ODP Relationship to NFV

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Alphabet Soup

NFV - Network Functions Virtualization, a carrier initiative organized under ETSI (European Telecommunications Standards Institute) to promote network agility and manageability

ODP - OpenDataPlane, a Linaro initiative to define an efficient open source framework for data plane applications on Linux SoCs, and to produce reference implementations

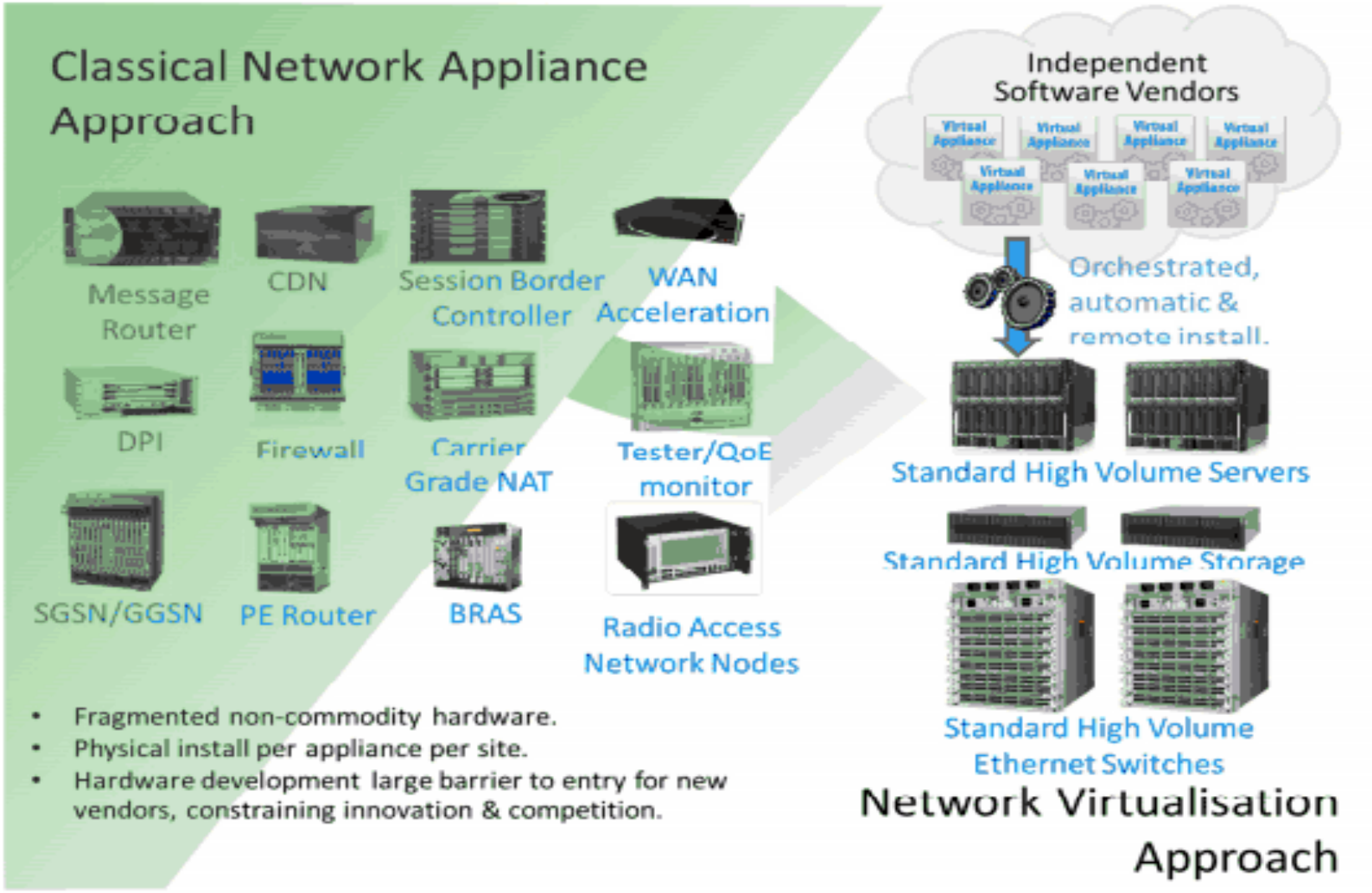
Brief Intro

Joined LNG in September, leading ODP reference implementation team

Previous 10 years worked in the data plane on network SoC firmware development doing I/O offload and converged networking from 1Gb/s to 100Gb/s at several startup and public companies

Starting doing OS and embedded programming at IBM on mainframe systems

NFV: The Big Picture



NFV Goals

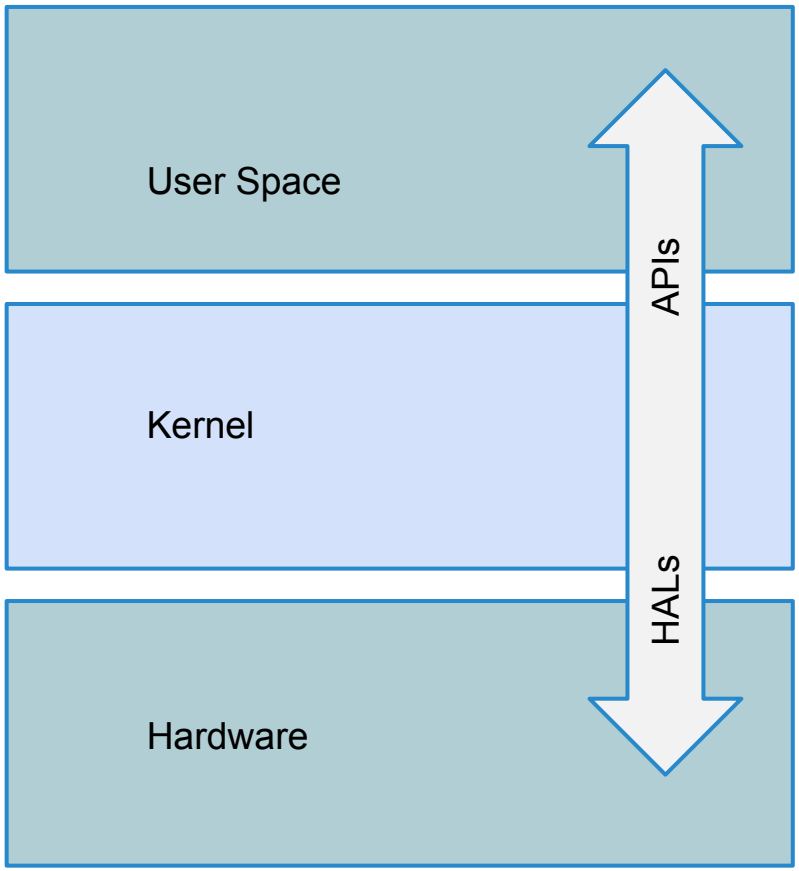
Move network applications from dedicated appliances to virtual containers which can be deployed on COTS (Commercial Off The Shelf) equipment

Enable network agility by improving the manageability of networks

Result: More flexible and responsive networks which can offer value-add services instead of just being a “data pipe”

Why ODP?

Traditional Linux Application Structure



Very flexible, rich services environment

Stable APIs enable portability across HW platforms

High degree of overhead associated with kernel calls

Unique HW features require kernel support, not directly usable by applications

Sources of Overhead

Services Overhead

Thousands of cycles for context saves/restores, parameter validation and translation, interrupts and reschedules, etc.

Resource Sharing Overhead

Constant background interrupts for kernel scheduler / resource balancing activity. Unpredictable responsiveness.

General Overhead

Virtual memory, paging, CPU cache and TLB thrashing, etc.

Data Plane Performance Requirements

Extremely high transaction rates

10s of millions of packets per second on 100Gb/s links

Very tight processing budgets

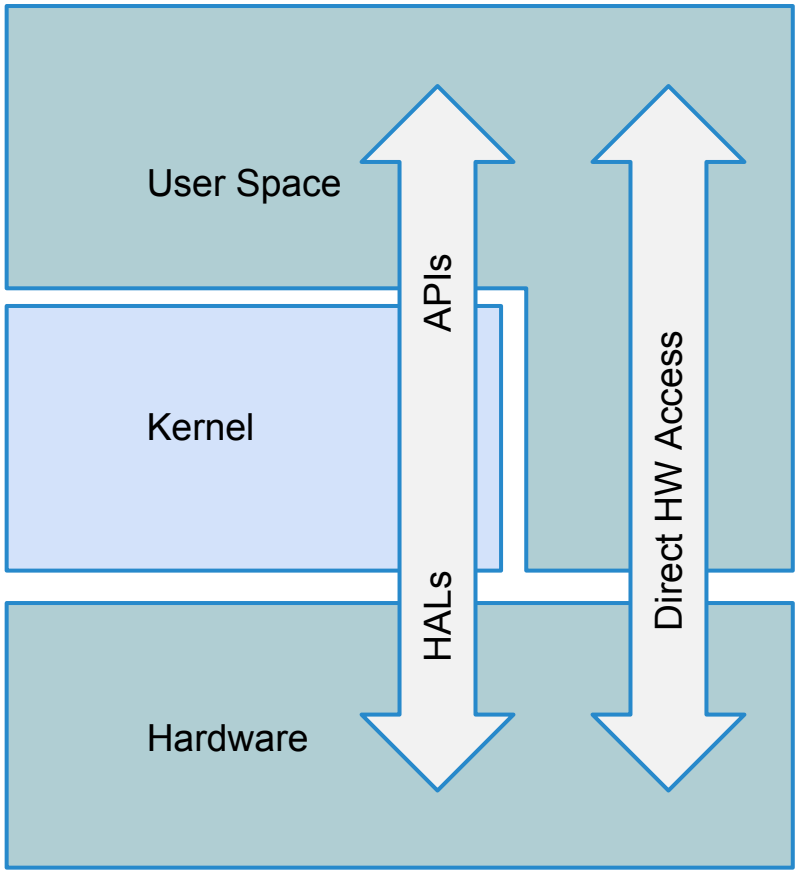
A few hundred cycles per packet

Predictable response times

Must maintain line rate processing without interference from other workloads

From the Application Standpoint

Desired Application Structure



Retain access to Linux services when needed

Provide direct access to platform HW by application

Close analog to current “bare metal” approach common in the data plane

Problem with Direct Access

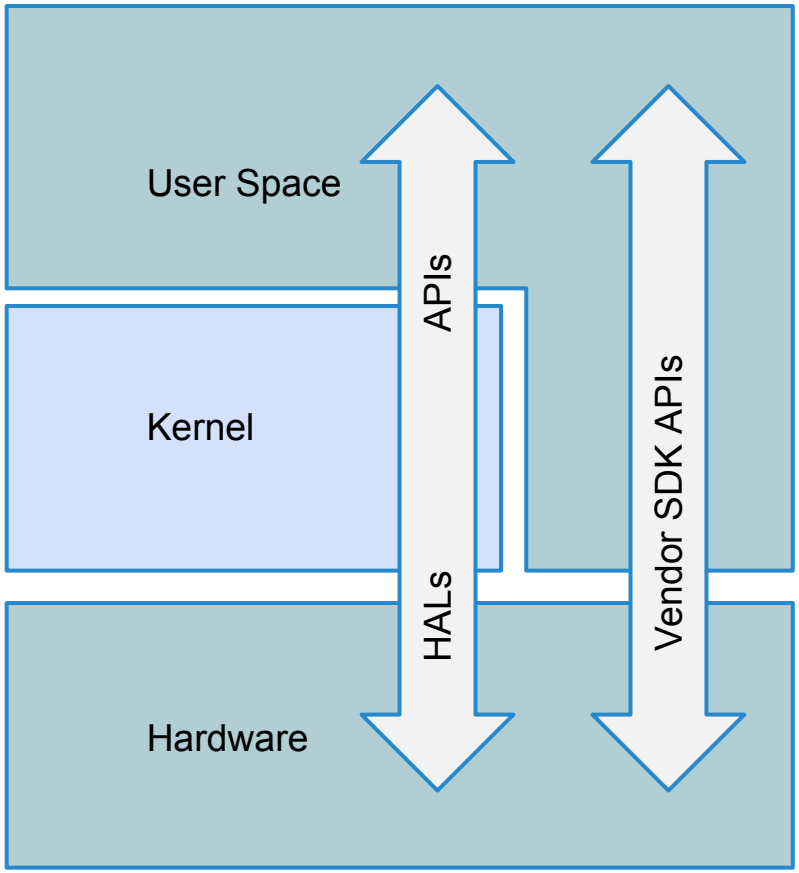
Application closely tied to specific HW

Not easy to leverage common function across different applications running on same HW

Not easy to move applications to different SoCs

Vendor SDK Approach

Provide an Architected Fastpath



Application accesses HW via a thin layer SDK API.

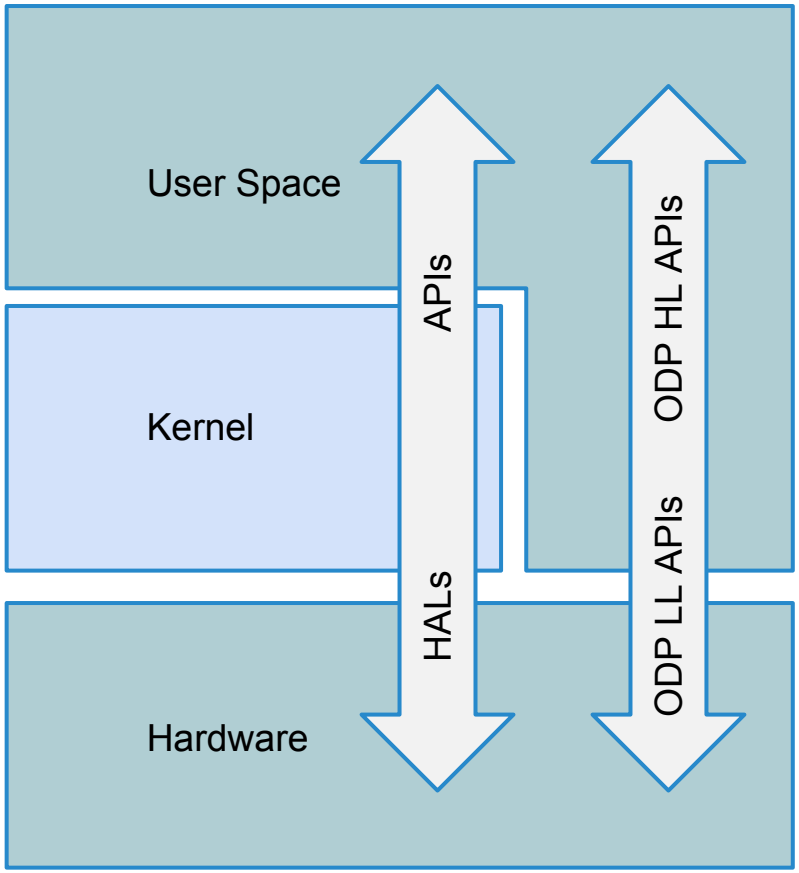
Preserves application portability

Depending on which SDK chosen may not be open source, may require costly licenses, or may be restricted to a handful of supported platforms

DPDK: An open source SDK clearly optimized for and targeting a specific set of HW

ODP Approach

Separate Fastpath APIs into Application and Implementation



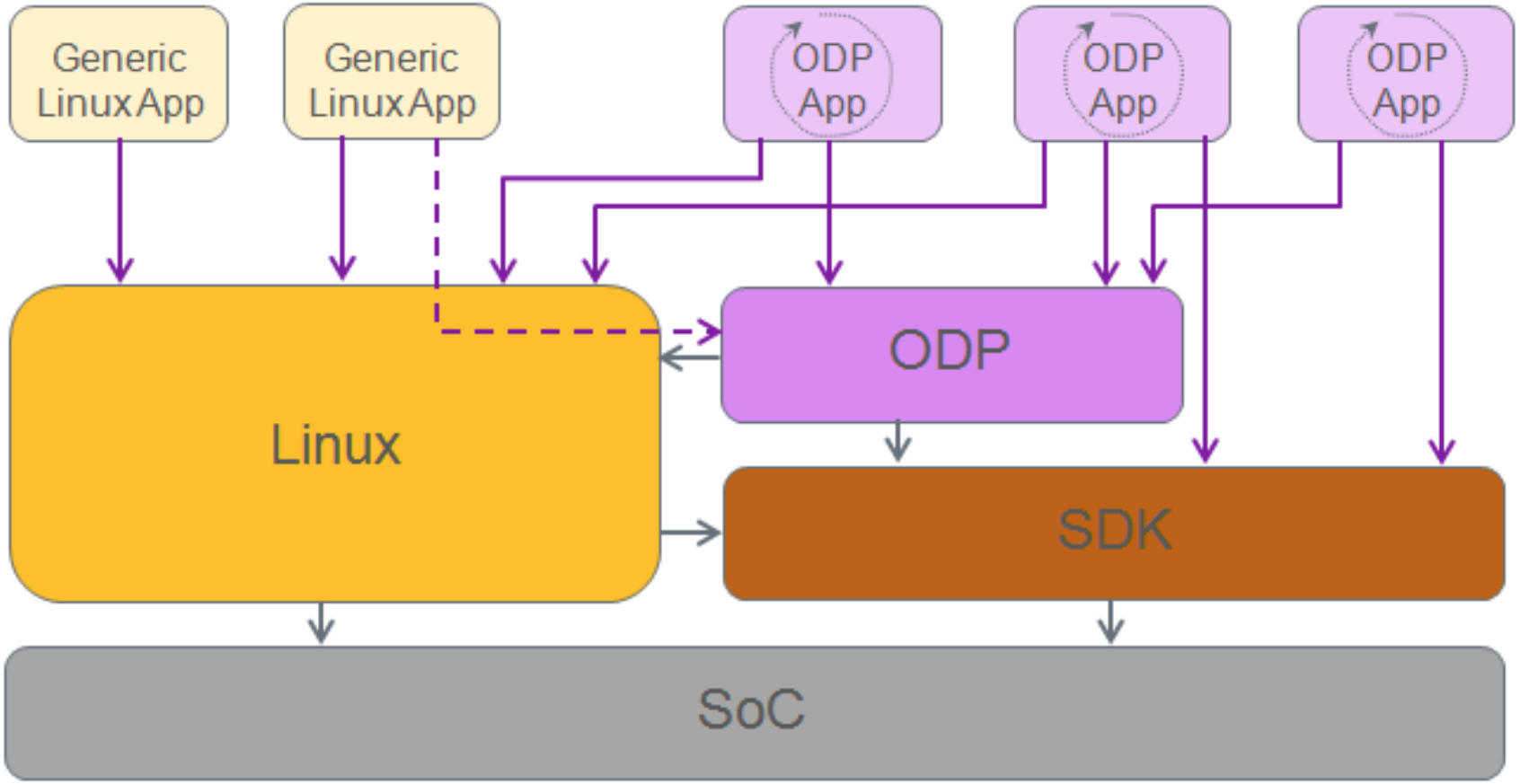
Applications directly accesses HW via ODP High Level APIs

Preserves application portability

ODP Implementations map to SoC HW via Low Level APIs

Preserves ODP portability

Resulting System View



ODP Reference Implementations

Pure Linux

Not a performance target, but an easy way to bootstrap ODP applications onto new platforms

Select ARM SoCs

Provide deep exploitation of native HW accelerator functions needed in the data plane

Other Architectures

To serve as implementation models and promote Open Source nature of ODP

ODP as a Technology to Realize NFV

Major NFV activity will be focused on "Orchestration" (management) of network application and their configuration, deployment, and operation.

ODP provides a framework for common data plane applications which can easily be migrated across different HW platforms while retaining the performance advantages of native SoC accelerator function access.

Discussion

Your input please!

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