DPDK

DATA PLANE DEVELOPMENT KIT

Reflections on Mirroring with DPDK

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Introduction

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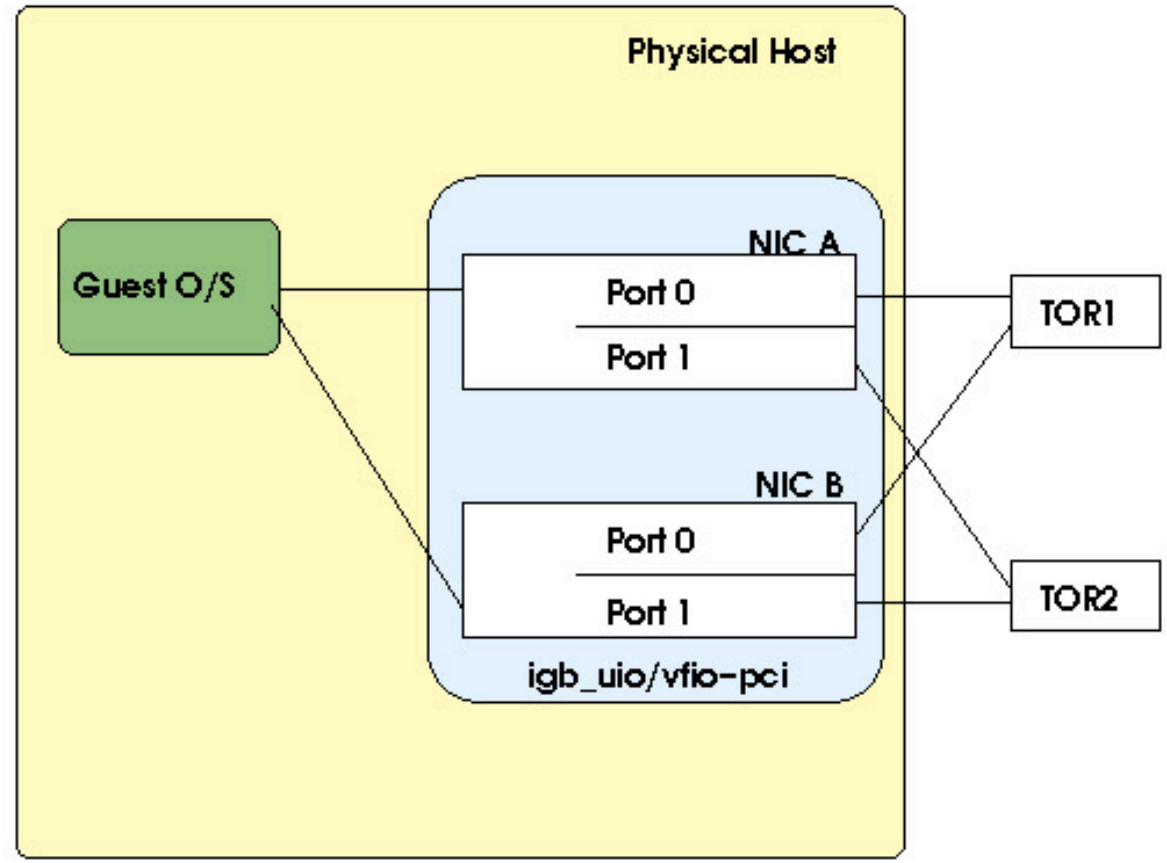
- Debugging network problems for an SR-IOV guest is hard
- Attaching igb_uio or vfio-pci to the PF eliminates use of useful tools (e.g. tcpdump)
- Further complicated by network redundancy measures



Why Bind DPDK Driver on Physical Host?

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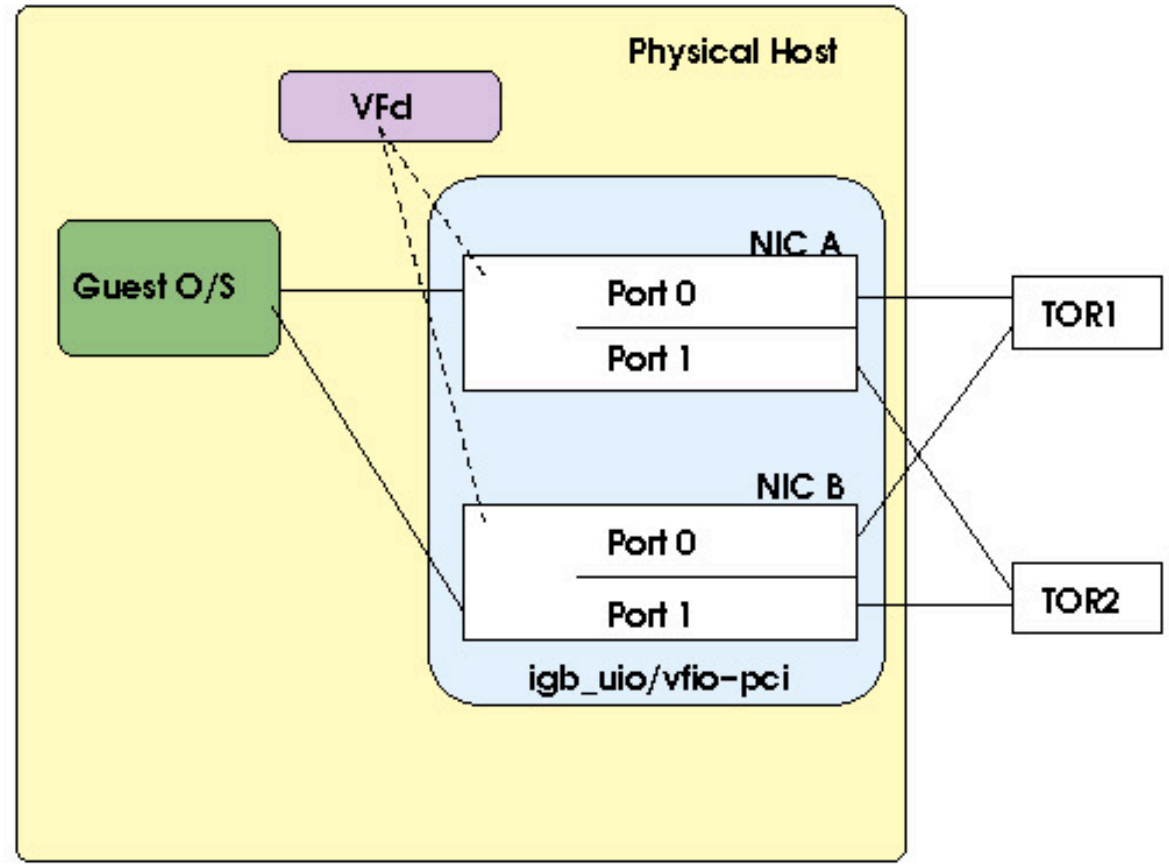
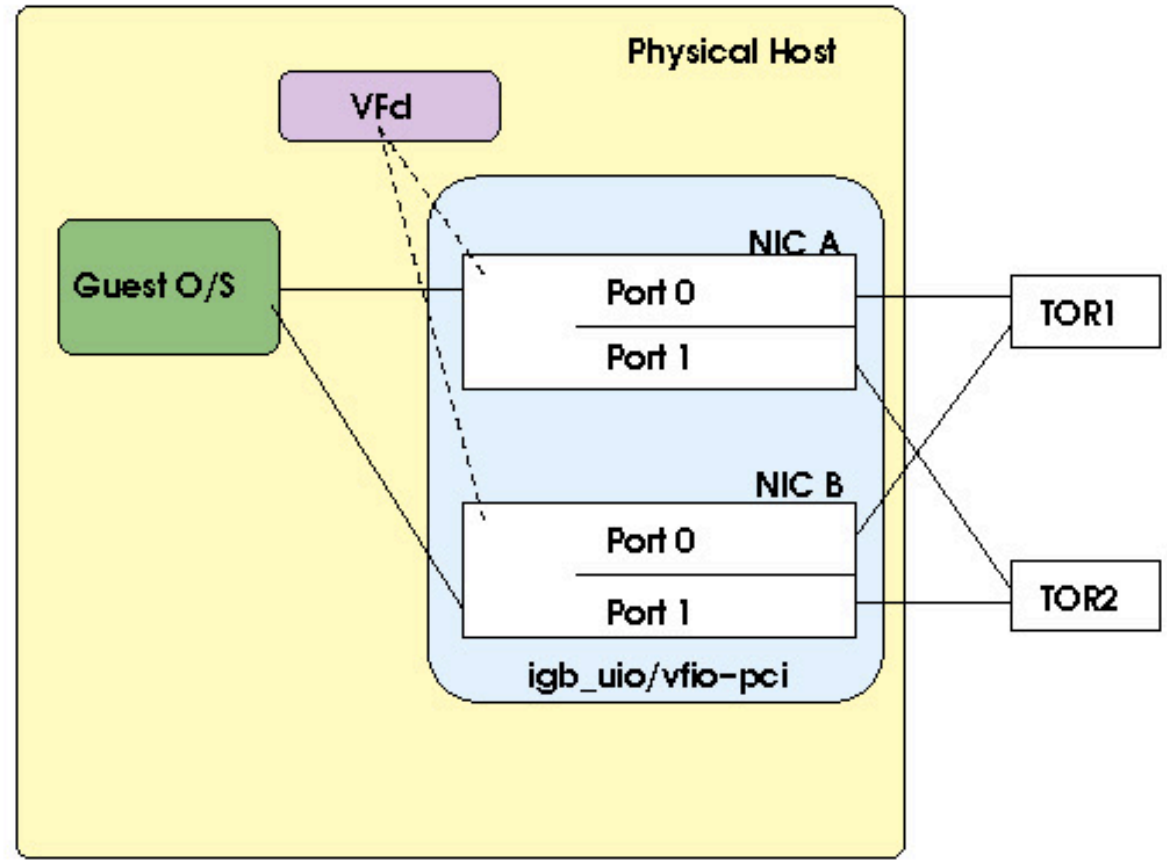
- Want to use **VFd** to provide configuration & implement policy
- VFd:
  - A *Network Hypervisor*
  - A DPDK application
  - VF configuration not available via kernel drivers (e.g. allow VF to change MAC)
  - Enforces local policy (e.g. validate VF supplied VLAN)



Typical Guest Problem

- 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!

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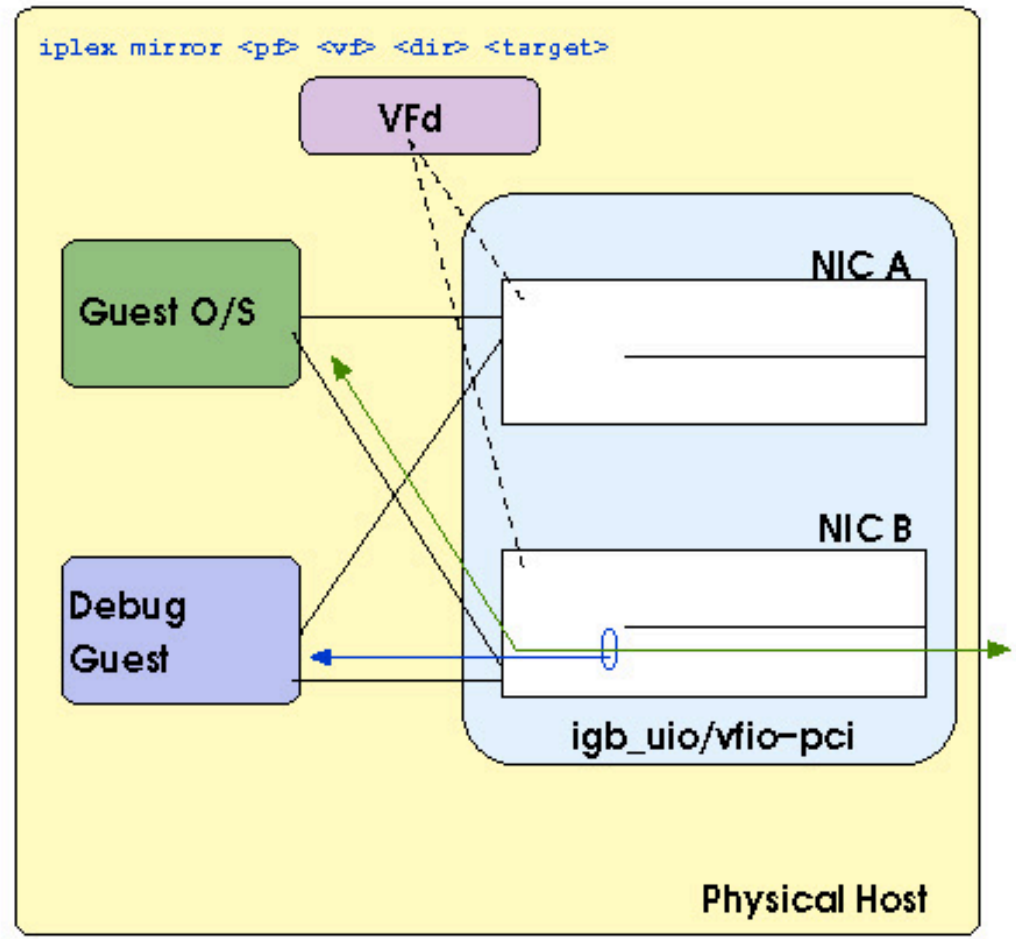
- Use VFd to enable mirroring
  - One or both guest interfaces
  - Either in, out, or both directions
- Then:
  Start a debugging, guest and run tcpdump in the guest
- Or:
  Attach driver to target PF on host and run natively



Implementation

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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)

Mirroring: More Than Just For 'Local' Debugging

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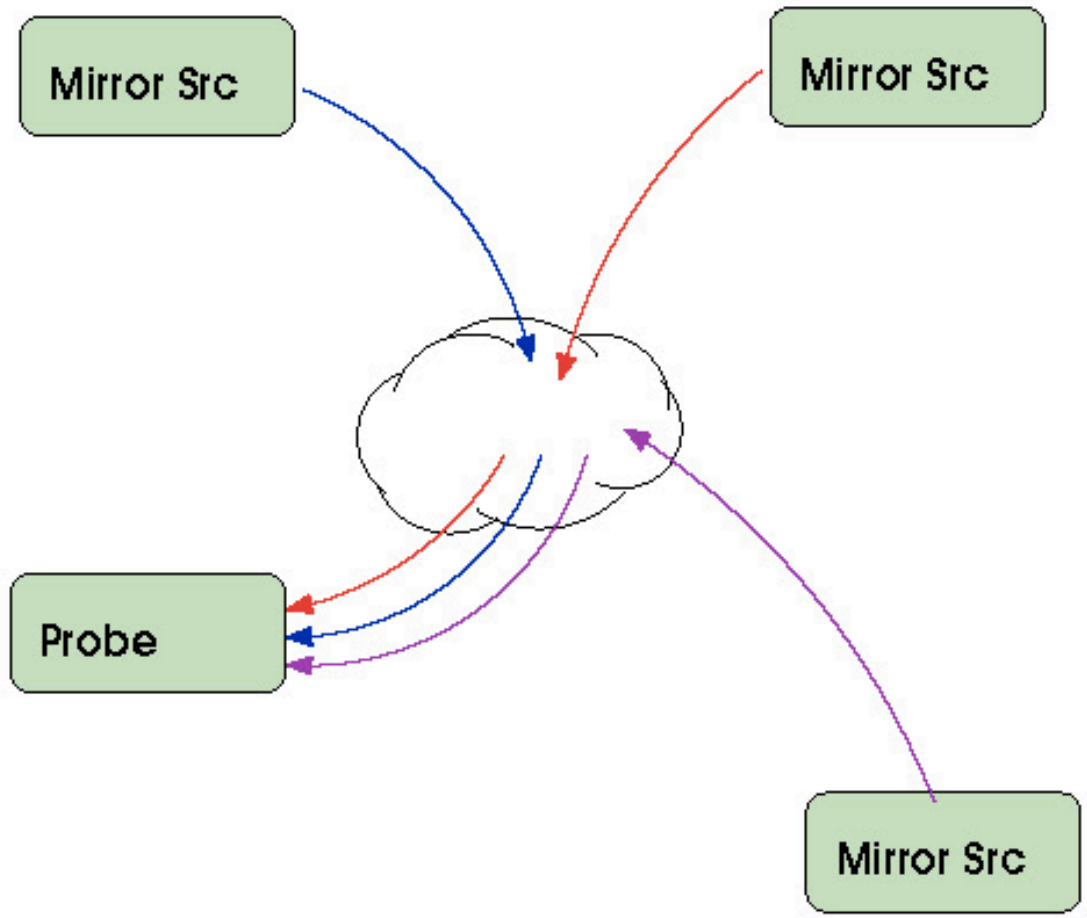
Possibilities

- 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

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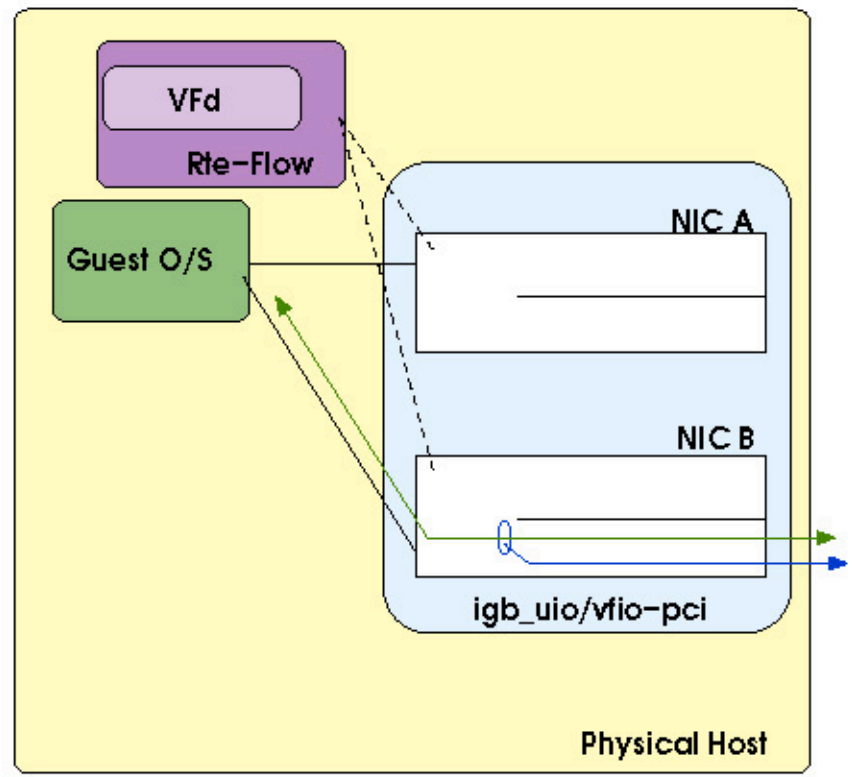
- Semantics well established and cover most mirroring requirements
- Encapsulation and transmission off host
- Mirror only what is needed (5-tuple matching)
- Some NICs support these features today; let's use them.



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"Consider anything, only don't cry!"*

Many thanks to

The VFd Community:

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* Lewis Carrol; *Through The Looking-Glass,*