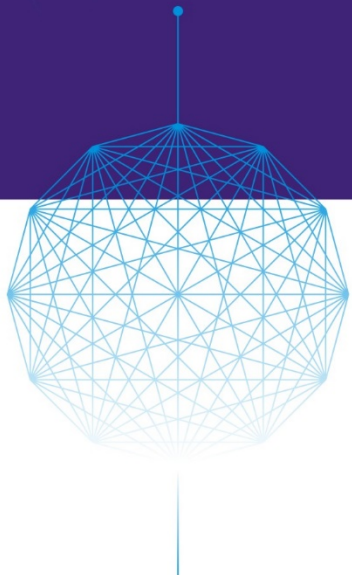







# DPDK SUMMIT CHINA 2017



主办方：

参与方： 腾讯云  ZTE  美团云  Panabit®  太一星晨   云杉网络

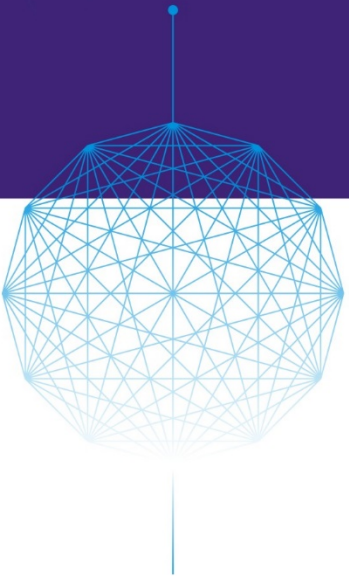
协办方： SDNLAB 专注网络创新技术 视频支持方： IT大咖说




# DPDK in container

Status Quo and Future Directions


Jianfeng Tan, June 2017



主办方：

参与方： 腾讯云  ZTE  美团云  Panabit®  太一星辰 Balance Your Networks  UnitedStack 联合云  云杉网络 Yunshan Networks

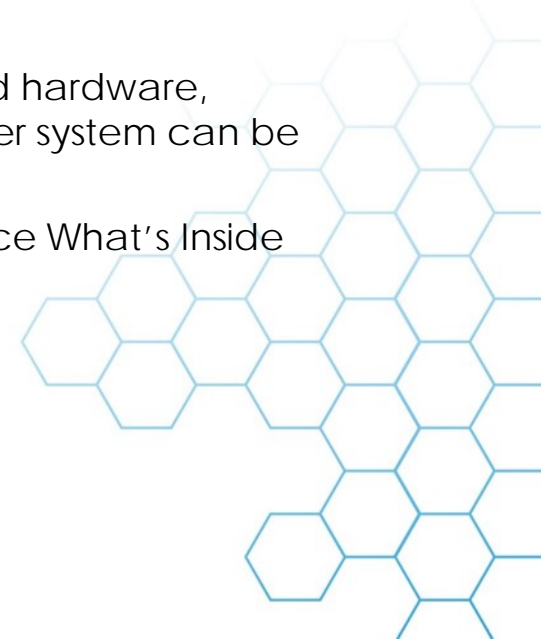
协办方： SDNLAB 专注网络创新技术

视频支持方： IT大咖说 网络全媒平台



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# Agenda

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- ▶ Why containers
- ▶ Challenges in container networking
- ▶ Data plane
- ▶ Control plane
- ▶ Summary

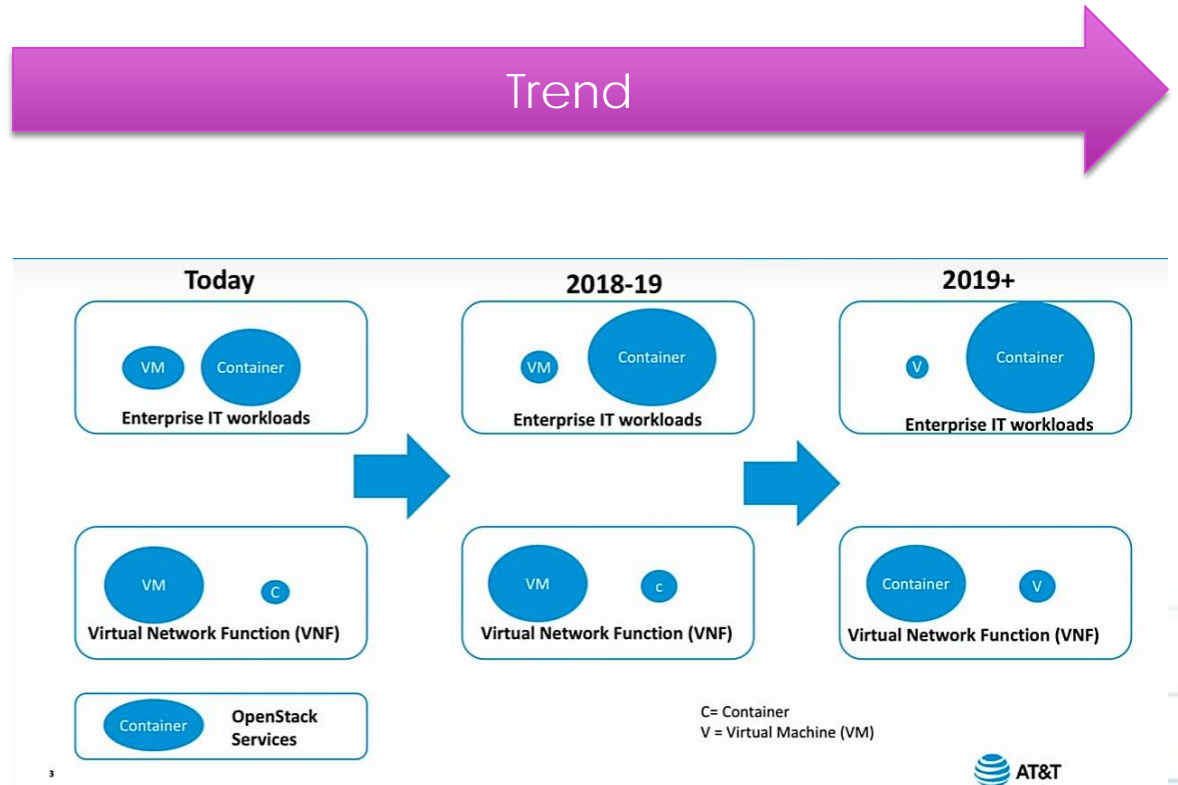


# Why containers

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- ▶ Easy-to-deploy
- ▶ Lightweight
  - ❑ Deployment time
  - ❑ Footprint (image & memory & CPU)

- ▶ Benefits
  - ❑ Service agility
  - ❑ Performance

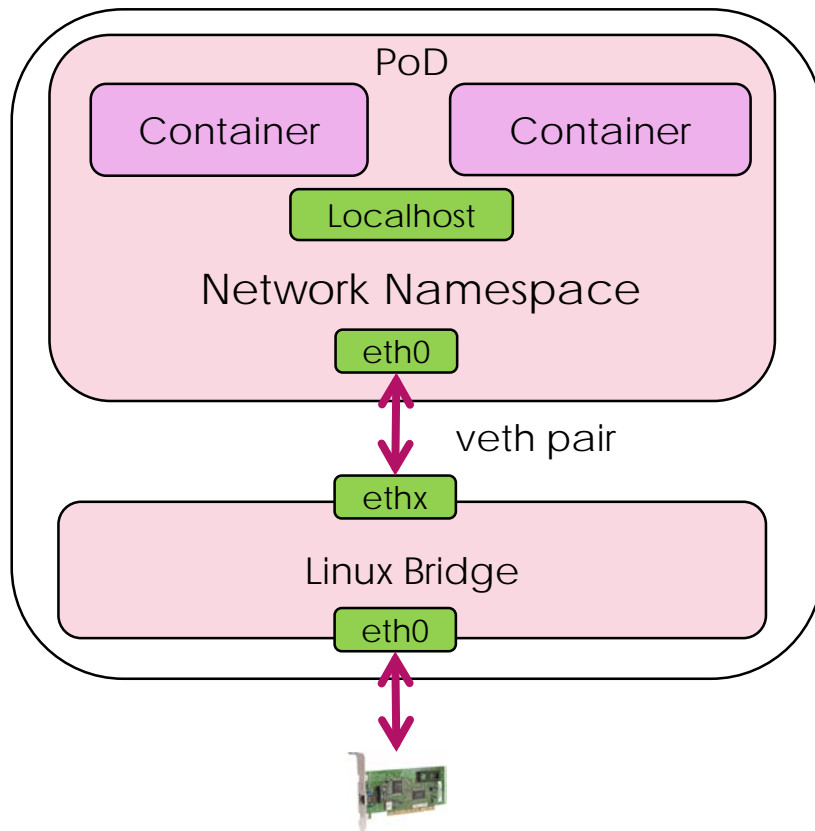


AT&T Container Strategy and OpenStack's Role in It,  
OpenStack Boston 2017 ([bit.ly/2rfftRA](http://bit.ly/2rfftRA))



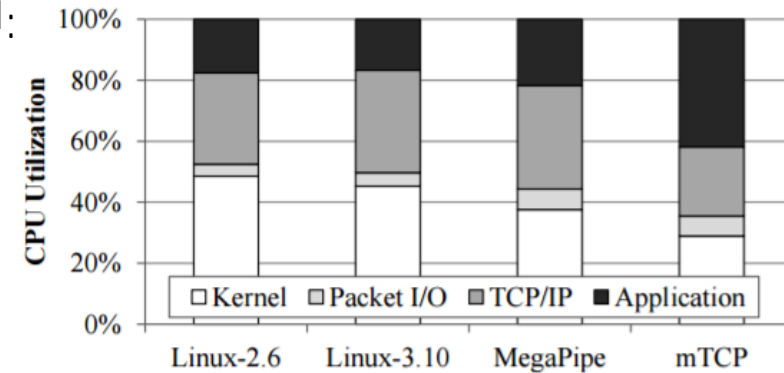
# Challenges in Container networking

6



HAProxy<sup>[1]</sup>: 5% user and 95% system

Lighttpd<sup>[2]</sup>:



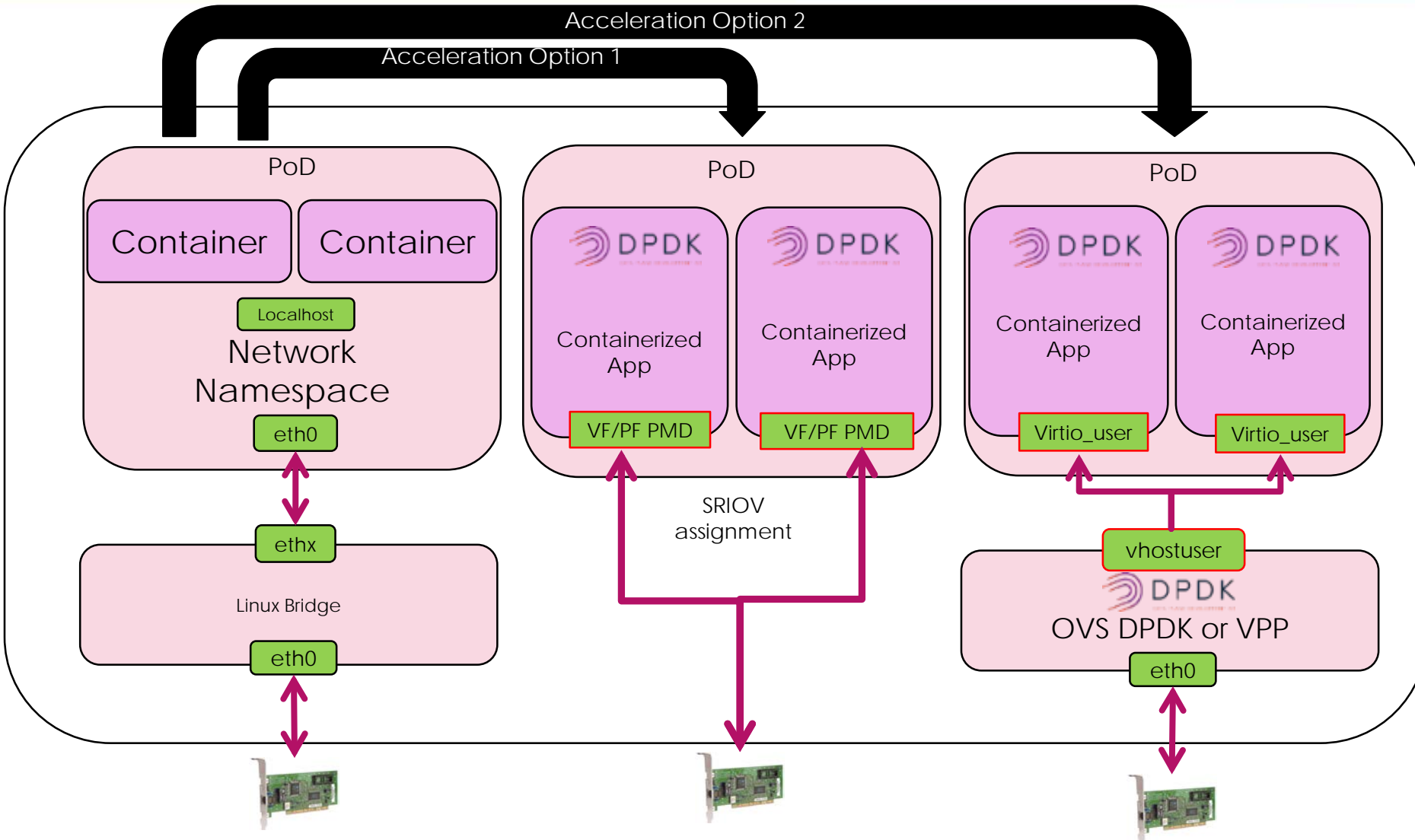
How much time spent in percentages in kernel space?

[1] <http://www.haproxy.org/>

[2] [https://www.usenix.org/sites/default/files/conference/protected-files/nsdi14\\_slides\\_jeong.pdf](https://www.usenix.org/sites/default/files/conference/protected-files/nsdi14_slides_jeong.pdf)

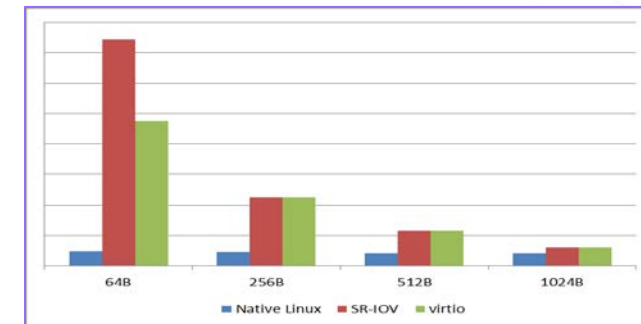
# Data plane: DPDK as user space networking

7



Latency:  
Microsecond-level

Throughput:

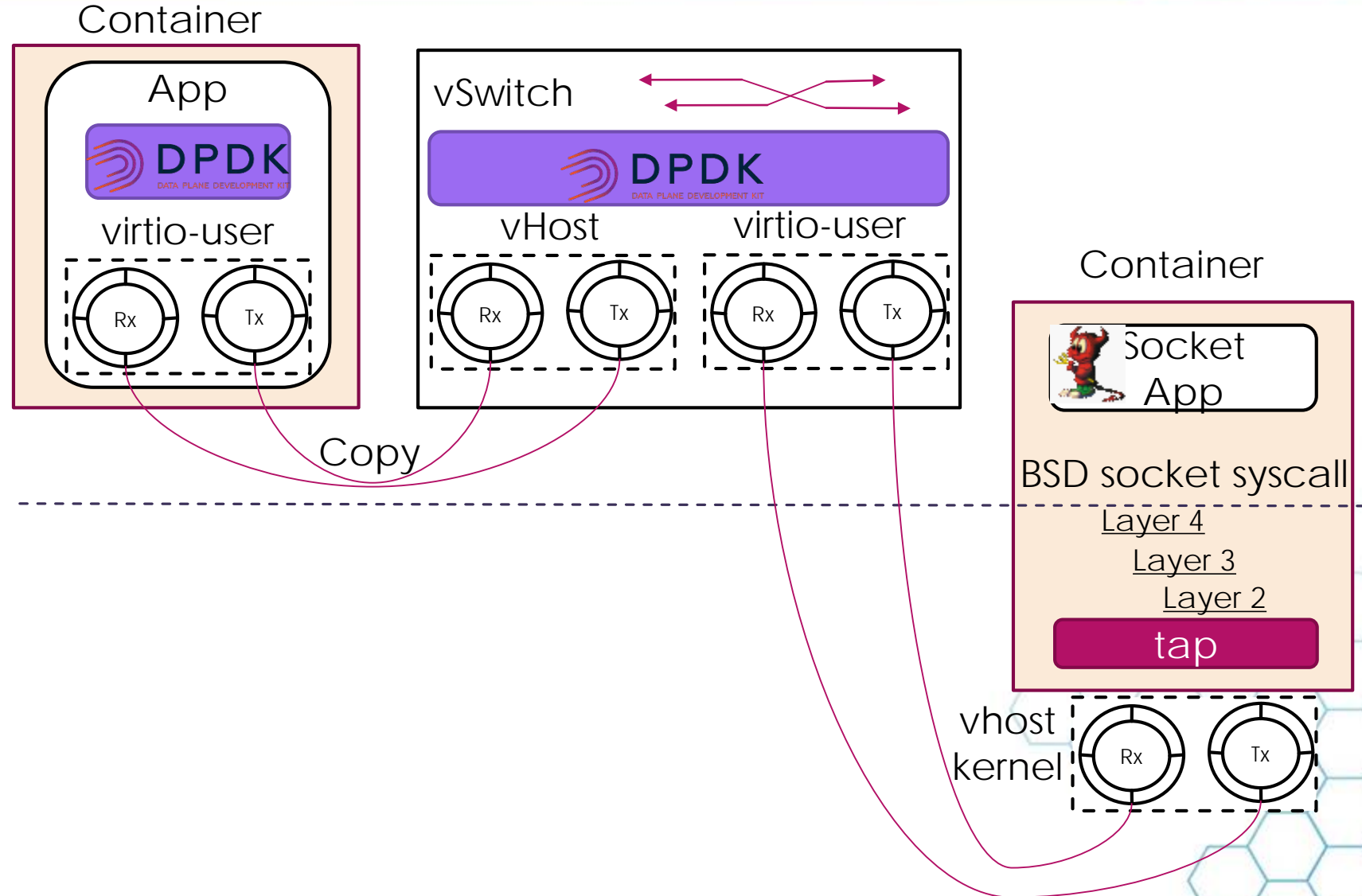


# Bridge legacy containers with vSwitch (1)

8



- ▶ Performance?
  - ▶ One more data copy
  - ▶ Packet mmap?
- ▶ Thread model
  - ▶ Tx in application context instead of vhost kthread context

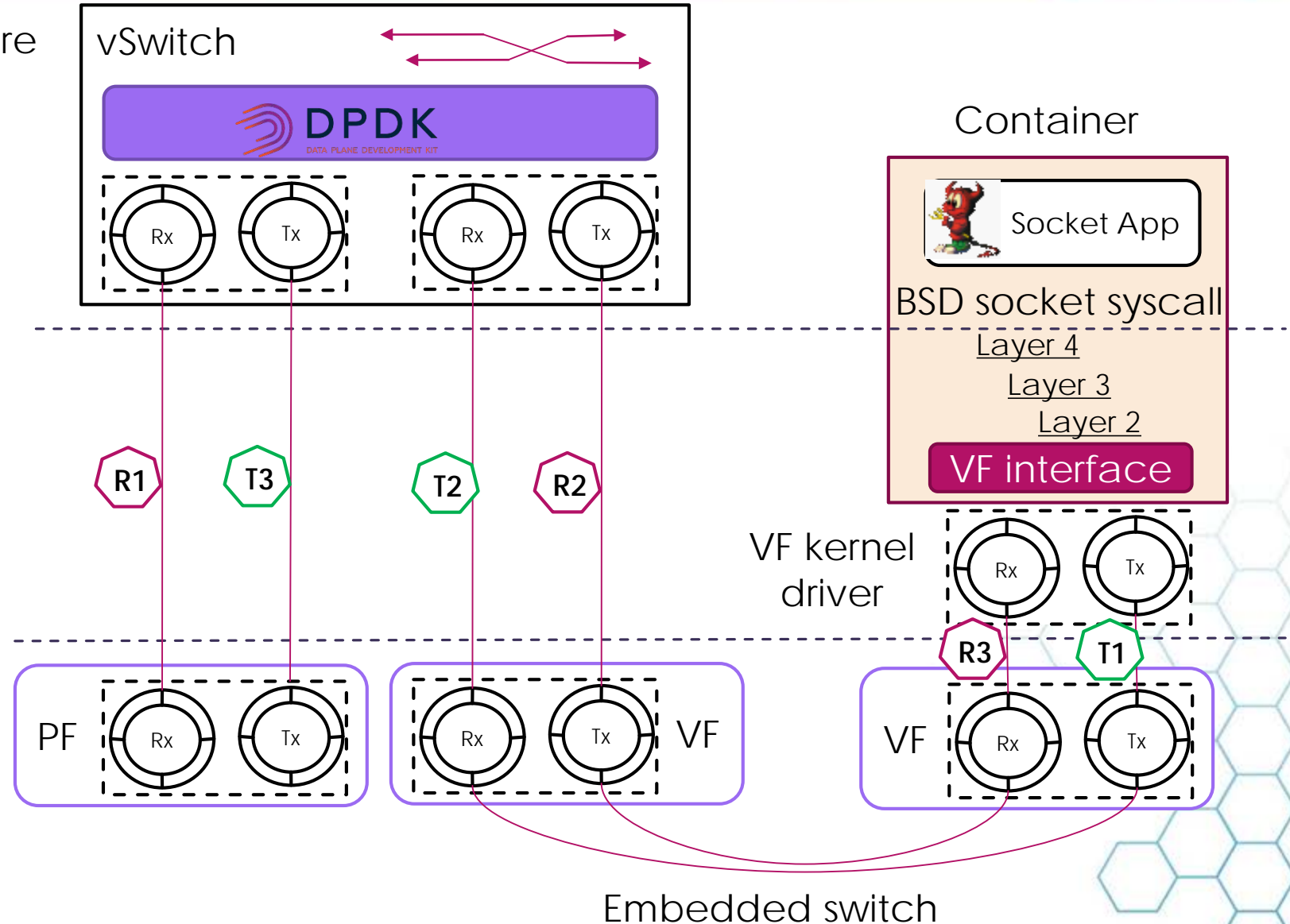




# Bridge legacy containers with vSwitch (2)



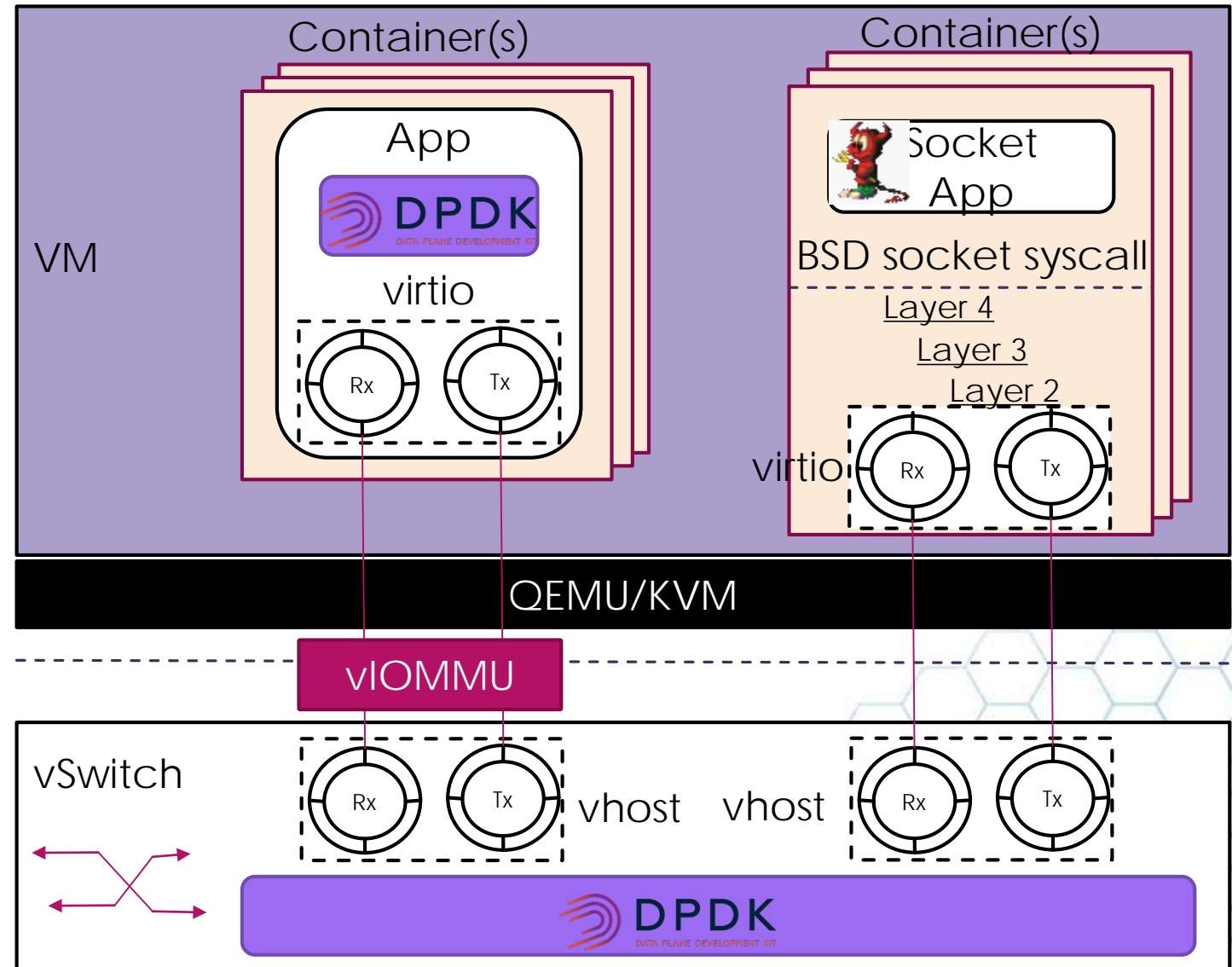
- ▶ Dimidiate throughput for 1x more data crossing PCIe bus
- ▶ Pressure on embedded switch



# Bridge legacy containers with vSwitch (3)

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- ▶ 1 VM :  $n$  containers
- ▶ Virtio-net device(s) hot-plugged per Container
- ▶ VT-x de-privileged host allows radical optimization
- ▶ Containers in the same trust zone reside in one VM
- ▶ Protect DMA attack from compromised DPDK application through vIOMMU



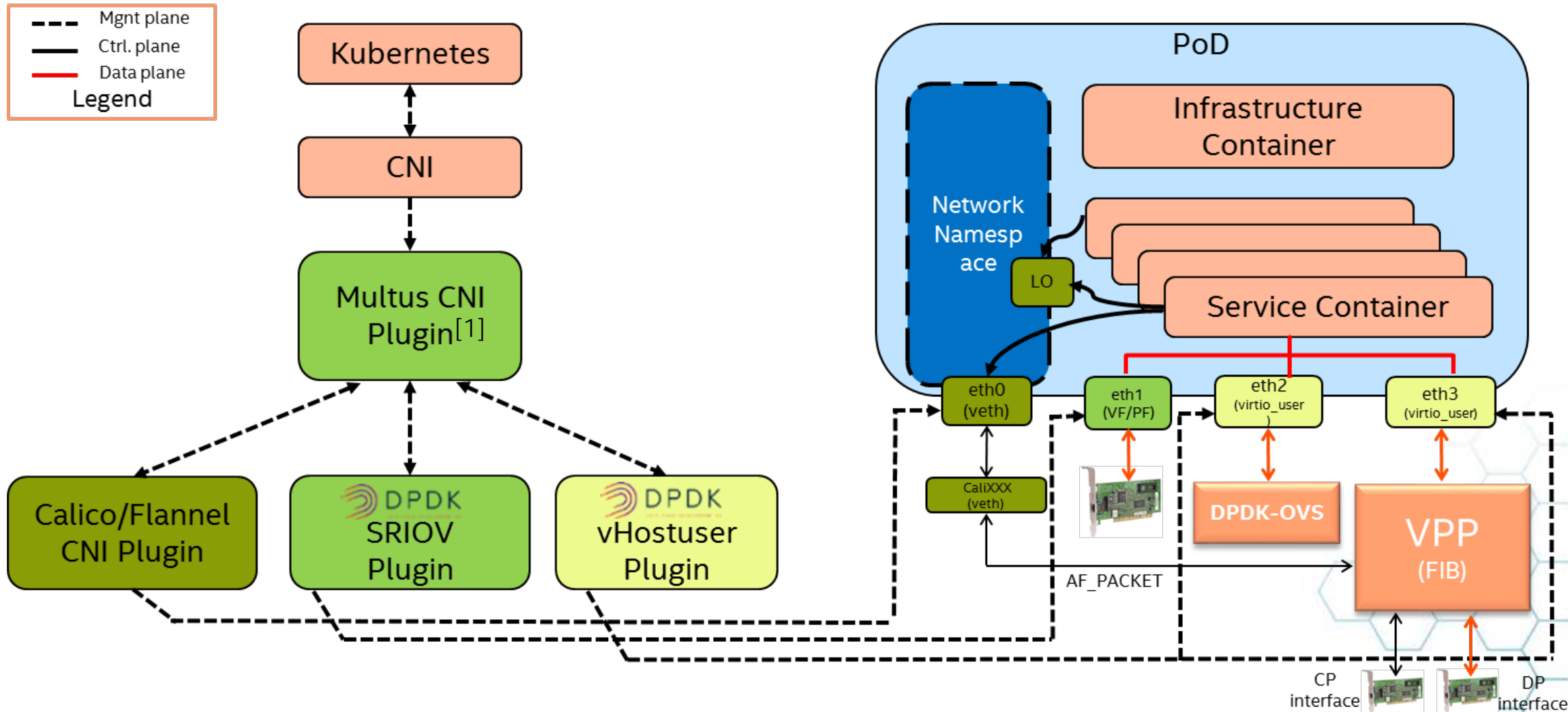


- ▶ Rapid lifecycle
  - ▶ No PCI full scan if there is a whitelist param
  - ▶ Memory – lazy allocation
- ▶ Scalability
  - ▶ 4K pages support
  - ▶ Core sharing - interrupt mode for vhost-user
  - ▶ Device hotadd/hotplug
  - ▶ More fine-grained device pass-through
- ▶ Stable and performant user space TCP stack



# Control plane: status quo

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- ▶ Intel® Resource Director Technology (RDT)
  - ▶ Linux kernel 4.10 introduces L3 CAT, etc
  - ▶ Linux kernel 4.12 is on-track to support MBA
- ▶ CPU pinning, NUMA aware, huge pages
  - ▶ Enhance kubelet service?
- ▶ Enhanced Platform Awareness (EPA) feature framework in k8s through Node Discovery pod<sup>[1]</sup>

[1] <https://github.com/Intel-Corp/node-feature-discovery>





# Acknowledge contribution from:

14



- ▶ Cunming Liang
- ▶ Danny Zhou
- ▶ Heqing Zhu
- ▶ Hongjun Ni
- ▶ Huawei Xie
- ▶ John DiGiglio
- ▶ Johnson Li
- ▶ Kuralamudhan Ramakrishnan
- ▶ Ray Kinsella





- ▶ DPDK as the user space container networking data plane is ready and still in evolution.
- ▶ Control plane of user space container networking is WIP.
- ▶ Bridging legacy containers with user space vSwitch is WIP.

*You are very welcomed to share ideas and contribute code!*





# Thanks!



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