at 0.002 loss for 10 minutes

VSPERF SR-IOV
- 64 Bytes PVP SR-IOV passthrough will achieve 10 Mpps at 0 loss for 10 minutes
- 1500 Bytes PVP SR-IOV passthrough will achieve 1.6 Mpps at 0 loss for 10 minutes

PVP Tests
- Open vSwitch DPDK datapath 10 hour long duration (PASS if OVS is still passing traffic after 10 hours, without any crashes in between)
- OVS Linux Kernel datapath 10 hour long duration (PASS if OVS is still passing traffic after 10 hours, without any crashes in between)

Beaker Functional Tests China OVS Team
- OVS kernel functional tests, needs to PASS all tests

Note that DPDK performance will be validated via VSperf and not via PVP.

Requirement for the HW offload datapath

For ovs_pvp it should pass the 10-hour long duration test, both L2, and L3. Which means it is still passing traffic after 10 hours, without any crash in between.

In addition, the 10 hours 10k L3 flows test should reach the minimum packets per second (pps) forwarding rate for each packet size specified to pass. The minimum pps rate per packet can be taken from the tables below. Each interface speed has its own table and is based on average numbers of already existing solutions.

Finally in addition to the above, the following flow characteristics should be met:

1. it must be possible to offload simultaneously up to 10K flows
2. the flow installation rate should not be less than 1.5K flows/s

Packet Size	Minimum Packets Per Second
64	2490513
128	2400604
256	2256274
512	2114661
768	1427664
1024	1077586
1514	733376

Pass table for 10Gbps interfaces

Packet Size	Minimum Packets Per Second
64	9637204
128	6508473
256	4000375
512	3693513
768	3462503
1024	2671544
1514	1819386

Pass table for 25Gbps interfaces

Packet Size	Minimum Packets Per Second
64	10217438
128	9092933
256	8657281
512	6536093
768	5280149
1024	4024205
1514	2619575

Pass table for 40Gbps interfaces

Packet Size	Minimum Packets Per Second
64	26067795
128	23473241
256	18772297
512	10476825
768	7083181
1024	5347950
1514	3640232

Pass table for 50Gbps interfaces

Packet Size	Minimum Packets Per Second
64	26899051
128	24033668
256	18772297
512	13542611
768	9978782
1024	7948678
1514	5451593

Pass table for 100Gbps interfaces

References

[1] PVP setup, https://github.com/ctrautma/RHEL_NIC_QUALIFICATION