LAS16-401: Accelerating applications with OFP+ODP: highlighting NGINX, OpenSSL and L3FWD

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ODP Performance results

- ODP-OpenSSL Performance on SoCs
- L3FWD Performance on X86 and SoCs
- NGiNX- OFP Scaling on X86 and SoCs
- L2 and L3 forwarding comparing core isolation vs non-isolated

Note: This data presents a snapshot, with many investigations still left to complete
ODP-OpenSSL

Description of ODP-OpenSSL

ODP-SSL is ODP based OpenSSL engine that utilizes ODP for offloading cryptographic operations.

Description of the Measurements

- OpenSSL on ARM Linux
- OpenSSL on ARM Linux compiled with ARM extensions
- OpenSSL on ARM with HW offload
- Hybrid approach using ARM extensions for small packet sizes and HW offload for large packets
ODP-OpenSSL

NXP DPAA2 based (LS2088) SoC

OpenSSL

OpenSSL Benchmark

ODP plugin

ODP-dppa2

CAAM (Crypto accelerator)

NXP LS2088 SoC.
ODP-OpenSSL Performance NXP LS2 SoC

Relative OpenSSL performance on ARM SoC

% improvement vs linux

bytes

16 64 256 1024 8192 16384
ODP L3FWD

ODP-L3FWD is doing IPv4 forwarding in user-space based on ODP API.

Description of the measurements

- Linux L3FWD ---- kernel forwarding, sysctl -w net.ipv4.ip_forward=1
- DPDK L3FWD ---- l3fwd in dpdk.git
- ODP-DPDK L3FWD ----- odp-l3fwd running with odp-dpdk.git
- ODP-Native- DPDK-PKTIO L3FWD ----- odp.git
  - odp-l3fwd running with dpdk pktio
  - odp-l3fwd running with socket pktio
ODP L3FWD HW connection

X710-DA2 on a X86 machine with:
Intel(R) Xeon(R) CPU E5-2620 v2 @ 2.10GHz * 12 (6 cores, 12 threads)
MemTotal: 16G
HugePageMem: 1024 * 2M
OS: CentOS7.1
ODP L3FWD vs Kernel on X86

L3FWD linux Kernel vs X86 Optimized ODP

Mbps Throughput

Packet Size
ODP L3FWD vs Kernel on Accelerated HW

![Graph showing l3fwd percentage difference to line rate at 20G](image-url)

- Frame Size (bytes): 64, 128, 256, 512, 1024, 1280, 1518
- Y-axis: Percentage Difference (-2400.00% to 0.00%)
- Legend:
  - `odp-l3fwd-1t`
  - `odp-l3fwd-2t`
  - `odp-l3fwd-4t`
  - `odp-l3fwd-8t`
  - `kernel-8t`
ODP L3FWD odp-dpdk vs DPDK on x86
ODP L3FWD odp-linux vs odp-dpdk
ODP L3FWD linux vs odp-linux (PKTIO=socket)
ODP L3FWD odp-linux vs odp-dpdk vs dpdk
ODP L3FWD vs DPDK

Percentage deficit to native SDK

- Percentage
- Packet size

- 0.00%
- -6.00%
- -12.00%
- -18.00%
- -24.00%
- 64
- 128
- 256

cores 1
cores 2
cores 4
ODP NGiNX and ODP TCP stack Performance

Compare on a high core count X86 Linux NGiNX running with ODP to show the scaling on cores.

Description of the measurements

- Zero application change of NGiNX using LD_PRELOAD
- Modified for OFP NGiNX performance
- Linux NGiNX performance
ODP NGiNX and ODP TCP stack Performance

X86

httpperf

1 x 10G NIC

x86

NGiNX

OFP

ODP-DPDK

Cores

Demo Machine
ODP NGiNX and OFP on X86 10G interface
ODP NGiNX and OFP on X86 1G interface
ODP Linux Forwarding performance with isolation

- ODP generator and l2fwd run on 2 x86 CPUs in normal Linux user space environment and run in isolated (cpuset) cores

- ODP using socket PKTIO -

Description of the measurements

- 10 sets of measurements are taken with 10 samples each. Both with and without isolation.
- Isolation is achieved by starting l2fwd in an isolated cpuset
ODP Forwarding performance with isolation
Thank You

For further information: opendataplane.org