NFV Use-case Enablement on DPDK and FD.IO

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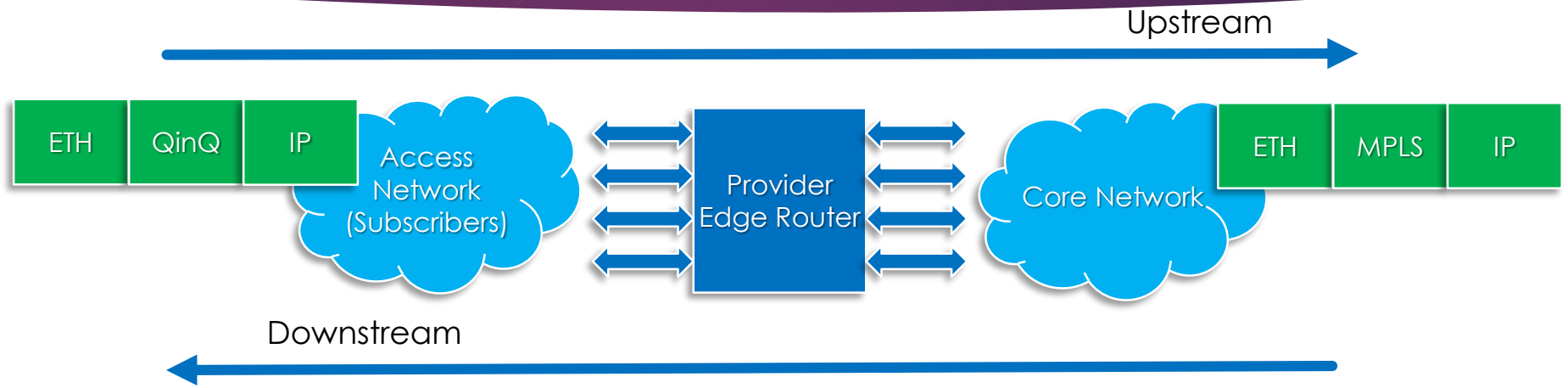
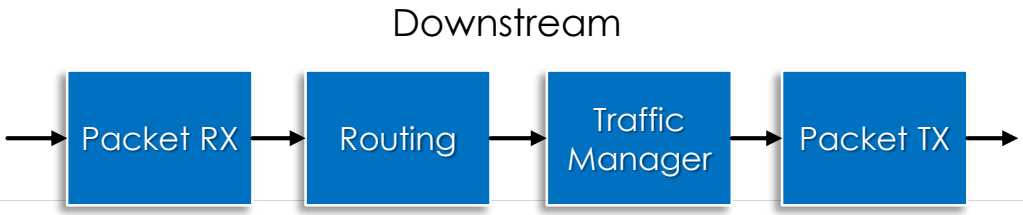
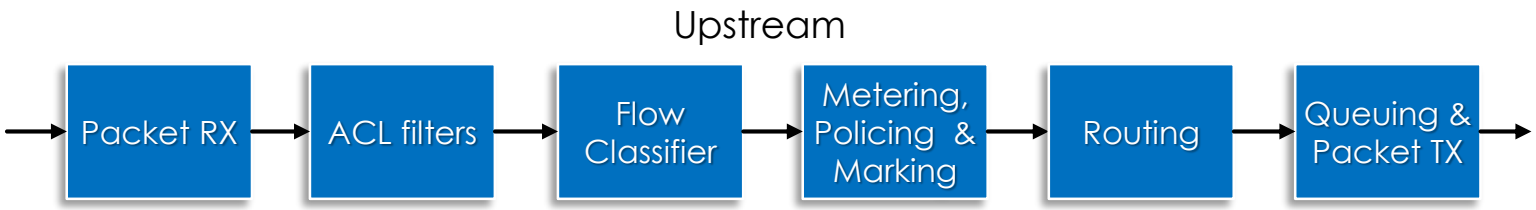
NFV Use-case Enablement on DPDK and FD.IO

- Edge Router Use-case Overview
- Implementation using DPDK
- Implementation using FD.IO VPP

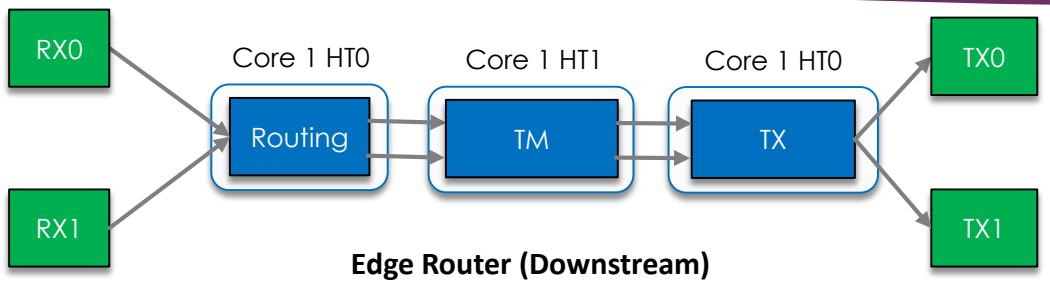
Edge Router Use-case Overview







Implementation using DPDK (1)



Edge Router (Downstream)

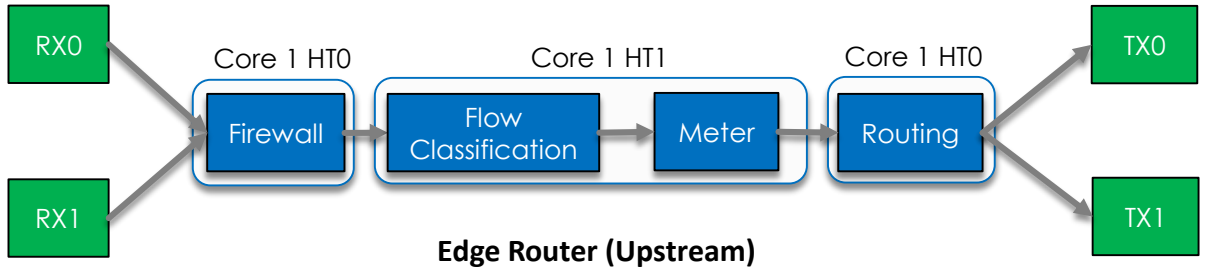
#File“<DPDK>/examples/ip_pipeline/edge_router_downstream.cfg” :

[PIPELINE1]
type = ROUTING
core = 1
pktq_in = RXQ0.0 RXQ1.0
pktq_out = SWQ0 SWQ1 SINK0
encap = ethernet_qinq
ip_hdr_offset = 270

[PIPELINE2]
type = PASS-THROUGH
core = 1h
pktq_in = SWQ0 SWQ1 TM0 TM1
pktq_out = TM0 TM1 SWQ2 SWQ3

[PIPELINE3]
type = PASS-THROUGH
core = 1
pktq_in = SWQ2 SWQ3
pktq_out = TXQ0.0 TXQ1.0

[MEMPOOL0]
pool_size = 2M



Edge Router (Upstream)

File “<DPDK>/examples/ip_pipeline/edge_router_upstream.cfg”:

[PIPELINE1]
type = FIREWALL
core = 1
pktq_in = RXQ0.0 RXQ1.0
pktq_out = SWQ0 SINK0
n_rules = 4096
pkt_type = qinq_ipv4

[PIPELINE3]
type = FLOW_CLASSIFICATION
core = 1h
pktq_in = SWQ0
pktq_out = SWQ1 SINK1
n_flows = 65536
key_size = 8
key_offset = 268
hash_offset = 128
Key mask = 00000FFF00000FFF

[PIPELINE4]
type = FLOW_ACTIONS
core = 1h
pktq_in = SWQ1
pktq_out = SWQ2
n_flows = 65536
n_meters_per_flow = 1
flow_id_offset = 132
ip_hdr_offset = 278
color_offset = 136

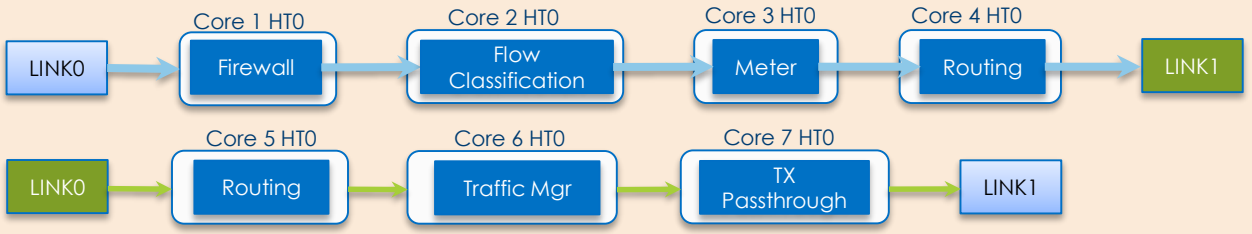
[PIPELINE5]
type = ROUTING
core = 1
pktq_in = SWQ2
pktq_out = TXQ0.0 TXQ1.0 SINK2
encap = ethernet_mpls
mpls_color_mark = yes
ip_hdr_offset = 278
color_offset = 136

Implementation using DPDK (2)

DPDK

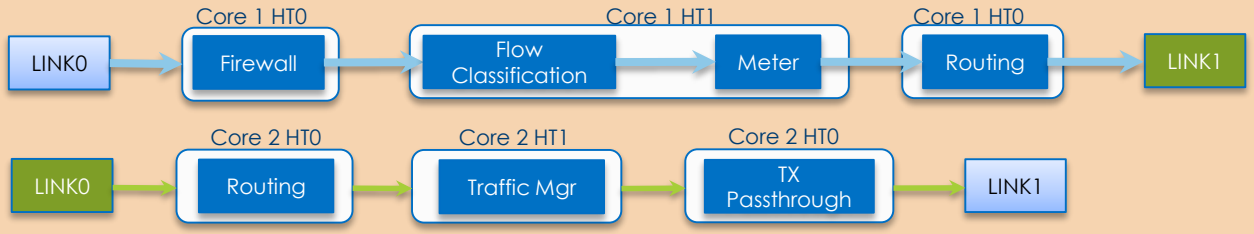
Step 1: Functional development

- Focus on functional correctness and block-level performance optimizations
- Each pipeline on separate CPU core



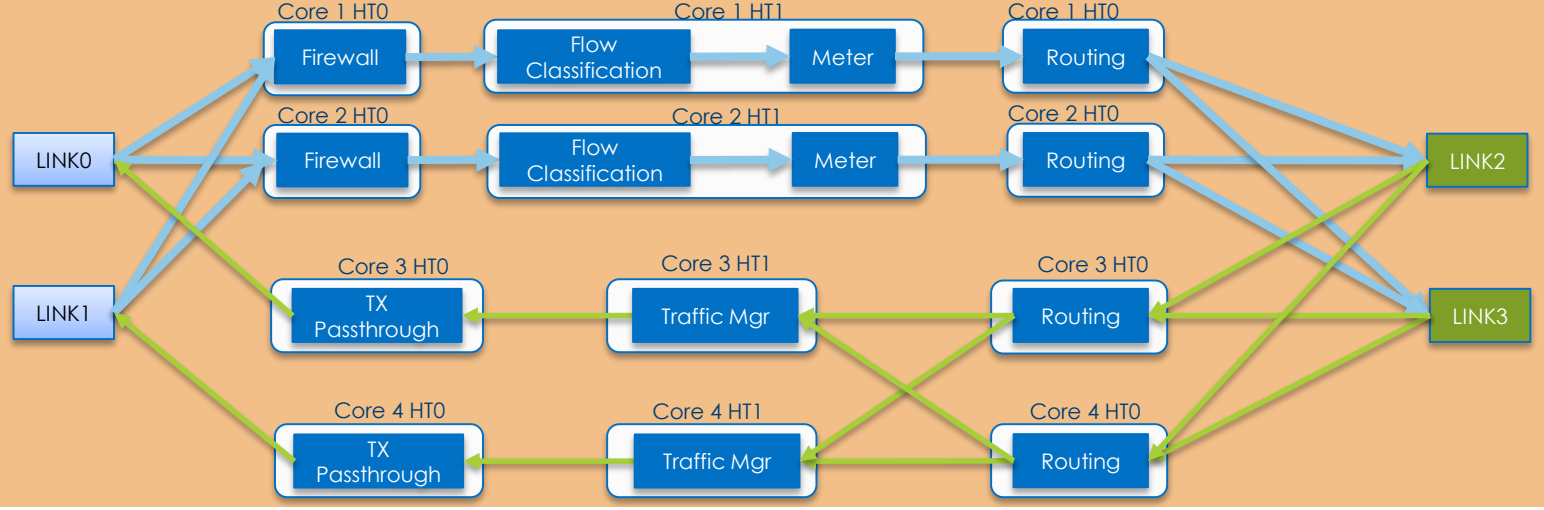
Step 2: Optimal mapping to CPU cores

- Identify optimal mapping of pipelines to CPU cores for single app instance (golden mapping)
- Maximize performance per physical CPU core: max(P/N), where: P=app throughput, N=#physical CPU cores



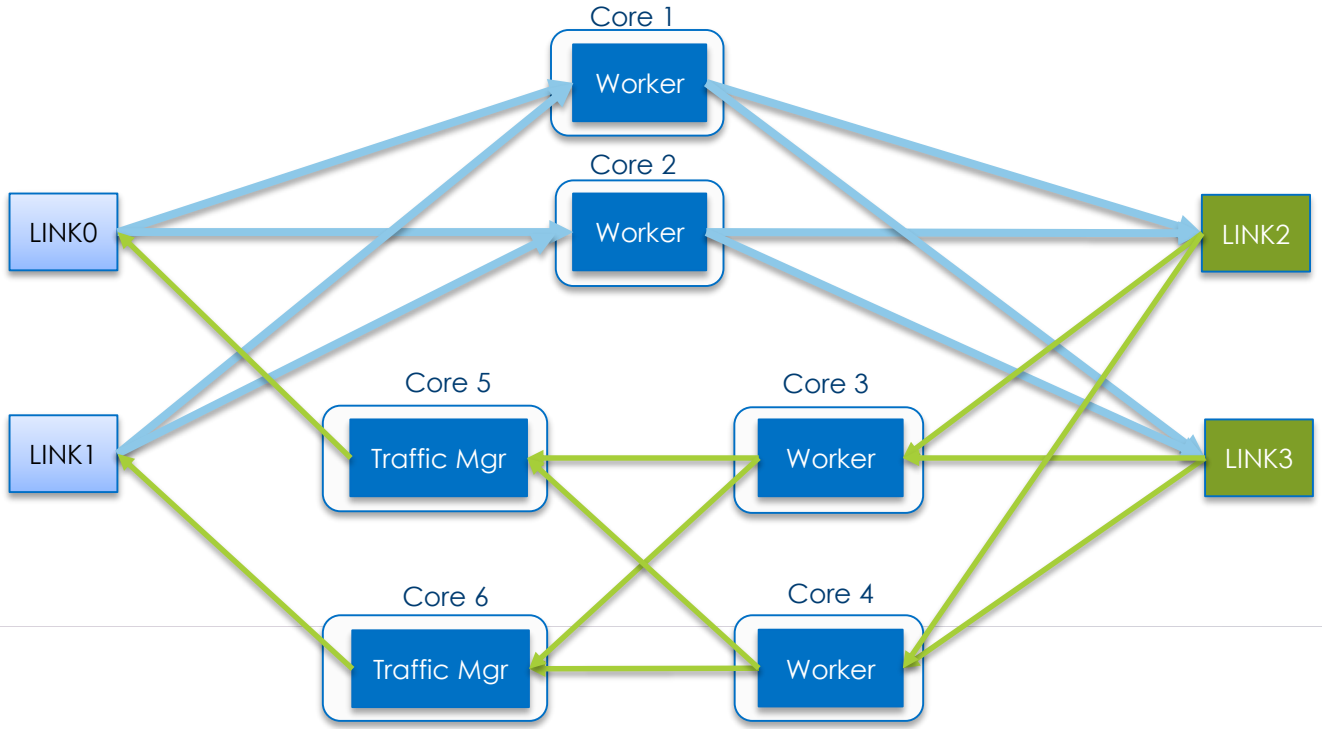
Step 3: Performance scale up

- Replicate the golden mapping several times
- Run multiple app instances on different CPU cores



Implementation using FD.IO VPP (1)

- VPP Framework
  - Process a vector of packets (frame) using directed graph of nodes
  - Large library of network functions
- Egress Traffic Management in VPP
  - Leverage DPDK QoS library (librte_sched)
  - 5-level hierarchical scheduler to make best use of available bandwidth



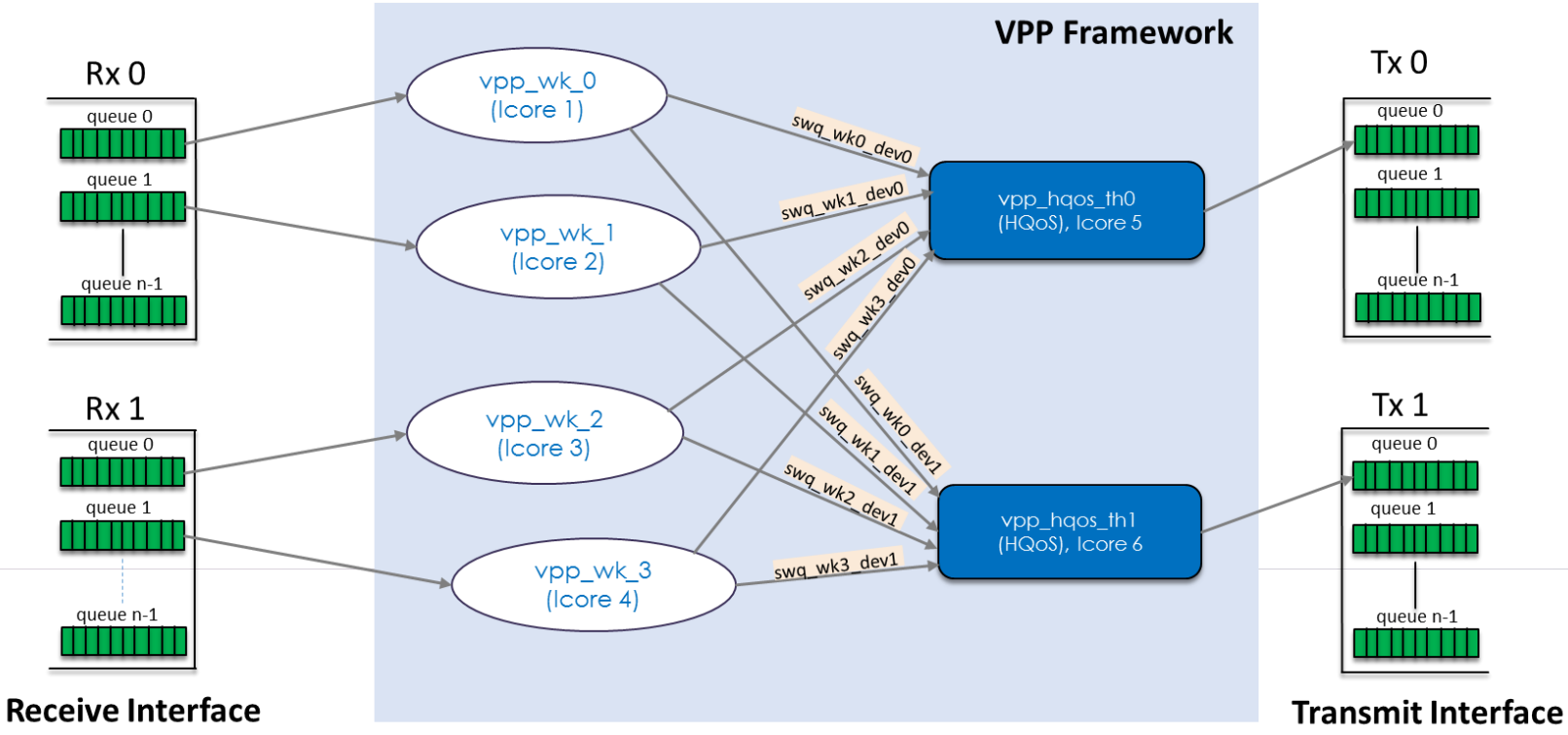
Implementation using FD.IO VPP(2)

```
#File "/etc/vpp/startup.conf":

unix {
interactive
log /tmp/vpp.log
cli-listen localhost:5002
full-coredump
}

dpdk {
socket-mem 16384,16384
dev 0000:02:00.0 {num-rx-queues 2 hqos}
dev 0000:04:00.0 {num-rx-queues 2 hqos}
num-mbufs 1000000
}

cpu {
main-core 0
corelist-workers  1,2,3,4
corelist-hqos-threads  5,6
}
```



Questions?

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