DPDK

DATA PLANE DEVELOPMENT KIT

Integrating AF_XDP into DPDK

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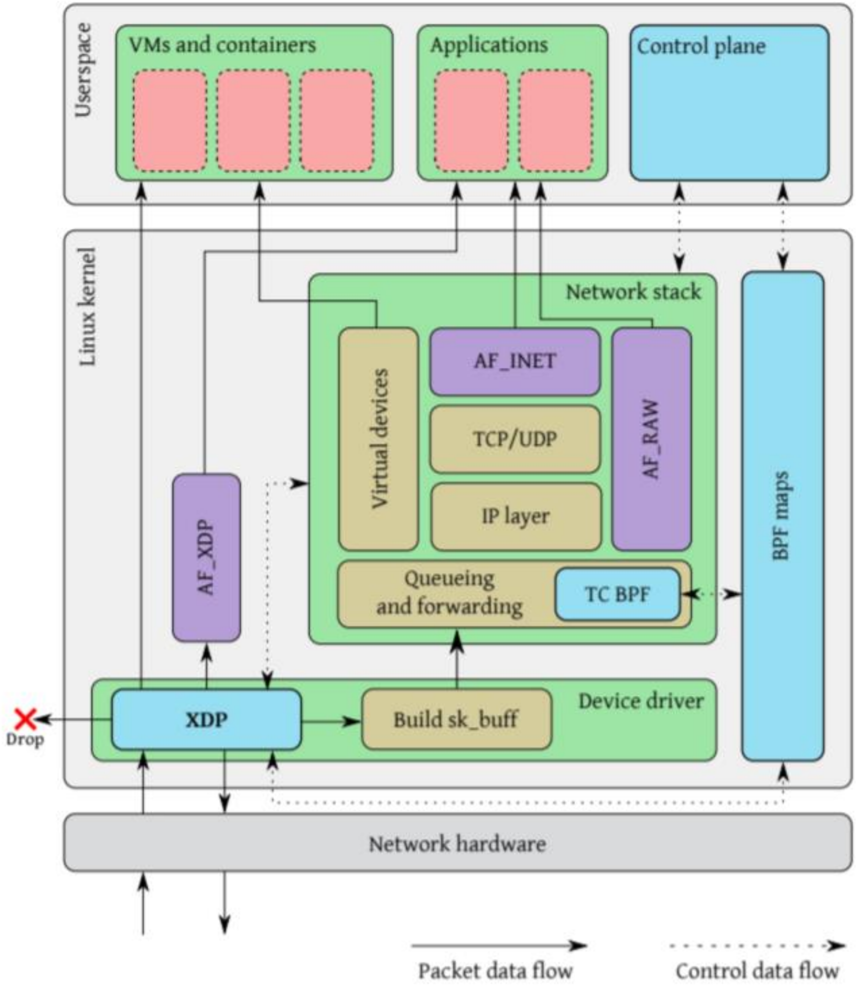
INTEL

Agenda

- AF_XDP introduction
- AF_XDP PMD in DPDK
- Performance
- Future work

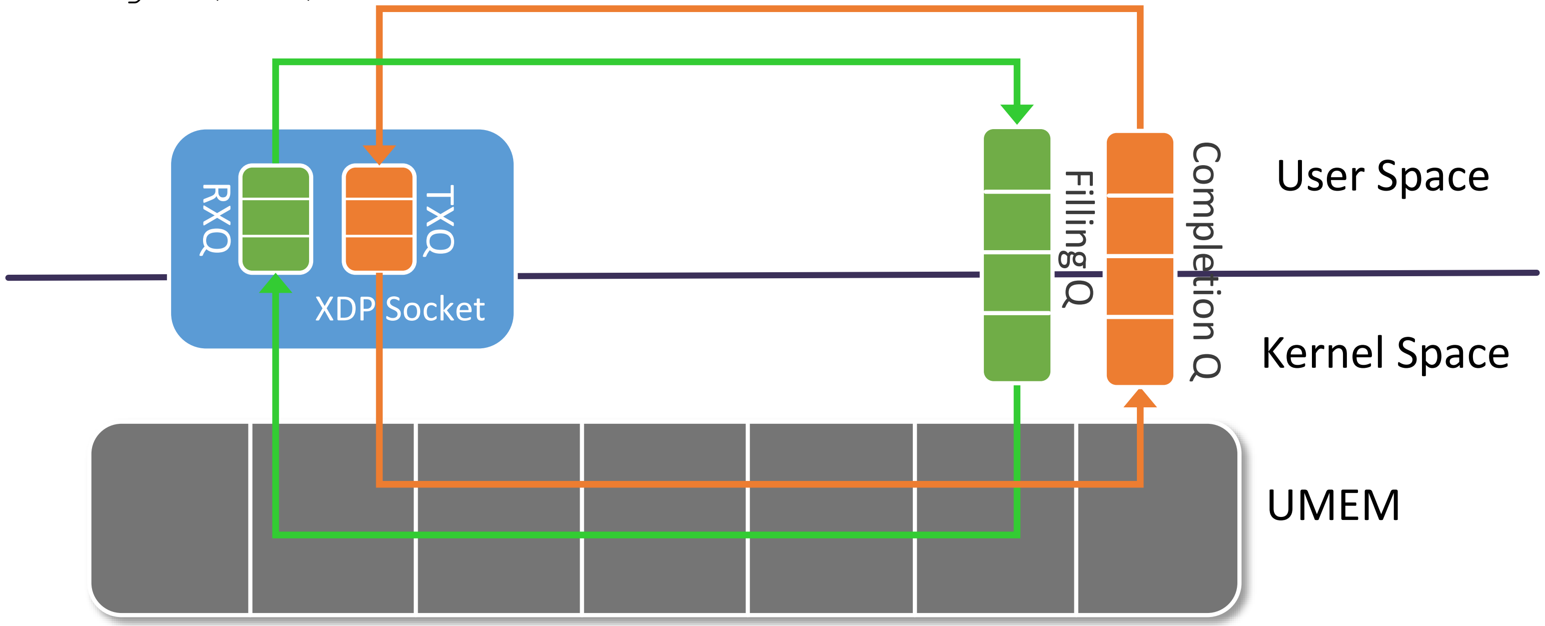
AF_XDP

- Overview
  - XDP's user space interface
  - Use XDP program to trigger Rx path for selected queue
  - Zero Copy from DMA buffers to user space with driver support
  - Copy mode for non-modified drivers
- Benefits
  - Performance boost
  - Support all Linux network devices



AF_XDP

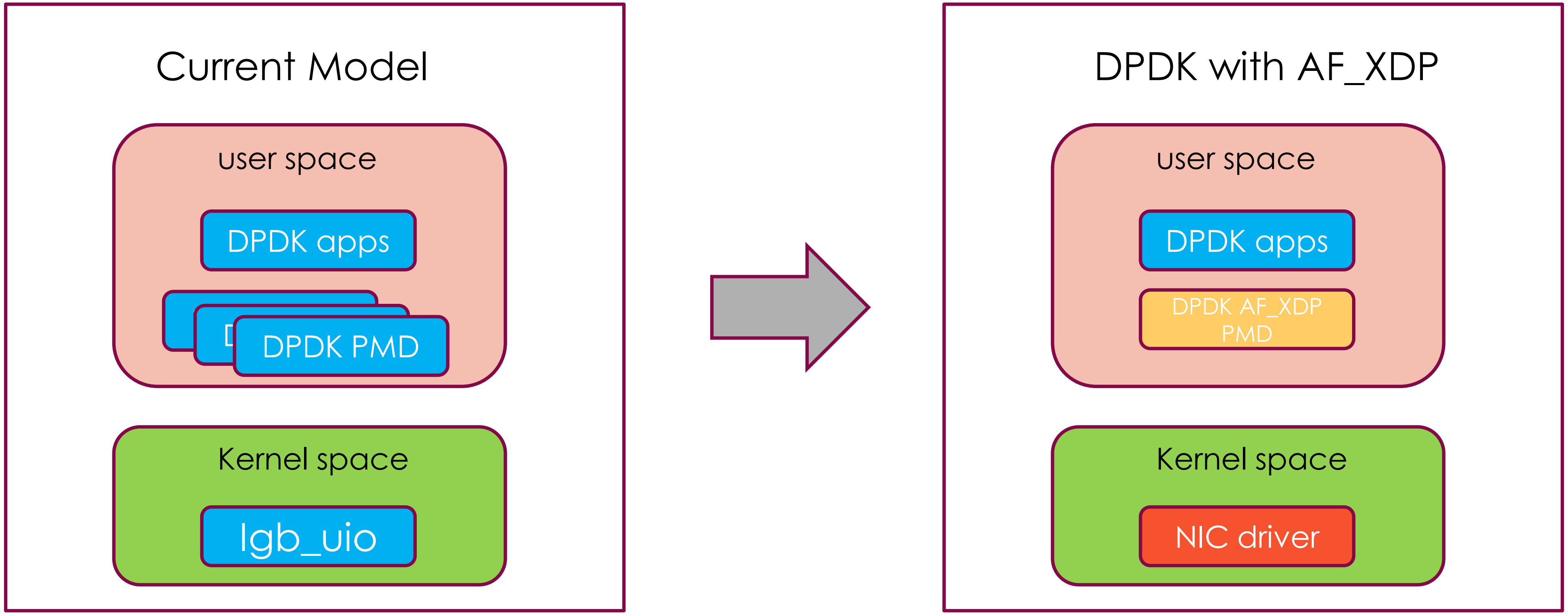
```
sfd = socket(PF_XDP, SOCK_RAW, 0);
buffs = calloc(num_buffs, FRAME_SIZE);
setsockopt(sfd, SOL_XDP, XDP_MEM_REG, buffs);
setsockopt(sfd, SOL_XDP, XDP_{RX|TX|FILL|COMPLETION}_RING, ring_size);
mmap(..., sfd, ......); /* map kernel rings */
bind(sfd, ”/dev/eth0”, queue_id,....);
for (;;) {
        read_process_send_messages(sfd);
};
```



AF_XDP integrated into DPDK

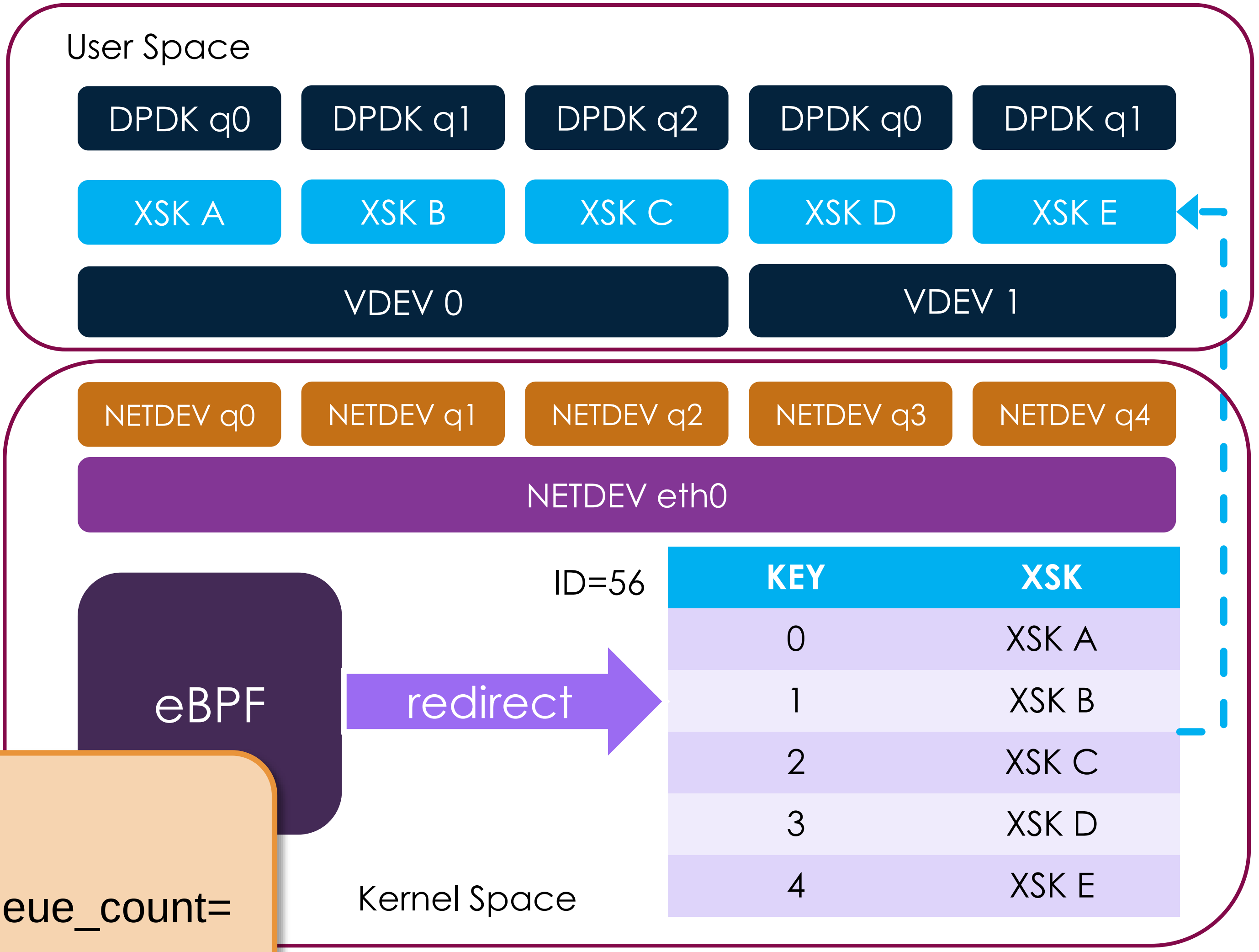
- Motivation
  - Support DPDK in container usecase
  - Support non DPDK NICs
  - Reuse DPDK libraries for applications
  - Use of hugepages for performance
  - Linux kernel driver handles hardware
  - Better security and isolation
  - Utilize existing Linux network tools
- Goal
  - DPDK apps can run unmodified using AF_XDP interface
  - Performance is on par with kernel xdpsock sample

AF_XDP integrated into DPDK



AF_XDP PMD

- Implemented by vdev
- Create af_xdp socket, umem, fill/completion/Rx/Tx rings
- Features:
  - Multi-queues
  - Zero copy between mbuf and umem

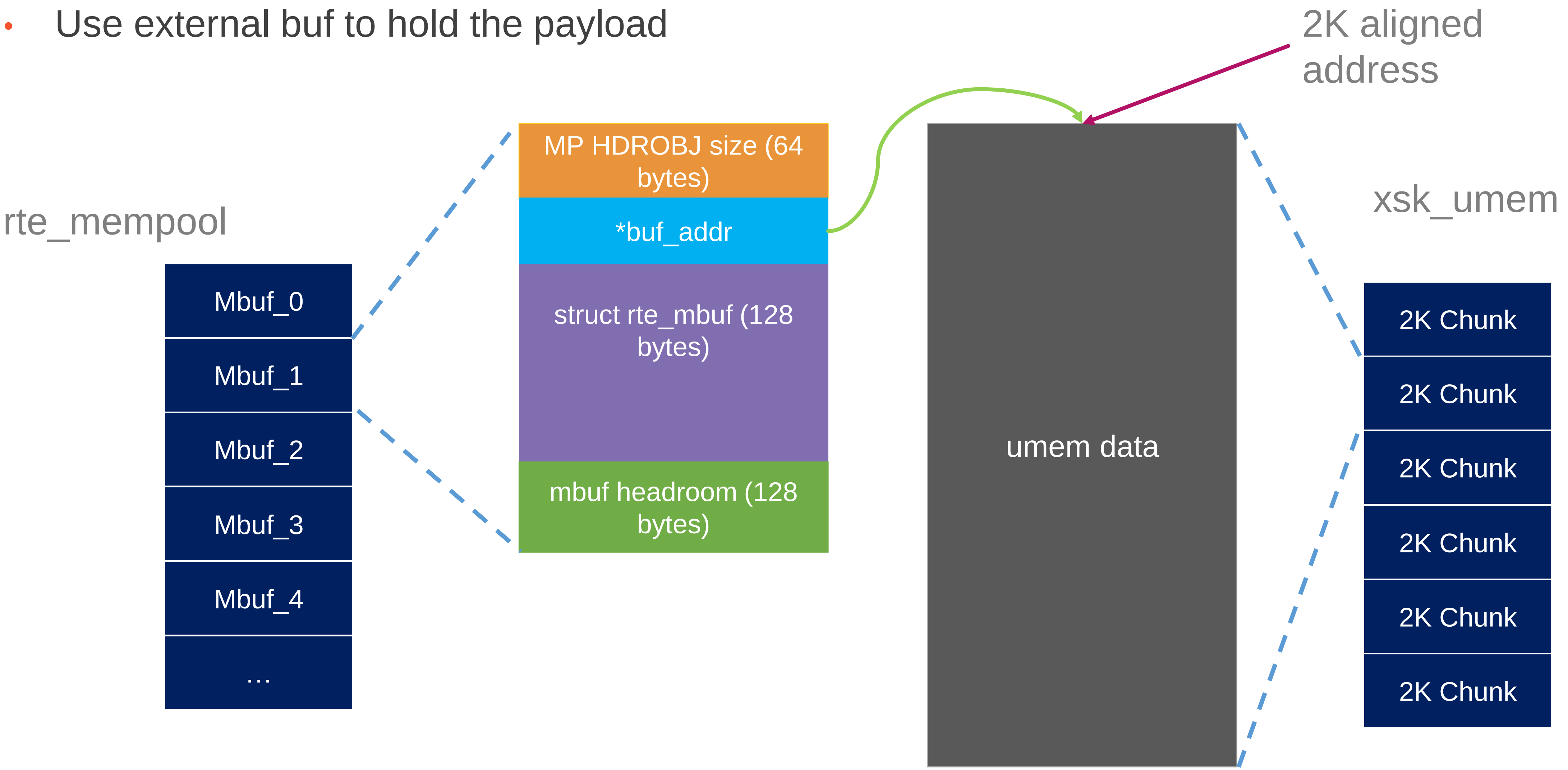


KEY	XSK
0	XSK A
1	XSK B
2	XSK C
3	XSK D
4	XSK E

```
./build/app/testpmd -l 5,6,7 -n 4 --log-level=pmd.net.af_xdp:info --no-pci --vdev net_af_xdp0,iface=ens786f1,start_queue=0,queue_count=3 -- -i --rxq=3 --txq=3
```

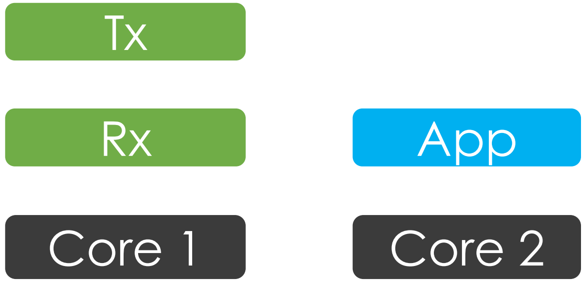
ZERO-COPY (through external mbuf)

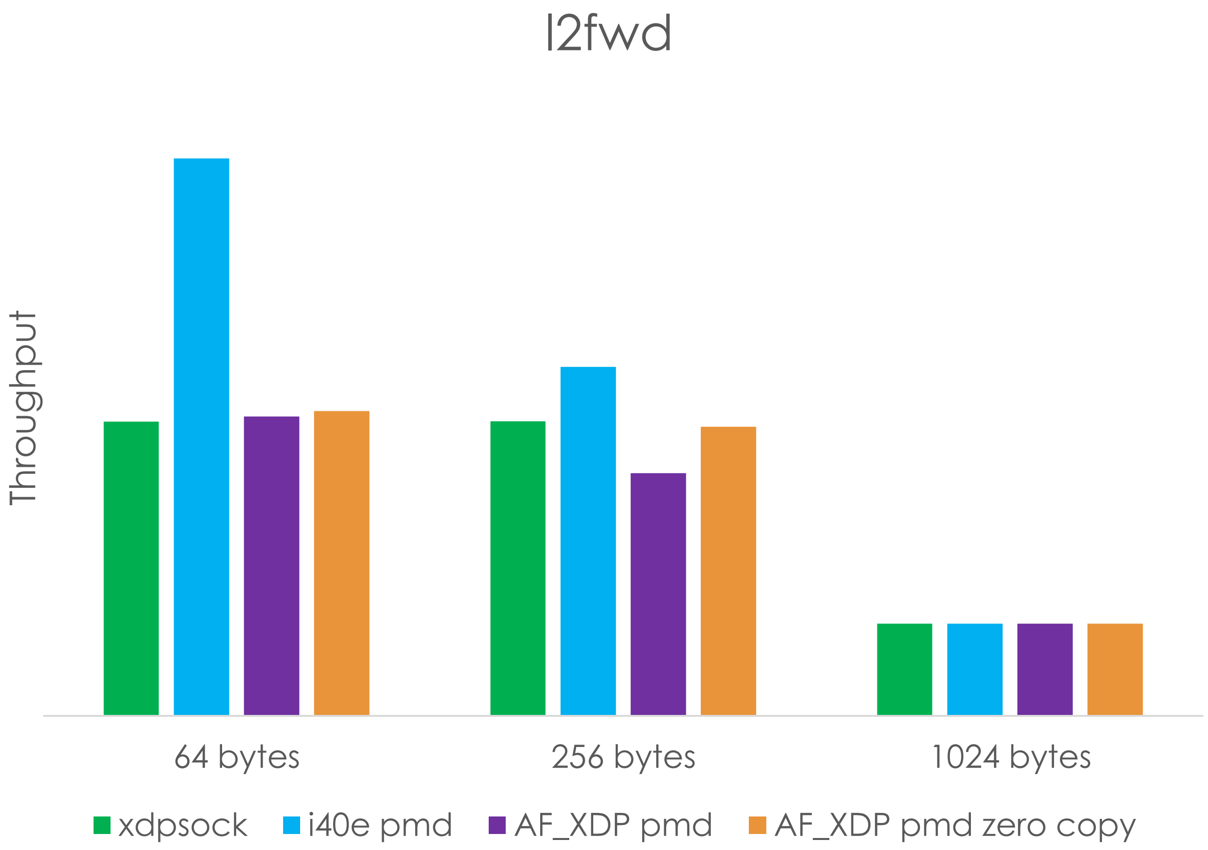
- Use external buf to hold the payload



Performance

- DPDK 19.05 + ZC patch
- Broadwell E5 2660 @ 2.0 GHz
- IXIA load generator blasting at full 40 Gbit/s
- Intel XL710 card (40G, i40e driver)





Future work

- Flexible umem chunk size and alignment
- Optimize AF_XDP pmd in container scenario

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Thanks