Network Virtualisation
Reference architecture
and ecosystem

Telefónica I+D @ Global CTO
18.03.2014

BE MORE
A future-proof network architecture requires distributing data plane intensive functions and centralising control plane ones.

There will be two kinds of Virtualized Network Infrastructure: **local PoPs** and **regional Data Centres**.
Network Virtualisation is not Cloud Computing

The network differs from the computing environment in 2 key factors:

1. **Data plane workloads** (which are huge!)
2. **Network requires shape** (+ E2E interconnection)

- **NEED OF HIGH AND PREDICTABLE PERFORMANCE** (as with current equipment)
- **GLOBAL NETWORK VIEW IS REQUIRED FOR MANAGEMENT**

...which are big challenges for vanilla cloud computing

...and most of industry is offering to Telcos just IT based cloud products as network virtualization environments
ETSI NFV ISG has generated a reference architecture for ensuring interoperability and carrier grade performance.
High and predictable performance is not an issue (e.g. vCPE, vCG-NAT, vBRAS...) as long as you know how!

What defensive Industry says

What can be achieved doing things well(*)

(*) ETSI NFV Work Item “NFV Performance & Portability Best Practises”:
DGS/NFV-PER001 Current version: v0.0.7 (stable draft - 15/10/2013)
Telefónica is rapporteur of the draft, as well as chair of Performance and Portability Expert Group
x86 technology evolves faster than ASIC

**Westmere (2010)**
- Bare Metal
- VM

**Sandy Bridge (2011)**
- Bare Metal
- VM

**Ivy Bridge (2013)**
- Bare Metal
- VM

**BARE METAL**
- Direct PCIe connection to the processor
- Direct cache access for I/O
- Large pages support for I/O

**VM**
- Support for translations in memory R/W from CPU (small and large pages)
- Support for translations in memory R/W from I/O (only small pages)
- Support of NICs in passthrough

80 Gbps per COTS blade
A more detailed HW visibility is needed...

**CLOUD COMPUTING VIEW**

MEMORY

CPU

Core
Core
Core
Core
Core
Core
Core

I/O device

**NETWORK VIRTUALISATION VIEW**

MEMORY

CPU

Core
Core
Core
Core
Core
Core
Core

Minimise QPI usage

Max. cache sharing
Min. mem. translations

Polling mode drivers
Full assignment to process
... while server configuration does not add bottlenecks.
If ignored, “equivalent” deployments would lead to completely different behaviours!

Correct mapping allows LINE RATE

Random mapping is FAR FROM LINE RATE

NETWORK VIRTUALISATION IS NOT CLOUD COMPUTING!

Random mapping leads to UNPREDICTABILITY x2.5
Based on the previous results, a formal list of recommendations aimed at a “telco datacentre” has been issued.

A formal list of features to be included in the templates for orchestration has been elaborated.

Both are collected in ETSI NFV Work Item “NFV Performance & Portability Best Practices”:

- **DGS/NFV-PER001** Current version: v0.0.7 (stable draft - 15/10/2013)
- **Telefónica** is rapporteur of the draft, as well as chair of Performance and Portability Expert Group.
... but more work is needed on closing the gaps and getting the industry focused on providing real value.

ADD VALUE HERE: Industry should focus on providing differential VNFs. Credible ROADMAP needed!!

Current State of the Art is good enough (if properly arranged)

Network Virtualisation Infrastructure and its Management should become COMMODITY

ADD VALUE HERE: Industry should focus on providing differential VNFs and Network Orchestration

Work is needed in Open Source to AVOID proliferation of VERTICAL SOLUTIONS
OUR NEXT STEP:
Network Virtualisation Reference Lab @ Telefónica

ECOSYSTEM

ADD VALUE HERE: Network Orchestration on top of Carrier-grade OpenStack

BASELINE TECHNOLOGIES

Proper HW & Hypervisor config

ADD VALUE HERE: Simplest integration

WE WANT YOUR LOGO HERE

Carrier-grade OpenStack going to upstream development
To introduce gradually and smoothly these changes in our network.

It is key to decide **what to virtualize first**…

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Local Data Centre

Regional Data Centre

Infrastructure orchestration

Net OS: joint orchestration of network resources

Real Time Network Analytics

SDN Orchestrator
DISCOVER_

DISRUPT_

DELIVER_