Intel powering NFV solutions
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For more information

Attend these sessions

- DT3109 - Why Network Functions Virtualization is going viral in the telecommunications industry
- BB2401 - Meeting management needs in the network functions virtualization environment
- BB3083 - Intel powering NFV solutions
- DF2402 - NFV for the communications market: a real world solution

Visit these demos

- Network Functions Provisioning (located in Converged Infrastructure Solutions Zone)
- NFV orchestration, Virtual IMS and Virtual CDN (located on Intel booth #501 in Hall 5)
- Virtualized network functions for Broadband, Router, Firewall and NAT (located in NDA Area)

After the event

- Contact your sales rep
- CME Twitter account: https://twitter.com/hpcms
- HP Communications Service Provider web page: http://www.hp.com/go/csp

Your feedback is important to us. Please take a few minutes to complete the session survey.
Agenda

Software Defined Infrastructure
NFV value and change
Enabling transformation
Early collaborations
Challenges and mitigation
HP and Intel on NFV
Software Defined Infrastructure
Changes the Game

From static to dynamic, from manual to automated
NFV value to Comms Service Providers

CapEX
- Equipment consolidation on volume servers

OpEX
- Uniform physical equipment
- Production, test and service upgrades on same infra
- IT skill set

Service revenue
- Provision services in new locations
- SW innovation to prototype new services with shorter time-to-market
NFV driving architectural transformation

**From This...**
Vendor proprietary solutions
Monolithic single-purpose box
Traditional networking topology

**To This...**
Open SDN standard solutions
Volume server HW
Networking within VMs

- **Mobility Management Element**
- **PDN Gateway**
- **Serving Gateway**

- **Vendor Proprietary OS**
- **ASIC, DSP, FPGA, ASSP**

- **VM: MME**
- **VM: PDN Gateway**
- **VM: Serving Gateway**

- **CPU**
- **Chipset**
- **NIC Silicon**
- **Switch Silicon**
- **Linux+Apps**

**Hypervisor**
Requirements on NFV infrastructure

Some difference to generic IT:

- Determinism and performance
  - Packet processing
  - Real-time, latency, jitter
- Availability
- Regulatory, geolocation
- HW adapters
- Advanced mgmt (OSS/BSS)
Enabling transformation
Intel® Software Defined Infrastructure for network

Management & Orchestration
- Single console (internal & external)
- Ease of services provisioning and assurance
- Ease of SW upgrades

Virtualization
- Performance (real-time latency, throughput, intra-VM and to network)
- Elastic scale
- Live migration

Reliability
- Failover... achieving 5 9s on volume server HW
- Monitoring and trouble shooting

Security
- Trust between virtual and physical domains
- Regulatory limits on geolocations
Enhanced Platform Awareness

- Optimized VM placement
- Filter all nodes for required feature like HW or SW acceleration

- Example in OpenStack Havana with Intel® QuickAssist Technology accelerator cards:
Optimization examples in open node

Orchestration

Node

app
DPDK* Linux** VM

app
DPDK Linux VM

DPDK vSwitch
Wind River OVP (KVM)

server
PCI-e card with acceleration chipset

Intel® 82599 10GbE Ethernet Controller

Intel® SSD DC S3700

* DPDK = Intel® Data Plane Development Kit, supported by:

Wind River OVP (KVM)

Open vSwitch

Intel® Quick Assist Technology

PCI-e card with acceleration chipset

Intel® XEON®

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Intel® Tick-Tock Model

- Intel® Core™ Microarchitecture
- Intel® Microarchitecture Codename Nehalem
- Intel® Microarchitecture Codename Sandy Bridge
- Intel® Microarchitecture Codename Haswell

**Merom**
- 65nm
- New Micro-architecture

**Penryn**
- 45nm
- New Process Technology

**Nehalem**
- 45nm
- New Micro-architecture

**Westmere**
- 32nm
- New Process Technology

**Sandy Bridge**
- 32nm
- New Micro-architecture

**Ivy Bridge**
- 22nm
- New Process Technology

**Haswell**
- 22nm
- New Micro-architecture

**future**
- 14nm
- New Process Technology

Latest micro-architecture on leading process technology
Intel® Xeon® Processor E5-2600 v2 Product Family

- **Socket compatible** with Intel® Xeon® processor E5-2600 product family
- **Up to 12 cores and 30MB cache** expected to deliver up to ~40% more performance in same power envelope
- Improved security with Intel® Secure Key & Intel® OS Guard for additional HW embedded security

More performance, energy efficiency and improved security

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For more information go to [http://www.intel.com/performance](http://www.intel.com/performance)
Intel NIC and SSD

Intel® 82599 10GbE Ethernet Controller

- 1GbE and 10GbE ports available, compatible with broad range of ProLiant Gen8 servers
- With Single-Root IO Virtualization (SR-IOV)

Intel® SSD DC S3700

- High Endurance Technology
- SATA 6Gb, up to 800GB
- Accelerates caching nodes in Content Delivery Networks
- vs HDD:
  - Better sequential and random IOPS -> less HW/SW for same peak CDN throughput
  - Less energy consumption and lower annual failure rates
Intel® Quick Assist Technology

• Accelerates network appliances
• Encryption: SSL, IPsec, RSA Decrypt, Kasumi, SNOW 3G...
• Compression: LZS, Deflate
• API, enabled frameworks and Linux* driver
• SR-IOV Virtual Functions

Intel® Quick Assist Adapter for Servers

• Low-profile, half-length, single slot PCIe card like:

More on:
Intel® Data Plane Development Kit

- Accelerate packet processing

- Run-to-completion or pipeline model, device polling, recognizes underlying HW for best utilization

More on:
- [http://www.intel.com/go/dpdk](http://www.intel.com/go/dpdk)
- [http://www.dpdk.org](http://www.dpdk.org), Intel DPDK open source community
- [https://01.org/packet-processing/intel%C2%AE-ovdk](https://01.org/packet-processing/intel%C2%AE-ovdk) Intel DPDK vSwitch

Intel® Architecture

Intel® 82599 10 GbE (SR-IOV)

Intel® VT-d

Data Plane VM Routing Stack (Forwarding Engines)

Virtual Machine Monitor (VMM)

Next Gen Firewall VM

Service Appliance VM

Intel® 82599 10 GbE (SR-IOV)

L2 Switch

Fast Path

SR-IOV = Virtual Function Driver Integration
WIND RIVER Open Virtualization Profile

- KVM with low latency (3 μs) and high throughput (includes DPDK-accelerated Open vSwitch with virtual switching 4.5x over non-optimized Open vSwitch)

- Optimizations resulted in 74% decrease in average latency and large decrease in jitter

More on:
Early collaborations
(all with HP)
Network Virtualization POC

Classical Network Appliances

Message Router
CDN
Session Border Controller
WAN Acceleration
DPI
Firewall
Carrier Grade NAT
Tester/QoE monitor
SGSN/GGSN
PE Router
BRAS
RNC

Independent Software Vendors

Orchestrated, automatic & remote install

x86 Servers
Storage
Ethernet Switches

Source: BT

Standard High Volume

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Verizon, HP, Intel collaboration to develop prototypes demonstrating NGN architecture based on cloud computing techniques and SDN.

Core partners are providing resources, lab facilities, technical expertise.

Other ecosystem partners are engaged based on functionality and alignment with the mission.

Source: Verizon
Matching of load to demand through ‘elastic’ controller capacity, delivered on sets of distributed and shared hardware platforms, will improve cost, availability, and performance of wireless networks.

**Virtualized processing platforms** Alcatel-Lucent uses innovative virtualization software and collaborates with partners like HP to enable a cloud-like wireless architecture for controllers and gateways.
CloudBand* Node

Pre-configured, all-in-one system for offering cloud-based network, compute and storage services

- Includes integrated cloud HW+SW for CommSPs’ distributed clouds
- Predefined form factors, pre-integrated, mounted and tested before delivery
- Uses third-party cloud stacks

3.5 hours to fully online

Source: Alcatel-Lucent
Challenges and mitigations
Challenges and mitigations

1. Planning: No Silver Bullet
2. Going beyond server virtualization
3. “SW-defined”, interfaces and integration
4. Abstract vs optimized

1. Complex industry transformation started
2. Full orchestration and operations systems
3. Agree open interfaces to lower integration cost
4. Optimize where needed, abstract where possible
HP and Intel on NFV
HP and Intel collaboration on NFV

Platform collaboration
SP engagements
Roadmap alignment
ISV enabling
Platform choice:
• Rack-mounted servers
• Blades
• Moonshot

Go-to-Market
Joint marketing
Spectrum Program
HP Intel Solution Center
Accelerate SW Defined Infrastructure solutions for datacenter and telecom:
• SDN
• NFV

http://networkbuilders.intel.com
SPECTRUM program

• Goal: HP and Intel program to accelerate the development and application of technologies for Telecommunications Solution Builders

• Benefits:
  • Development support
  • Marketing support
  • Sales enablement

• [http://www.hp.com/go/spectrum](http://www.hp.com/go/spectrum)
• Unique skill set and infrastructure
• Covers: NFV, Cloud computing, Big Data...
• Ready for onsite or remote solution demos, workshops, proof of concepts
• http://www.hpintelco.net
NFV topics at Intel booth #501 in Hall 5

• HP Virtual IMS and NFV orchestration
• HP Virtual Content Delivery Networks
• Meet HP NFV lead from HP Intel Solution Center

• Wind River Open Virtualization Profile
Summary

• New era of NFV and SDN is just getting started
• Virtualization, open standards, and compute leadership will unlock the new paradigm of networking
• Intel and HP ready to lead the network transformation together
Thank you!

For more visit as at:

• Intel Booth (Hall 5, #501)

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