Reflections on Mirroring with DPDK

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• Debugging network problems for an SR-IOV guest is hard

• Attaching igs_uio or vfio-pci to the PF eliminates use of useful tools (e.g. tcpdump)

• Further complicated by network redundancy measures
Want to use **VFd** to provide configuration & implement policy

**VFd:**
- A *Network Hypervisor*
- A DPDK application
- VF configuration not available via kernel drivers (e.g. allow VF to change MAC)
- Enforces local policy (e.g. validate VF supplied VLAN)
• Sporadic traffic arrives at the guest

• Possible causes:
  ○ Incorrect VLAN tags on some packets
  ○ Incorrectly configured VF
  ○ Incorrectly configured TOR
  ○ No traffic arriving at all

• Just flip on tcpdump, right?
Typical Guest Problem -- Yes, Use tcpdump!

- Use VFd to enable mirroring
  - One or both guest interfaces
  - Either in, out, or both directions

- Then:
  Start a debugging, guest and run tcpdump in the guest

- Or:
  Attach driver to target PF on host and run natively
Implementation

The good
- Implementation is straight forward. Completely NIC agnostic -- entirely implemented with DPDK API calls
- Possible expansion to include VLAN sensitive mirroring
- Enable/disable without traffic disruption

The bad
- Can mirror only to same PF
- Must engage NIC loopback
- Some inconsistencies between NICs (single direction on some NICs)
- Inbound mirroring applied only after VLAN filtering (Niantic)
Possibilities

- Application level protocol analysis
- *Probes* can generate things like step ladder diagram call traces

But.....

- Probes need mirrored traffic from multiple sources
- Usually requires encapsulation
- Tricky with current techniques
Imagine -- Add mirroring control to rte_flow

- Semantics well established and cover most mirroring requirements
- Encapsulation and transmission off host
- Mirror only what is needed (5-tuple matching)
- Some NICs support these features today; let’s use them.
"Consider anything, only don’t cry!"

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* Lewis Carroll, Through The Looking-Glass,