2015中国DPDK开发者大会
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DPDK's Role in Migrating from CT to NFV

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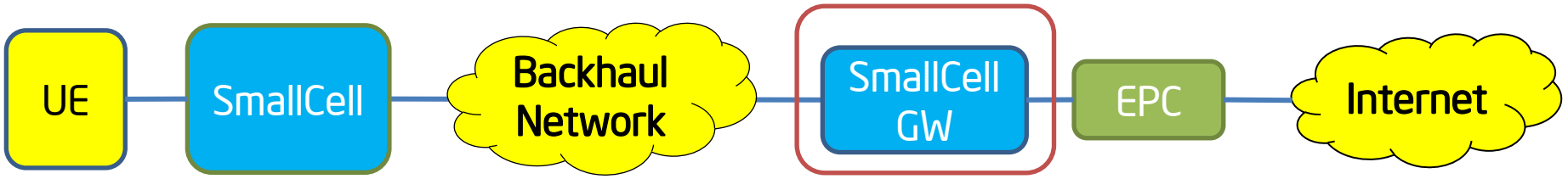
Outline

- Background
  - CMCC 's NFV Small Cell GW: Commercial ready Data Plane VNF
- Observation
  - Acceleration techniques (e.g. DPDK) is among key enablers for near future NFV deployment
- A Step Further
  - dpacc@OPNFV: towards common APIs for hardware acceleration

Background
Internal PoC: NFV Small Cell GW



SmallCell GW sits at the edge of EPC, on the path between smallcell and core network.
It has two major components: a signaling GW (SmGW) and a security GW (SeGW).
The SmGW is an optional component, while the SeGW is a mandatory component.

SmGW

- **Signaling Routing**: selects a proper MME for an attaching UE.
- **Signaling Pooling**: pools the interfaces to MME for a large group of small cells.
- **Optional**

SeGW

- **Authentication**: realize mutual authentication between small cell and GW.
- **Security Protection**: establish IPSec tunnels between small cell and GW.
- **QoS Inheritance**: copies the inner IP ToS/DSCP tags onto the outerIP header during encapsulation.

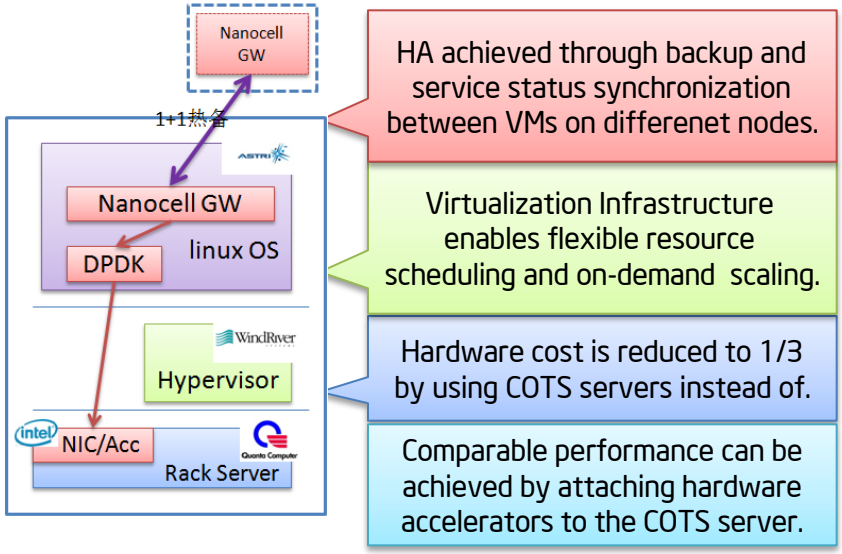
Nanocell GW NFV

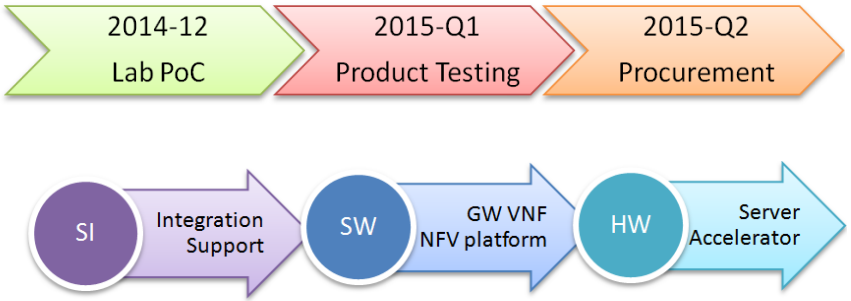
NFV enables Highly extensible Nanocell GW on low cost COTS servers.

Motivations：Reduced CAPEX + Enhanced Flexibility + Future Orientation

- Reduce the CAPEX for Nanocell GW deployment by replacing dedicated hardware devices with off-the-shelf rack servers.
- Enhance the flexibility in functionality/compacity configuration based on COTS server through on-demand automatical scaling capability of a virtualized resource pool in stead of physical addition/removal operations.
- As a new device, Nanocell GW eases the introduction of NFV technology to the production network.

Current Status：Completed PoC + Product testing + Industry Promotion





Phase1 (completed)	Sunnada	ASTRI, Windriver	Quanta, Intel
Phase2 (ongoing)	ZTE	Clevister, CentOS	

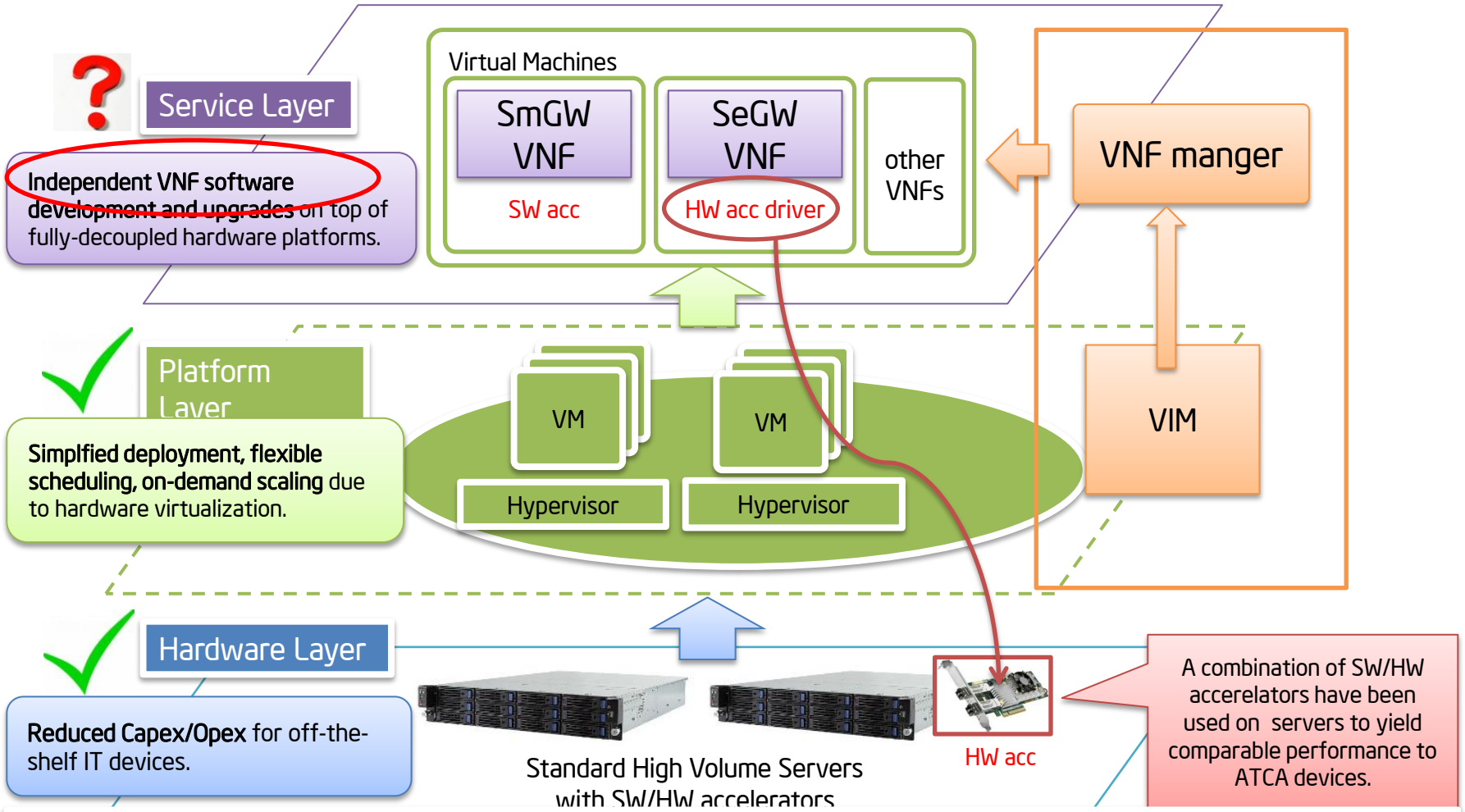
We would continue to drive the GW industry to move to NFV direction.

Observation 1
DPDK 's role in Data Plane Accleration

- HW/SW acc is common in dataplane network devices
  - Encryption, DPI, transcoding, firewall, etc.
- Acceleration applications in NFV environment
  - virtualized network functions: functional processing acceleration
  - vSwitch/vRouter: VM2VM acceleration
  - host native applications: platform infrastructure acceleration
- Acceleration techniques used in OPNFV
  - DPDK: user space polling mode drivers
  - Passthrough/SR-IOV: direct memory mapping from device to user space applications
  - HW accelerator: processing offloaded to dedicated chipset from CPU

DPDK in combination with pass-though/SR-IOV to accelerators gives the best performance for NFV apps.

Observation 2
DPA Acceleraion Leads to Lock-in

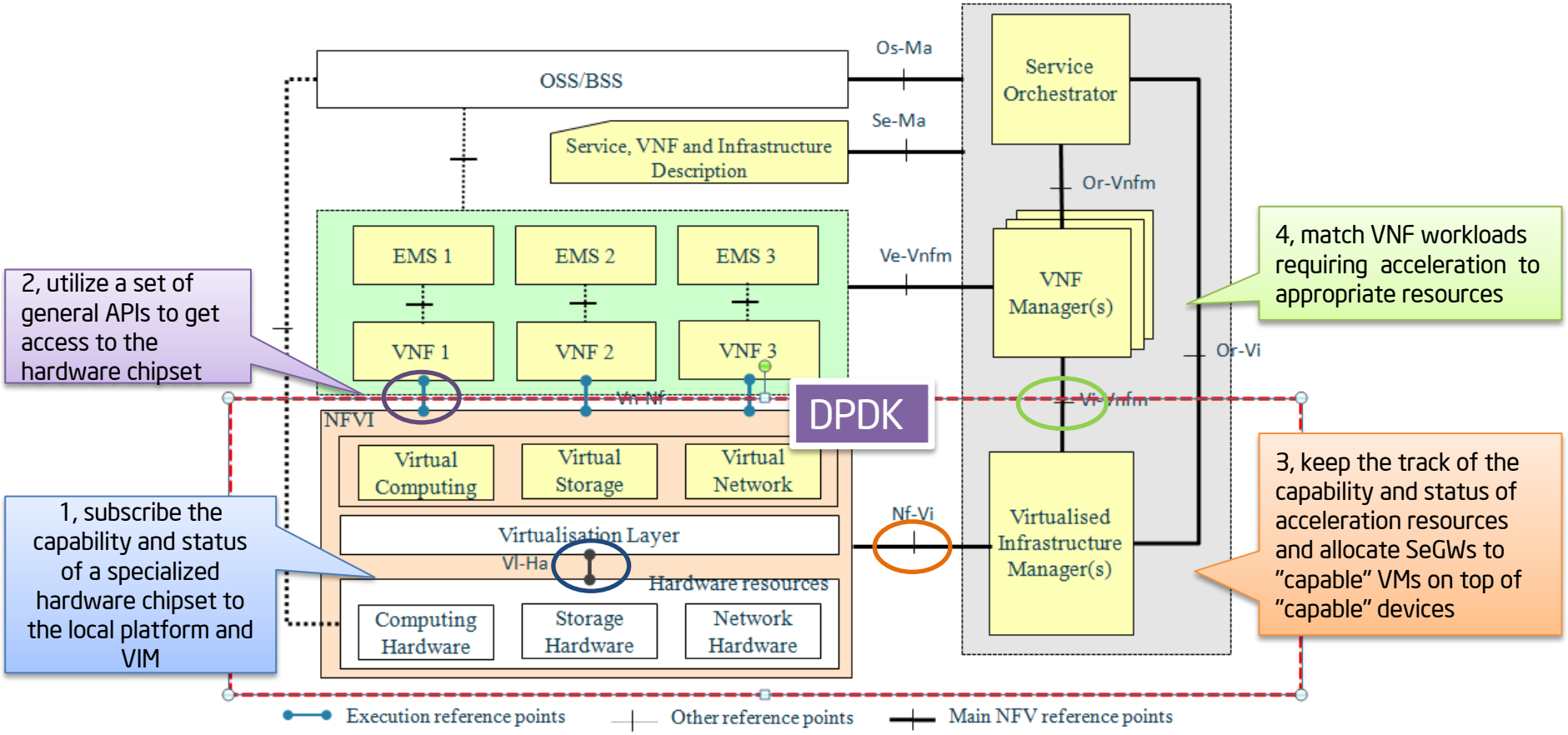


DPDK plus COTS server provide the best state-of-art NFV platform for data plane VNFs.

A Step Further
Common interfaces for DataPlane Acceleration

- dpacc@OPNFV
- Vision: a fully decoupled three-layer architecture
  - Observation: multiple choices exist for each given usecase
    - software-only acceleration (e.g. for general packet processing)
    - hardware assist acceleration in various forms (e.g. for encryption): separate acc card/integrated with NIC/integrated with CPU
  - Concern: no common interfaces exist for acceleration
    - DPDK APIs are hardware dependent and not general enough
  - Problem: no VNF portability for data plane acceleration
    - VNFs: rewrite their code extensively to do hardware migration
    - CSPs: binds VNF software with the underlying hardware devices.

Gap Analysis
Extensions to DPDK/OPNFV Interfaces



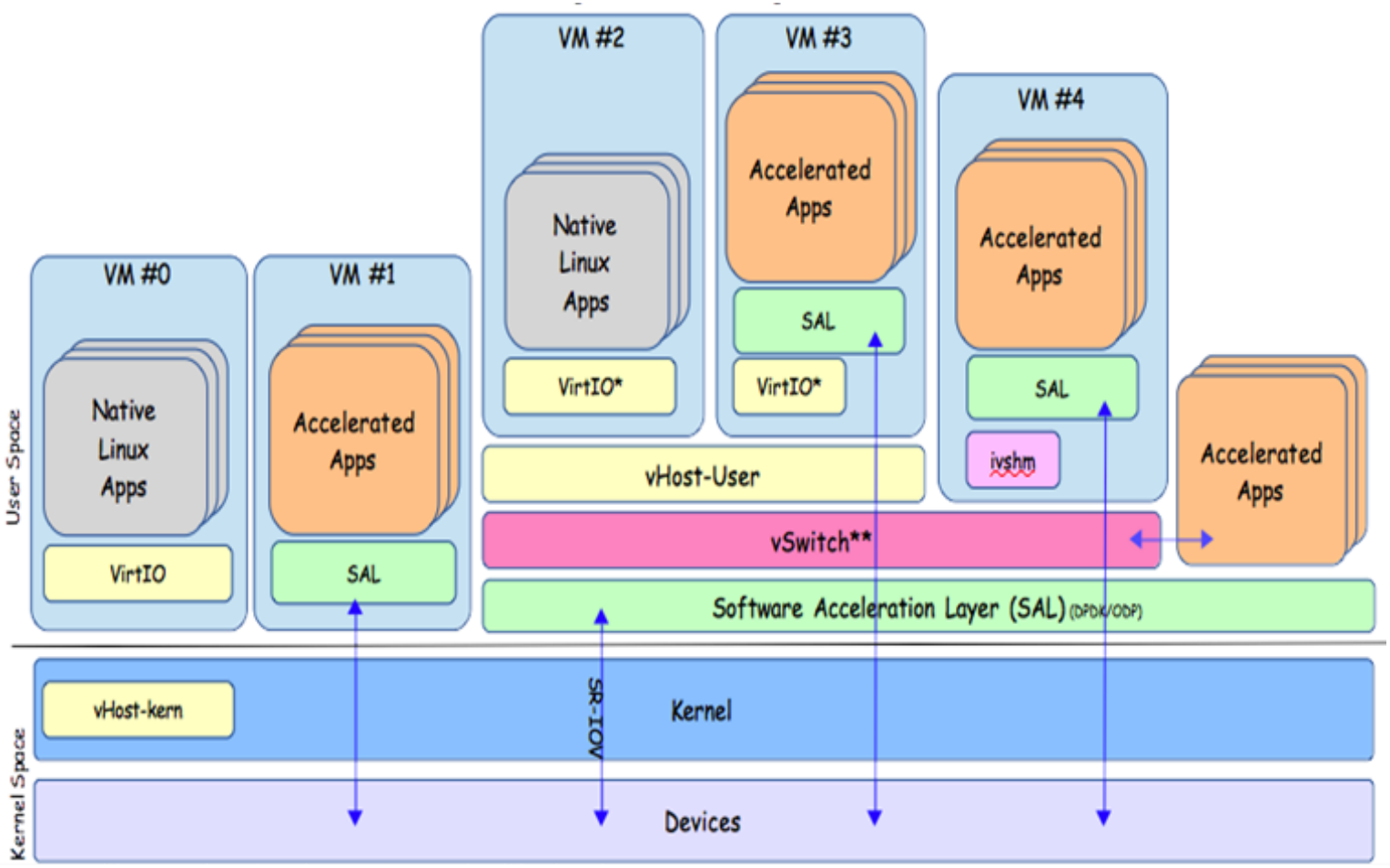
DPDK APIs needs to be extended/abstracted to enable hardware portability and manageability.

dpacc@OPNFV
Output, Scope and Related Projects

- Target: pass graduation review in 2015
  - Phase 1: (by 2015Q2) Use-cases, requirements and gap anlaysis
  - Phase 2: (by 2015Q4) General framework specification, running code and testing report
- Scope: PoC data plane implementation in 2015
  - usecases: packet processing, encryption, transcoding
  - data plane interfaces: Vn-Nf/Vi-Ha
  - potential extension and integration review in 2016
- Related Upstream Projects
  - DPDK, OpenDataPlane, OpenCL, libvirt, virtio, Openstack

dpacc framework proposal

Various DPA Usage from NFV Apps



Virtio extensions in addition to SR-IOV enablers to HW accelerators under the umbrella of DPDK is proposed to enable VM portability for vNF/vSwitch applications.

Thanks