LAS16-405 - OpenDataPlane - Software Defined Dataplane leader

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Software Defined XXX

Network: hardware is loaded with rules from software controller and deals with packets autonomously.

Storage: you don’t know where the hardware is or even its form factor (hard disk, NVMe flash, flash on a DIMM). Access and policies are managed by software.

Infrastructure, Radio, Compute...

Software DEFINES the XXX behavior but may not IMPLEMENT it.
Data Plane

The journey of a packet on SoC, Host+NIC, Host+SmartNIC...
Software Defined Data Plane: integrate HW blocks

Packet App may or may not be in datapath

Accelerator Functions may be in HW or SW
May be integrated or attached
May be hard or soft logic (e.g., FPGAs)
May support direct pipelining from one accelerator to the next
DPDK packet handling

Packet App ALWAYS in datapath

Inherent PCIe latency requires SW complexity to compensate. SW complexity constrains ability for HW to innovate.
Software Data Planes Use Lookaside Acceleration

PCIe latency added at every stage
Packet must revisit a core between each stage
Real benchmarks vs marketing benchmarks

Why care about packet ordering?
- SSL
- IPSec

How a telecom application performs (SCTP/IP/GTP/IPSec/MPLS/VxLAN/Ethernet) depends on many aspects, L2 pps between the VM and the host being probably the least important

Packet benchmarks are NOT telling much about application level performance.

Elements of ordered queues are dispatched to next “node” (HW block or thread) in parallel

Output is reordered if necessary so that output queues maintain same relative order as input queues
From inception to deployment

LTS Monarch released in August

Now focus on:

- Cloud high performance versions for ARM & X86
- Deploying into networking apps with OFP
- Deploying into networking infrastructure with VPP
- Distribute as part of the Enterprise RPB first, then derive additional RPBs for vCPE and Edge Node

Target form factors:
Low core count “edge nodes” and SmartNIC
ODP Roadmap

- ABI
- VPP integration
- ODP high performance for ARM/x86

- IPSec full offload demo
  Driver framework (virtio-net)
  Public Cloud Images

- vCPE Reference Platform Build
  virtio-crypto,
  virtio-ipsec

ODP Brimstone (post TigerMoth)
Long term and research

- Storage, NVMe over fabrics
- Switchdev to control SmartNICs?
- ODP bridging from switchdev interfaces to VMs
- vfio-odp hardware abstraction of ODP SmartNICs
- NGINX/OFP/ODP on FreeBSD for Netflix, Azure
- ODP over Microsoft PacketDirect on Windows
- Battery savings for LMG (Chrome/OFP/ODP)
- Core count economies for LHG (4K video)
- FPGA and network acceleration
- P4 control from ODP
Thank You

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