100G OVS Kernel Datapath Offload for AMD EPYC

Using AMD EPYC 7551 Platform & Chelsio T6 Adapter

Executive Summary

AMD EPYC, industry's first hardware-embedded x86 server security solution, is a system on chip (SoC) which provides exceptional processing power coupled with high-end memory and I/O resources to meet workload demands of any scale, from virtualized infrastructures to cloud-era data centers.

This technical brief highlights Chelsio's excellent OVS Kernel Datapath offload capabilities in an AMD EPYC 7551 Server (an x86 platform) setup by comparing packet processing rate (PPS) and CPU usage of offloaded and non-offloaded OpenFlow network traffic. Chelsio's T6 offload scores a considerable PPS of 47M with less than 1% CPU usage across the board. The combination of the AMD EPYC 7551 server with Chelsio's industry-leading Unified Wire adapter solution delivers compelling performance, power and total cost of ownership (TCO) advantages. This enables innovative topologies and networked computing models to address the most demanding processing needs.

Test Results

The following graph presents packet processing rate (PPS) and CPU utilization for offload and non-offload OpenFlow network traffic. The results are collected using **pktgen** tool with I/O size 64B and the number of OpenFlows varying from 1 to 10k.
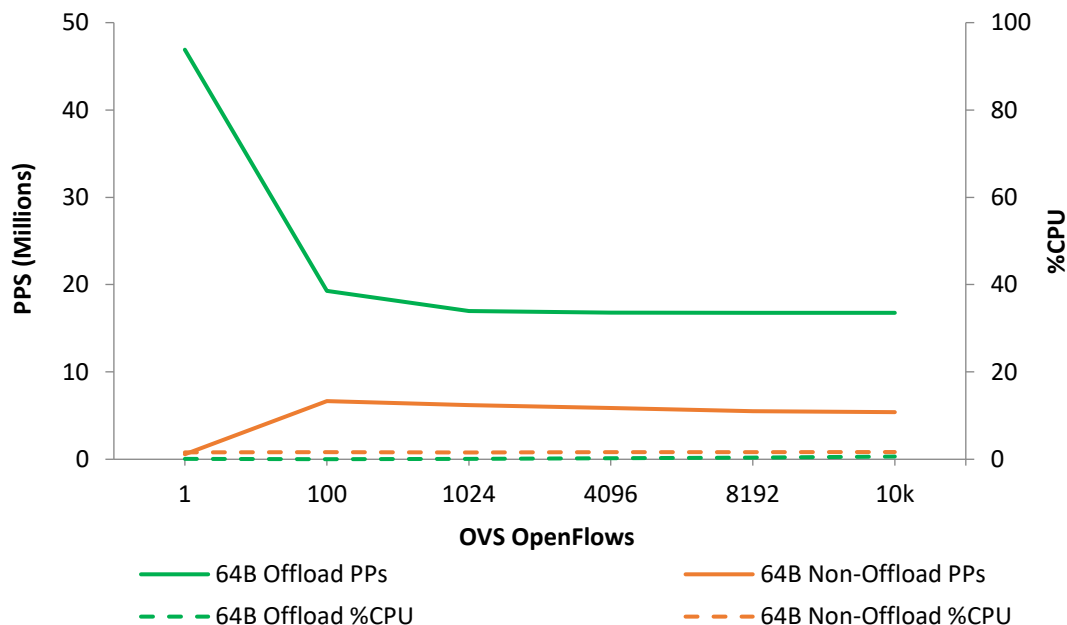

Figure 1 - PPS and %CPU vs. Number of Flows

By offloading OVS kernel datapath on to the adapter, Chelsio T62100-CR adapter performs exceptionally well with up to 47 MPPS at challengingly small I/O size. As the flows increase beyond 100, Chelsio's offload solution continues to deliver with an average of 3x the performance of non-

offload. Furthermore, with CPU usage of less than 1%, the processing power of the server is practically unused; free to be utilized for other CPU intensive applications.

Test Setup

The following diagram provides the test setup and configuration details:

AMD EPYC 7551 - working as OVS switch to process traffic between Host A and Host B

- Supermicro H11DSi-NT Server with T62100-CR adapter
- 2 AMD EPYC 7551 32-core @ 2GHz (HT disabled)
- 64GB RAM (DDR4, 2666 MHz)
- RHEL 7.3 (4.9.49 kernel)

- Supermicro X9DRD-iF Clients with T62100-CR adapter
- 2 Intel Xeon CPU E5-2640 0 6-core @ 2.50GHz (HT enabled)
- 64GB RAM (DDR3,1333 MHz)
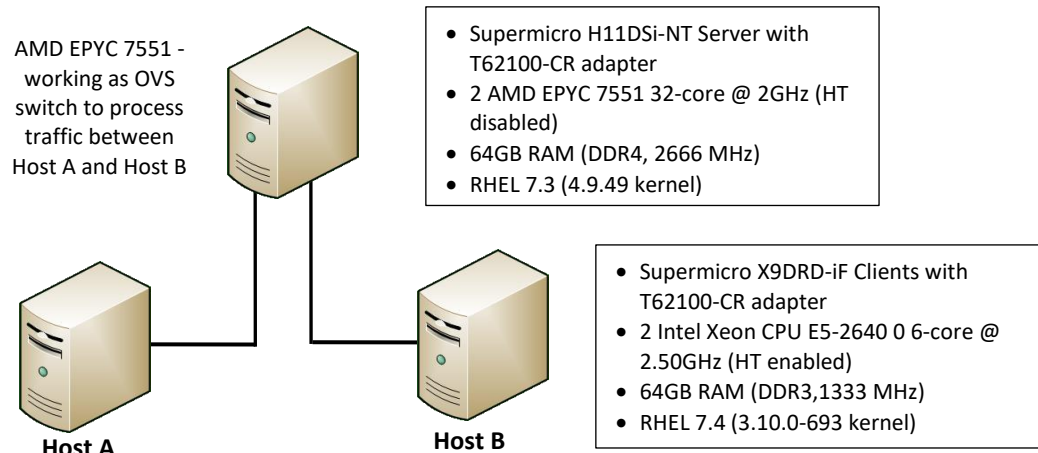- RHEL 7.4 (3.10.0-693 kernel)

Host A   **Host B**

Figure 2 – Test Setup

The test setup consists of 2 Client machines connected to an OVS Switch (AMD EPYC 7551 Server) machine using single 100Gb link. MTU of 9000B is configured on all the machines. Latest Chelsio Unified Wire software is installed on all the machines.

Conclusion

This paper showcases the performance advantages of Chelsio's OVS offload solution in an AMD EPYC 7551 based server. Chelsio's T6 Unified Wire adapter delivers up to 3x the packet processing rate of regular (non-offload) NIC with a maximum of 47M. Such an exceptional performance while processing small I/O size (64B) network packets is representative of real-world application demands.

In addition to the high packet processing performance, Chelsio's T6 solution delivers extraordinary CPU management capabilities with processing usage never crossing over 0.6%, even with 10k flows.

Chelsio's T6 Unified Wire adapter and AMD's EPYC server platform is the definite answer to the ever-increasing processing demands of datacenters in any environment-bare metal, virtual or cloud.

Related Links

The Chelsio Terminator 6 ASIC
OVS Kernel Datapath Offload Solution
OVS Kernel Datapath Offload at 100GbE