Upcall rate limiting in OVS-DPDK

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AGENDA

• Slow path and fast path in OVS+DPDK
• Why rate limit
• Solution
WHY RATE LIMIT?

• In OVS-DPDK both slow path and fast path execute in the context of the PMD thread.
• Lookup cost of EMC:Megaflow:Slowpath is 1:10:100
• This means that new flows leading to upcalls can increase the latency of other packets with learnt flows which are serviced by the same PMD.
• Sudden burst of such flows can also lead intermittent traffic drop for already learnt flows.
• This also make OVS-DPDK vulnerable for DoS attacks
PROPOSED SOLUTION

• Limit rate of packets going into slowpath
• Simple token bucket policer per PMD thread
• Upcall policer can be enabled/disabled using the below knob:
  • `ovs-vsctl set Open_vSwitch . other_config:upcall-rl=true`
• How to configure upcall rate and burst
  • `ovs-vsctl set Open_vSwitch . other_config:upcall-rate=xxx`
  • `ovs-vsctl set Open_vSwitch . other_config:upcall-burst=xxx`
• A packet entering slow-path has to take a token to get into slow-path and if no tokens are available, the packet is dropped and accounted per PMD
ACCOUNTING OF DROPS

ovs-appctl dpif-netdev/pmd-stats-show

  pmd thread numa_id 0 core_id 2:
  emc hits:0
  megaflow hits:0
  avg. subtable lookups per hit:0.00
  miss:287572
  rate limit drops:xxxxx <<<<<<<<<<<<<
  lost:0
  idle cycles:14925072116 (43.81%)
  processing cycles:19140112904 (56.19%)
  avg cycles per packet: 118457.93 (34065185020/287572)
  avg processing cycles per packet: 66557.64 (19140112904/287572)
PROPOSED SOLUTION

• Configure upcall rate limiting per port
  • `ovs-vsctl set Interface vm1p1 other_config:upcall_rate=xxx`
  • `ovs-vsctl set Interface vm1p1 other_config:upcall_burst=xxx`

• Or per queue
  • `ovs-vsctl set Interface vm1p1 other_config:queue_upcall_rate=“0:xxx,1:xxx,2:xxx”`
  • `ovs-vsctl set Interface vm1p1 other_config:queue_burst_rate=“0:xxx,1:xxx,2:xxx”`
SUMMARY & STATUS

Summary
- Importance of rate limiting in OVS+DPDK
- DOS attacks
- Setting upcall rate limits at PMD level
- Setting upcall rate limits at Interface/queue levels

Status
- Patch in the community. Need to work on the port/interface solution
  - https://patchwork.ozlabs.org/patch/909676/
THANK YOU