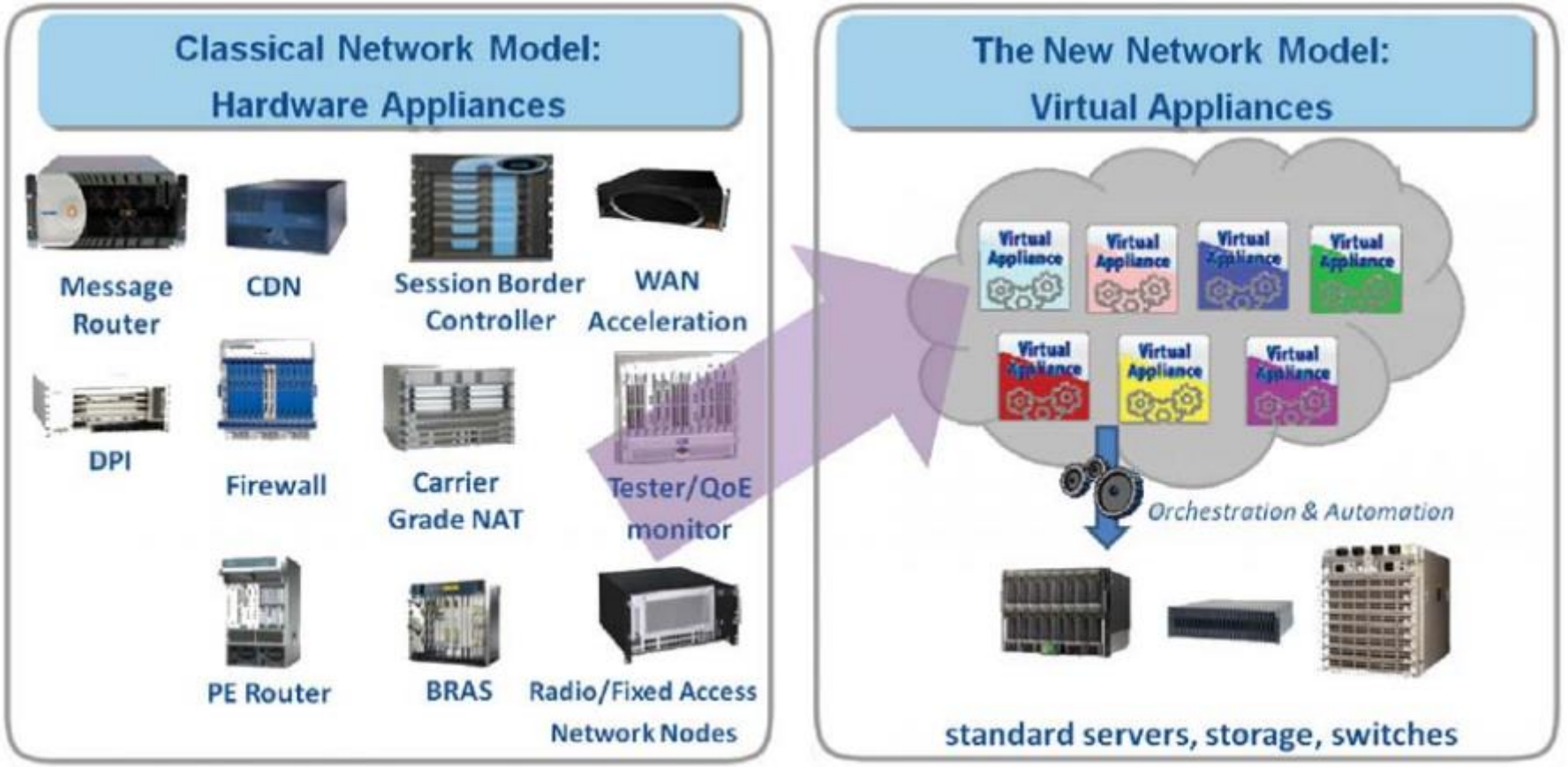
Network Functions Virtualization



ETSI 2013 Celebrating 25 years

From ETSI® NFV Leaflets

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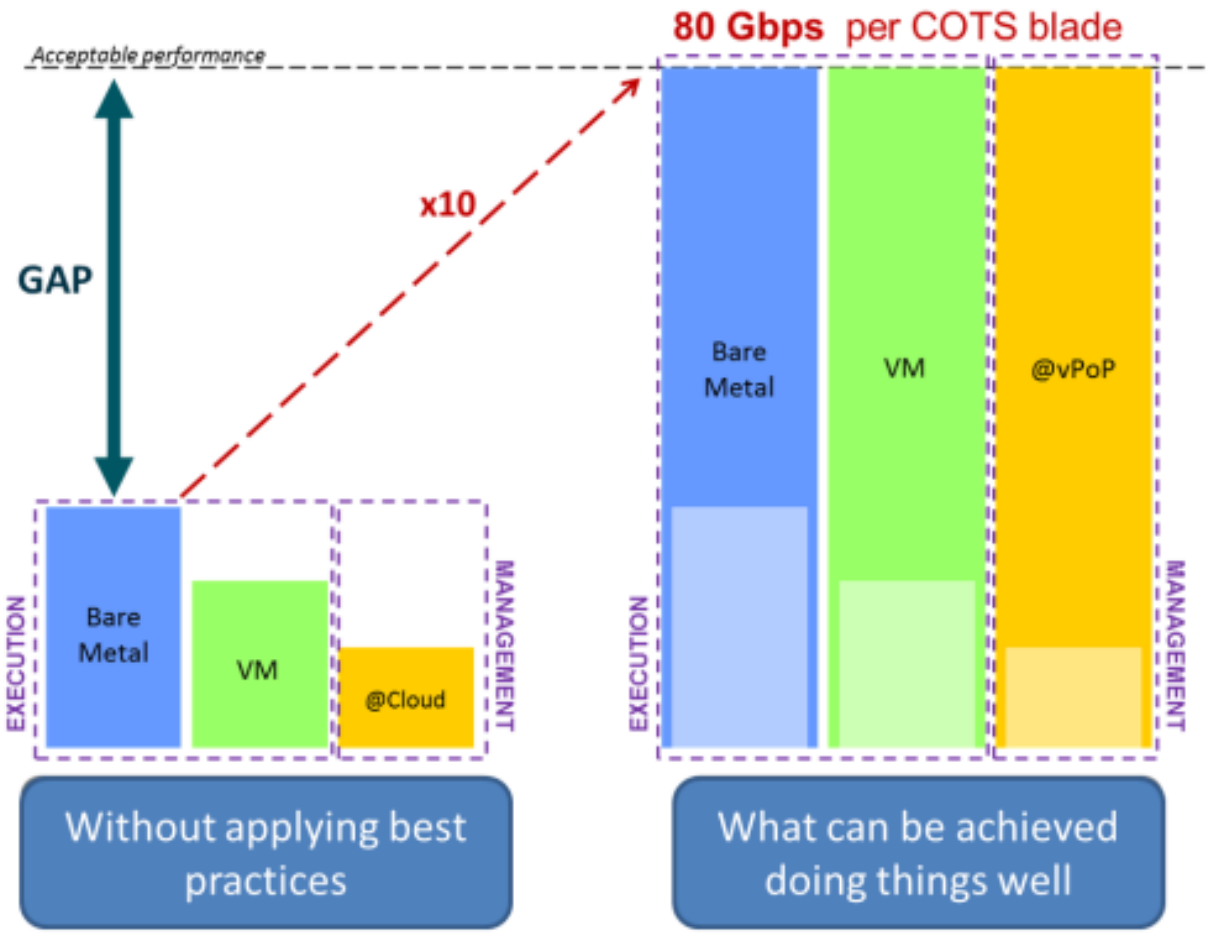

The goal has been achieved at laboratory, but now we should go into production!

From ETSI® NFV White Papers

NFV Potencial Use Cases

USE CASE	DESCRIPTION
Virtualization of mobile core network nodes	Virtualization of core network nodes, including IMS. Affected functions could include packet data network gateways, serving gateways, mobility management entities, and mobile home subscriber servers.
Virtualization of mobile base stations	Aims at realizing the base station function (at least specific functional block) with software based on standard IT platform. Mainly focused on LTE LTE-A, but similar concept can be applied to 2G, 3G and WiMax.
Virtualized home environment	Aims to shift functionality away from the home to a network-located environment as a way to solve many installation and lifecycle upgrade problems, consolidating the corresponding workloads into equipment installed in the network operator premises. Virtualization targets include: residential gateway; set-top box; WiFi access points; home eNodeB.
Virtualized network function as a service	Possible virtualization targets: enterprise access router/enterprise CPE, provider edge router, enterprise firewall, enterprise NG-FW, enterprise WAN optimization, deep packet inspection (appliance or a function), IPS – and other security appliances, network performance monitoring.
Service chains with NFV	Virtualizing the appliance functions and putting them into applications on a server in a single location or area – making service analysis more efficient and streamlining the flow of traffic in the network.
Virtualization of CDNs	Virtualization of content delivery networks (CDNs) potentially covers all components of the CDN, though the initial impact would probably be on cache nodes for achieving acceptable performance (e.g., throughput, latency).

Low and Mid-End Router ≠ Aggregation and High-End Router

From ETSI® NFV White Papers

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NFV Use Case: Virtual CPE Router

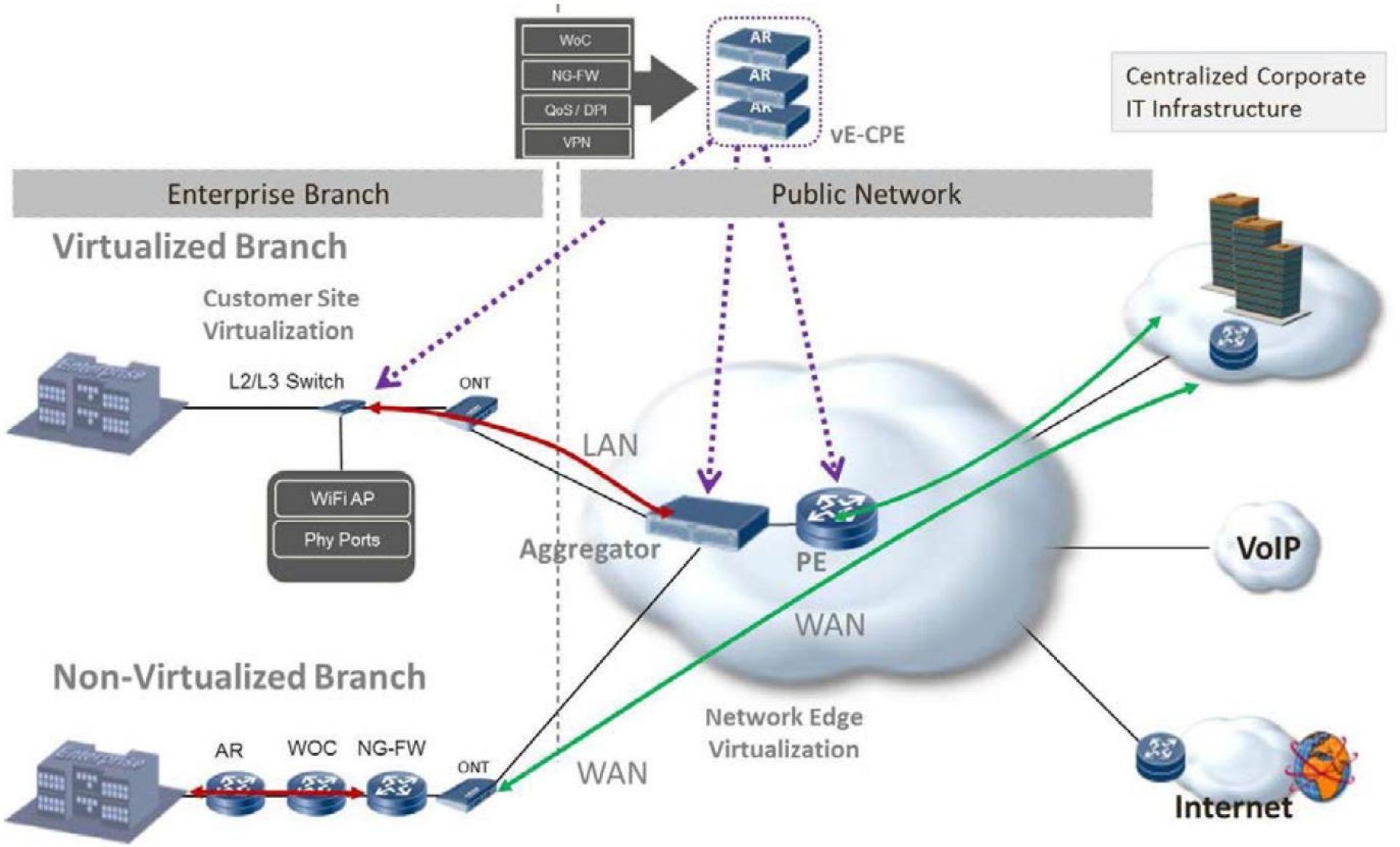

Figure from ETSI® GS NFV 001 V1.1.1 (2013-10)

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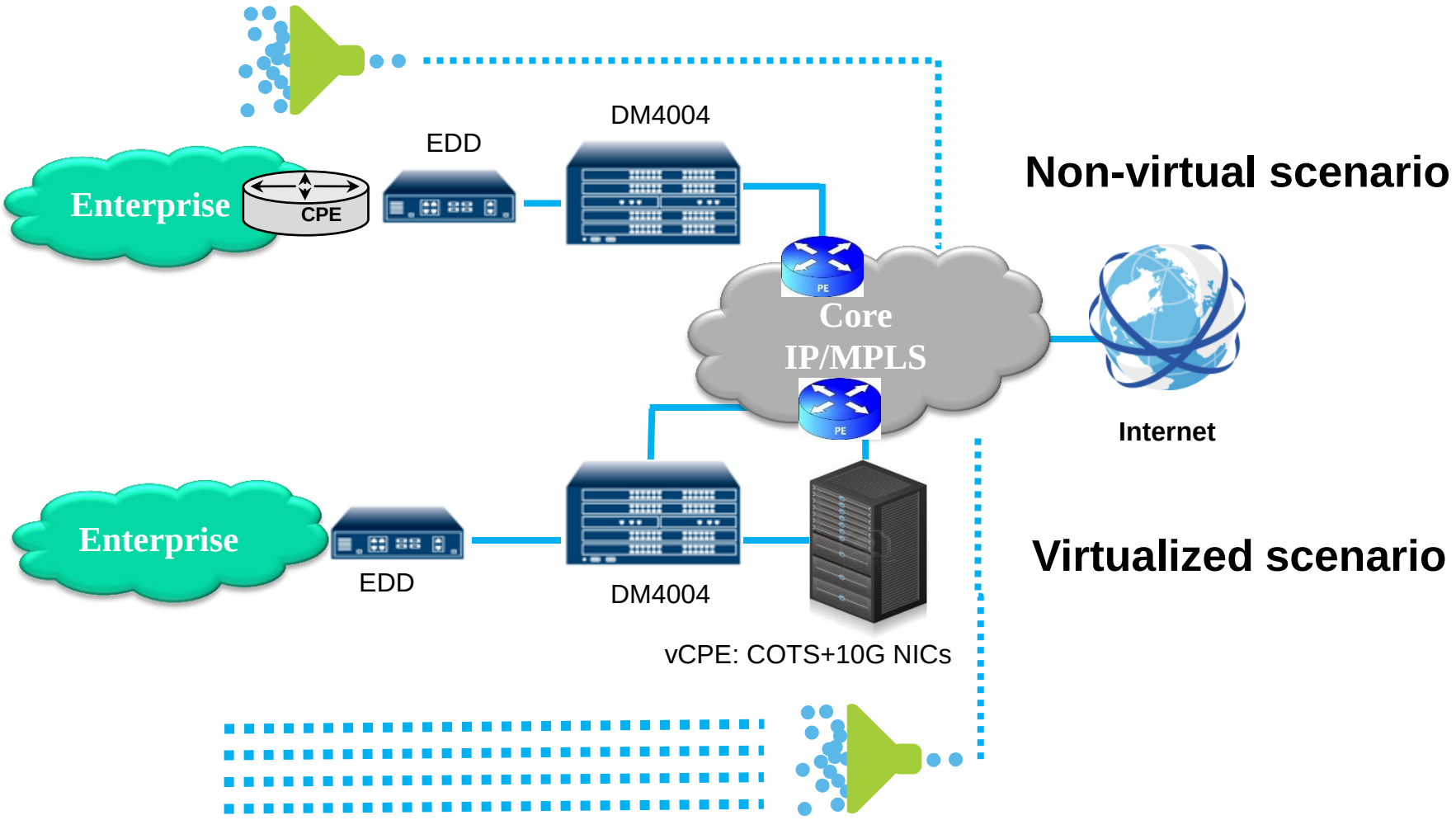
Market Opportunity: NFV coupled with Ethernet Access



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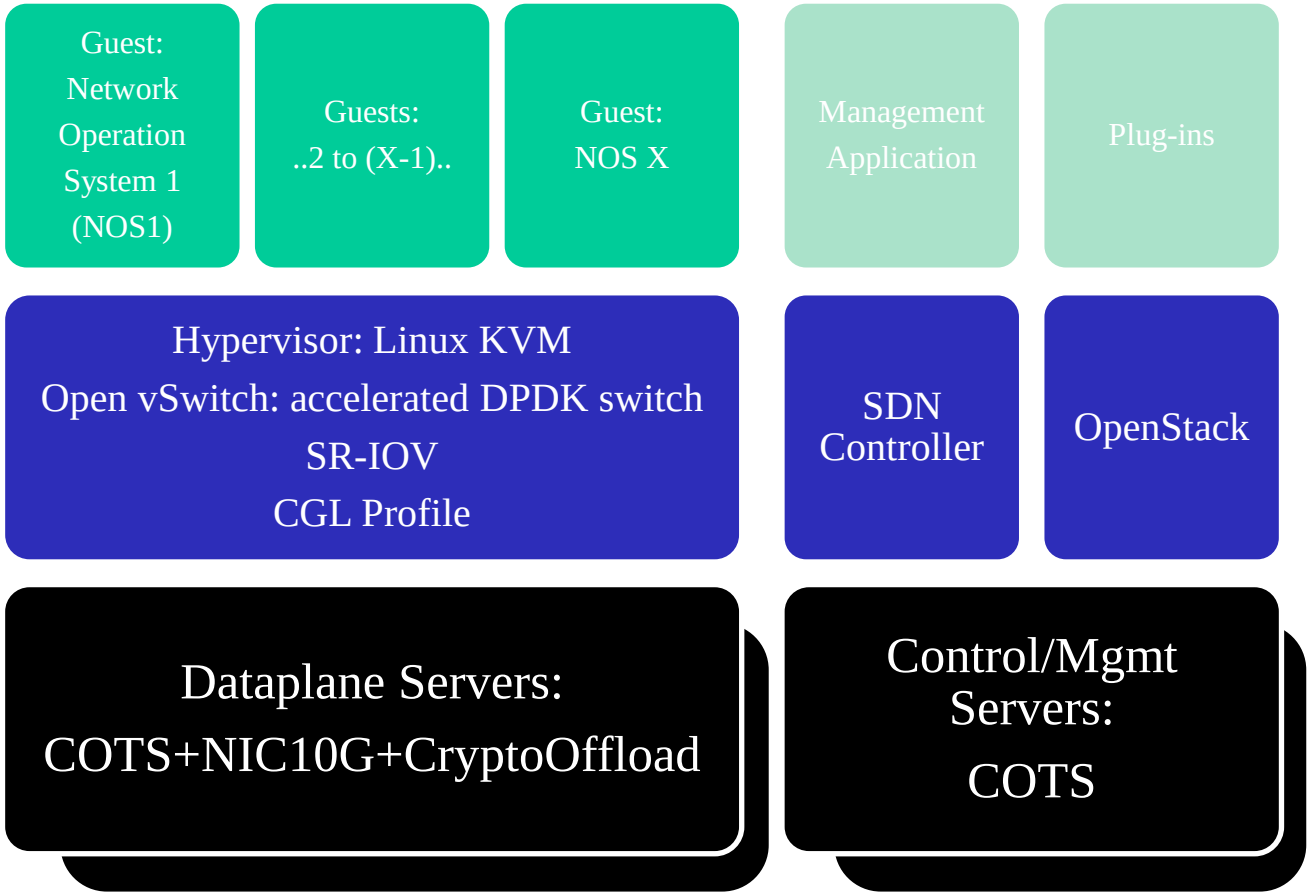
Virtualization Targets:

- AR – Enterprise Access Router => Scale Up and Down
  - [client] Can I upgrade my circuit?
  - [provider] Yes! You have 100M now, and a dual homed 1G access. How much do you want, from 100M up to 1G?
- FW / NG-FW – Enterprise Firewall => Managed Firewall as a Service
  - [client] Can I add a Managed Firewall to my link?
  - [provider] Yes! What are the basic rules that you would like to start with? I can add this to your circuit right now for xxxx/Month.
- Network Performance Monitoring => tight integration with the OSS/BSS

Other possibilities => XaaS (everything as a service!)

- WOC – WAN Optimization Controller
- DPI – Deep Packet Inspection
- IDS / IPS – Intrusion Detection/Protection System

NFV Infrastructure



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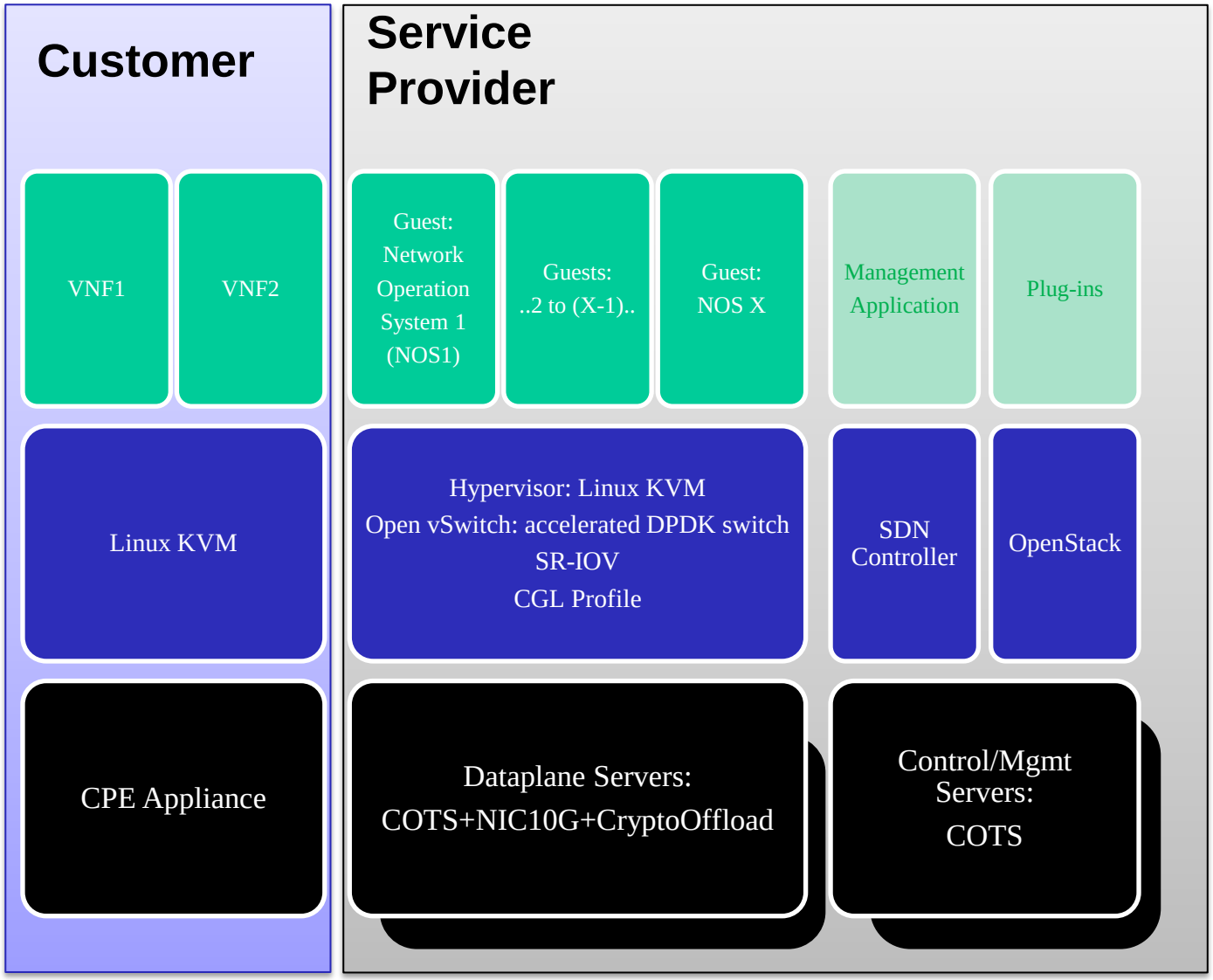
Distributed NFV Infrastructure



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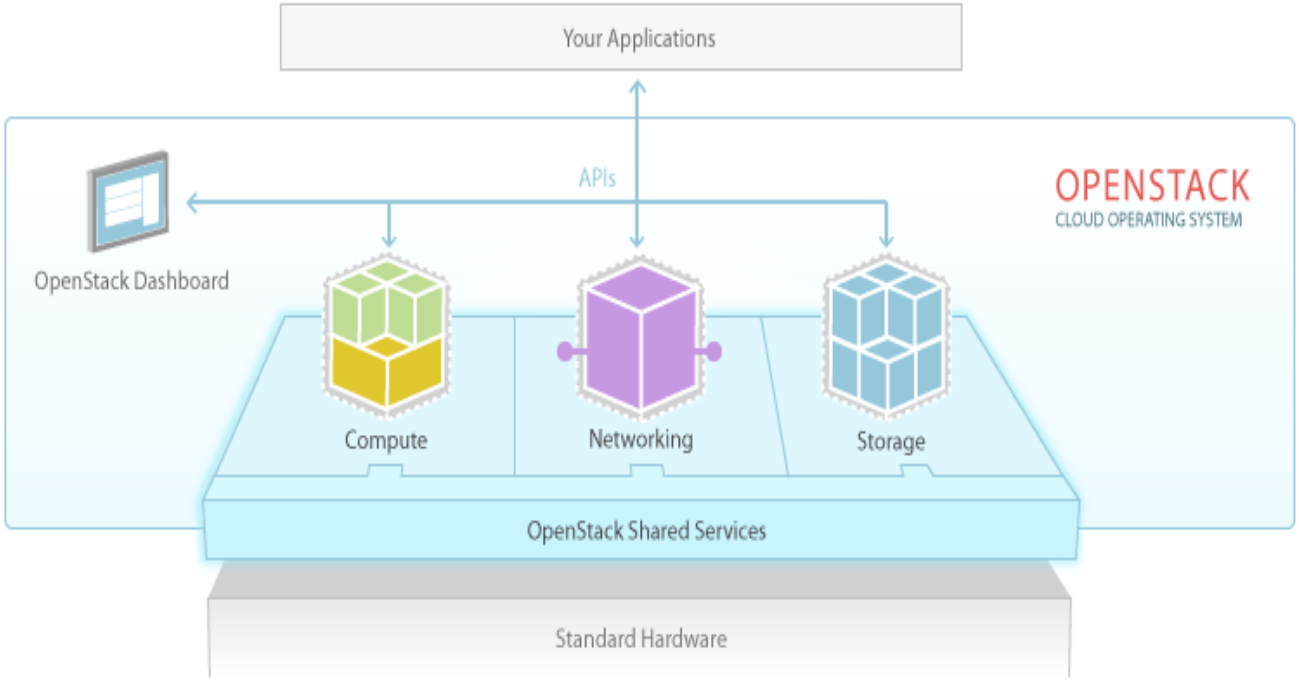
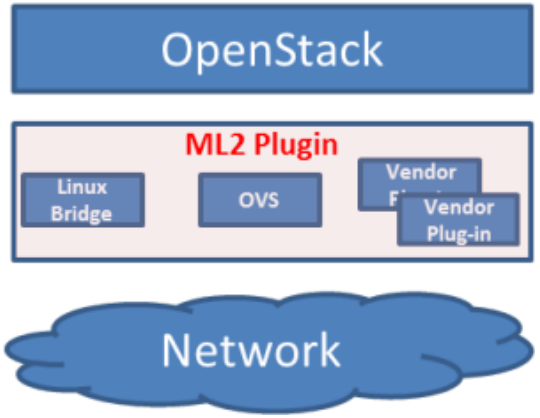
OPENSTACK ICEHOUSE:

- Linux KVM
- Neutron ML2 Plugin
  - Linux Bridge
- SR-IOV





Use Case: DmView

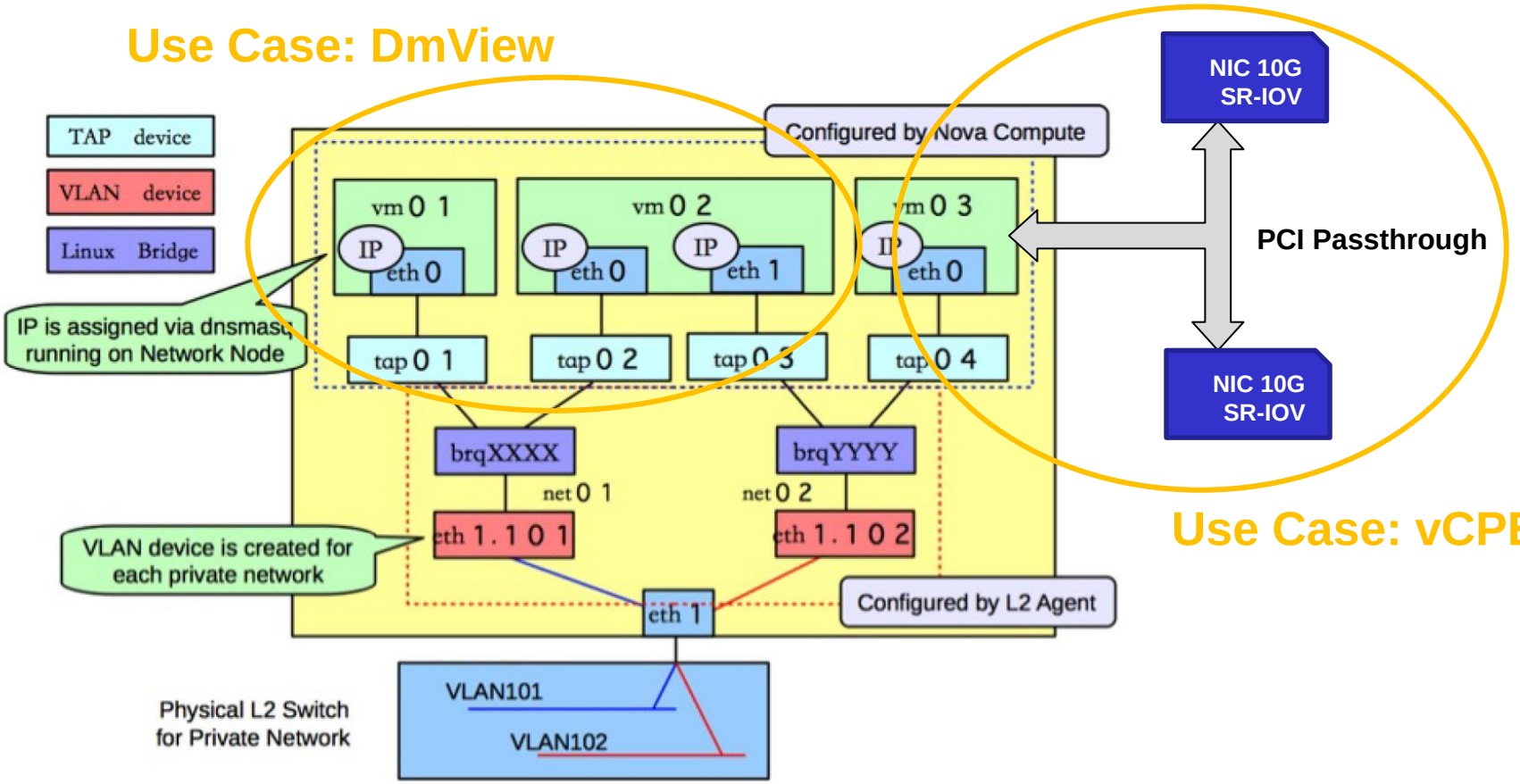
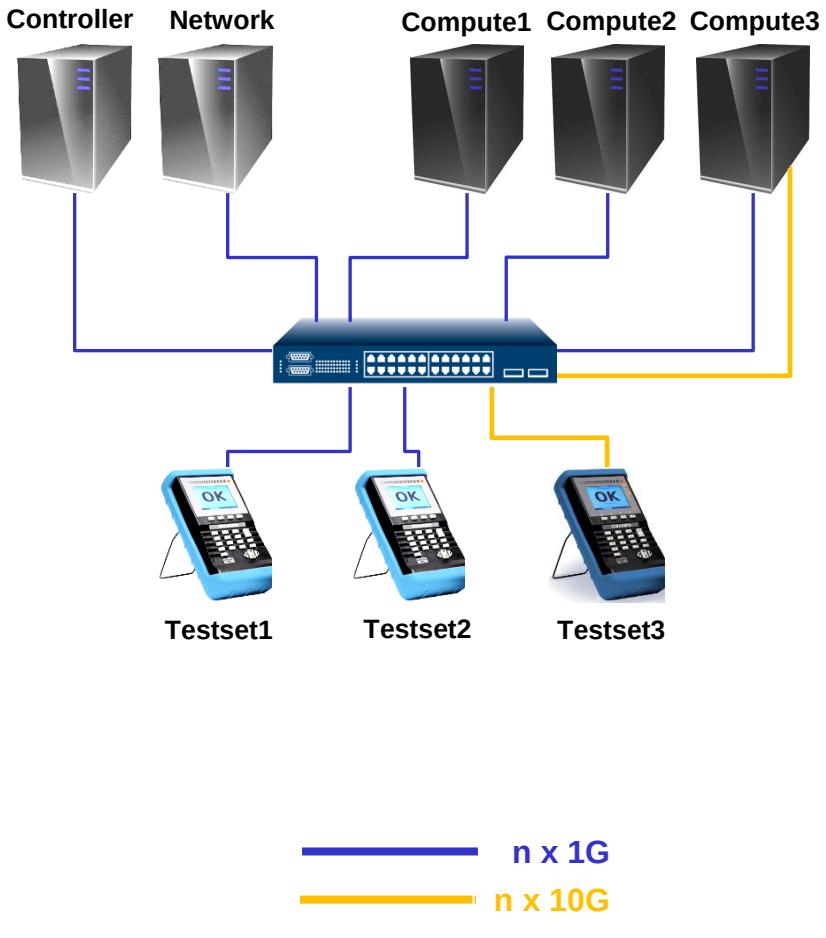


Figure 7.10. Linux Bridge: Scenario 1: Compute host configuration

Physical Infrastructure:

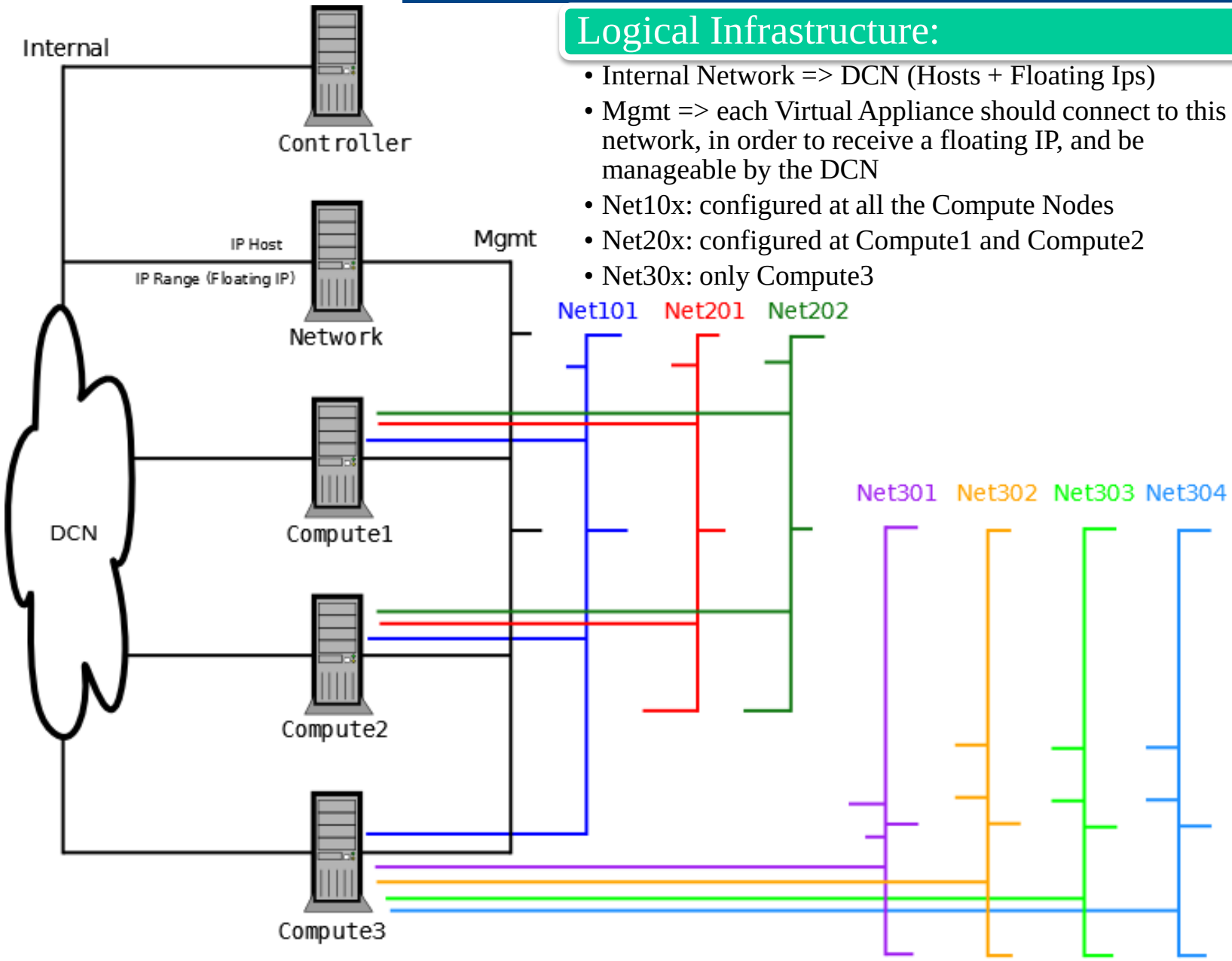
- Virtual Machine: Controller Node
- Virtual Machine: Network Node
- Bare Metal : Compute Node 1
- Bare Metal : Compute Node 2
- Bare Metal : Compute Node 3
- Switch: DM4100 24GT+4XX
- Testset 1: TSW900ETH 2x1G
- Testset 2: TSW900ETH 2x1G
- Testset3: BL2000A 2x10G



Testbed

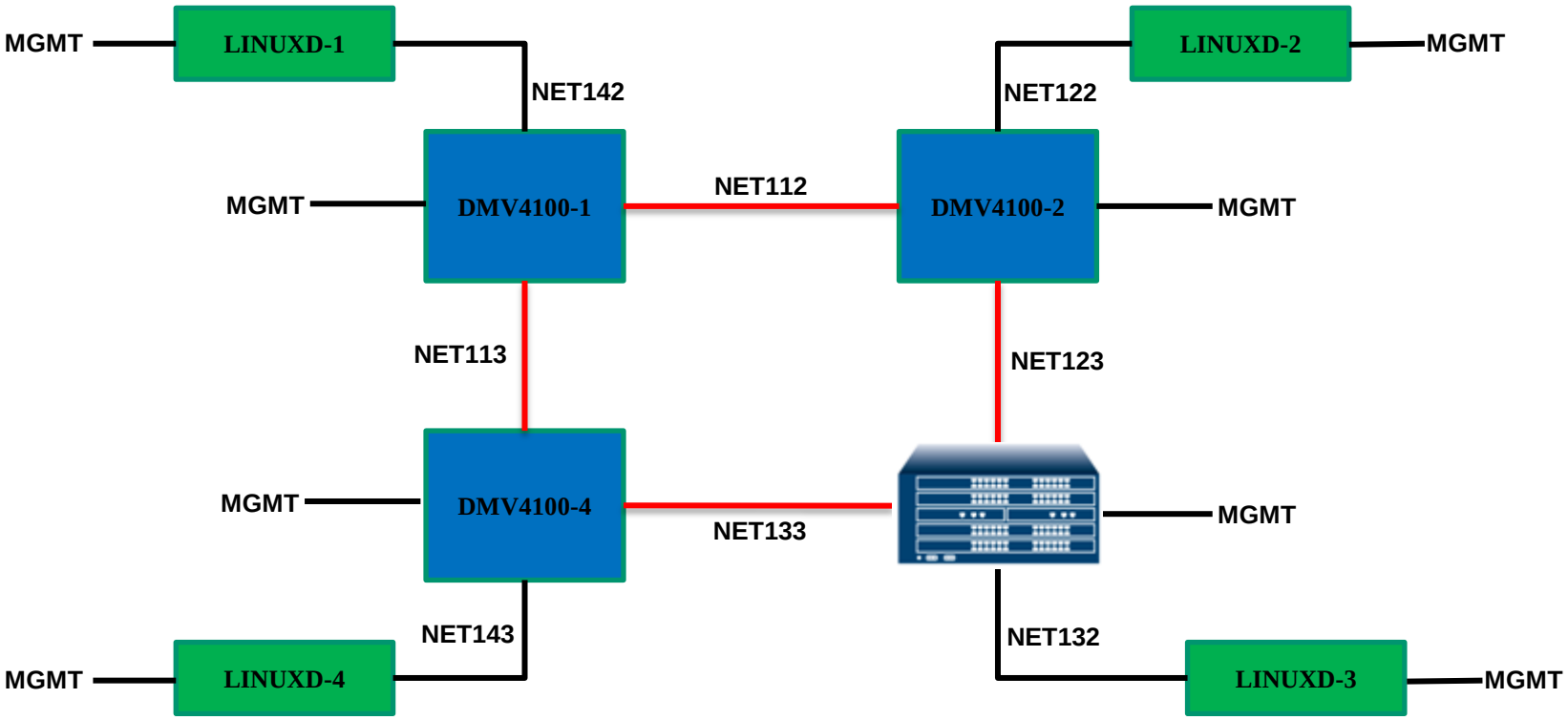
Logical Infrastructure:

- Internal Network => DCN (Hosts + Floating Ips)
- Mgmt => each Virtual Appliance should connect to this network, in order to receive a floating IP, and be manageable by the DCN
- Net10x: configured at all the Compute Nodes
- Net20x: configured at Compute1 and Compute2
- Net30x: only Compute3

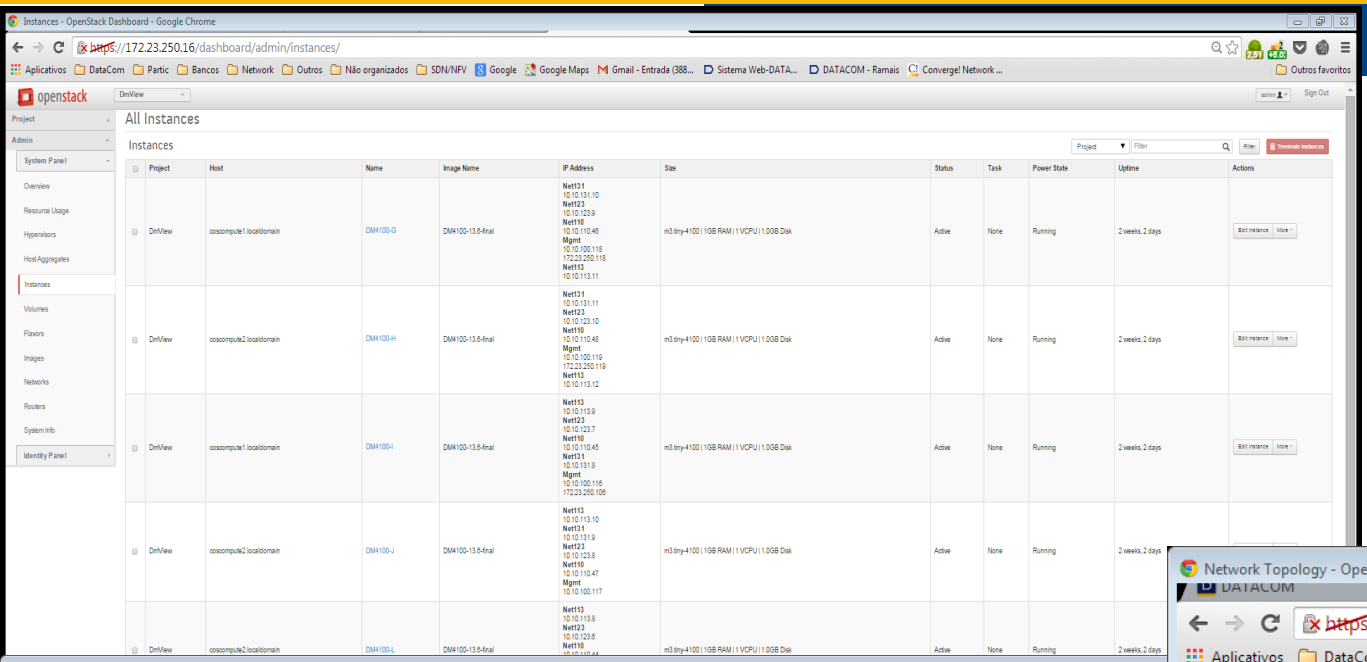


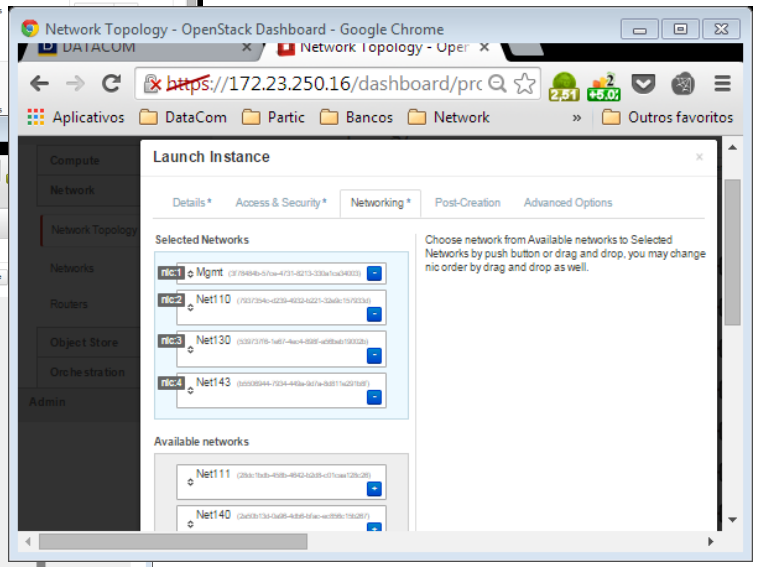
DmView development

- Any choice of topology
- DM4100 VMs
  - 1GB RAM, 1 vCPU, 1GB Disk
  - Up 7 Dataplane Interfaces + 1 Mgmt
- Mix of virtual and bare metal appliances



Use Case: DmView





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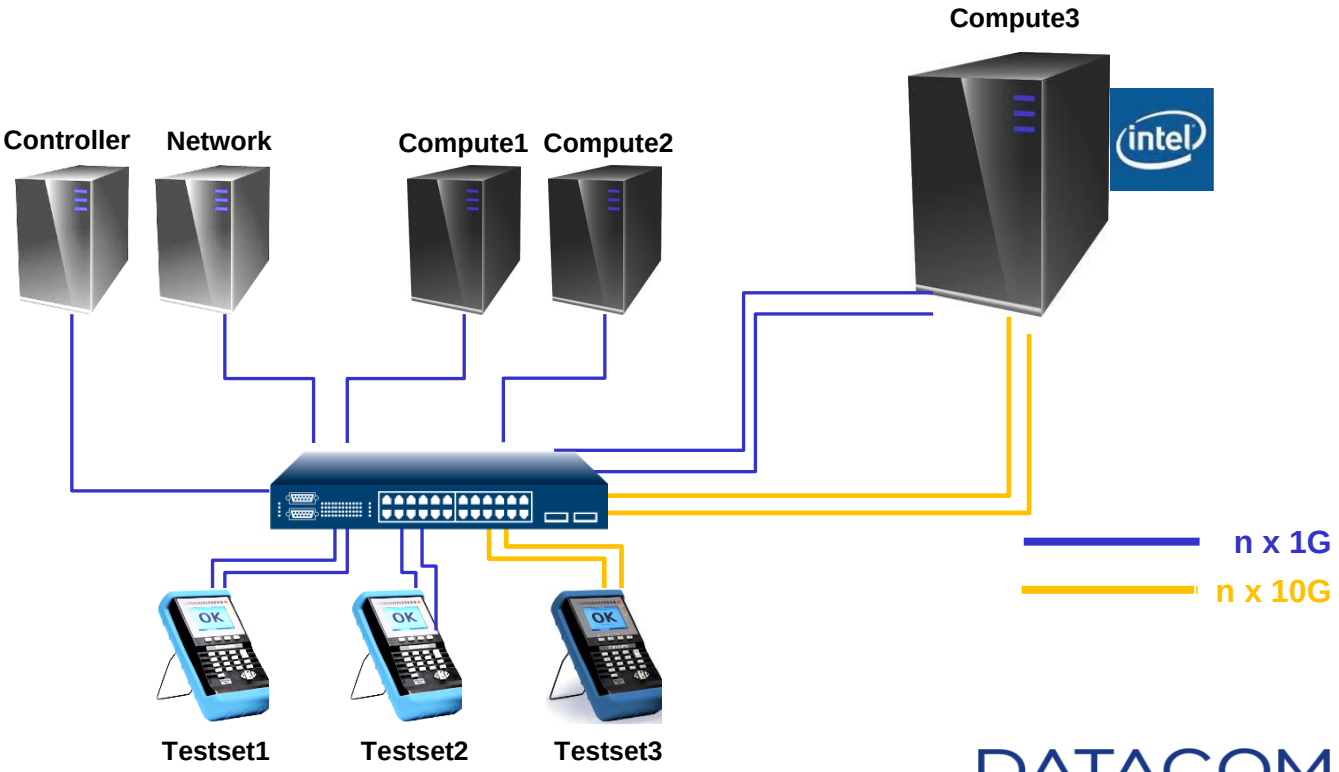
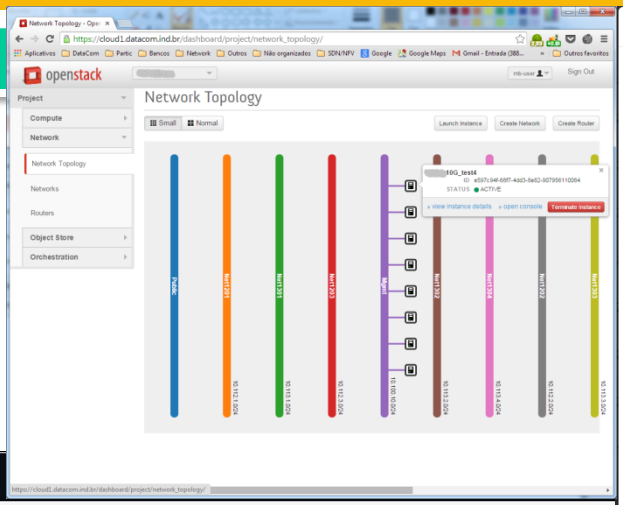
L3 Router

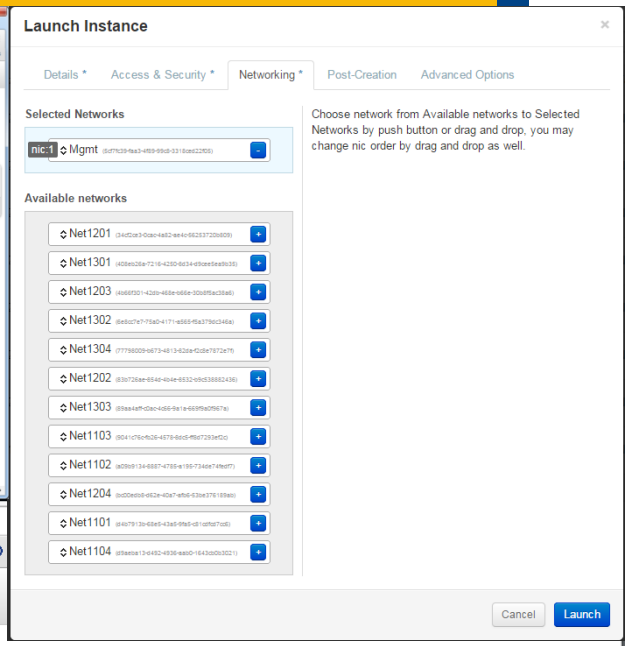
- Minimum vCPE has:
  - 2 dataplane interfaces through SR-IOV
  - 1 mgmt interface through Linux Bridge
  - 8 GB RAM
  - 5 vCPU

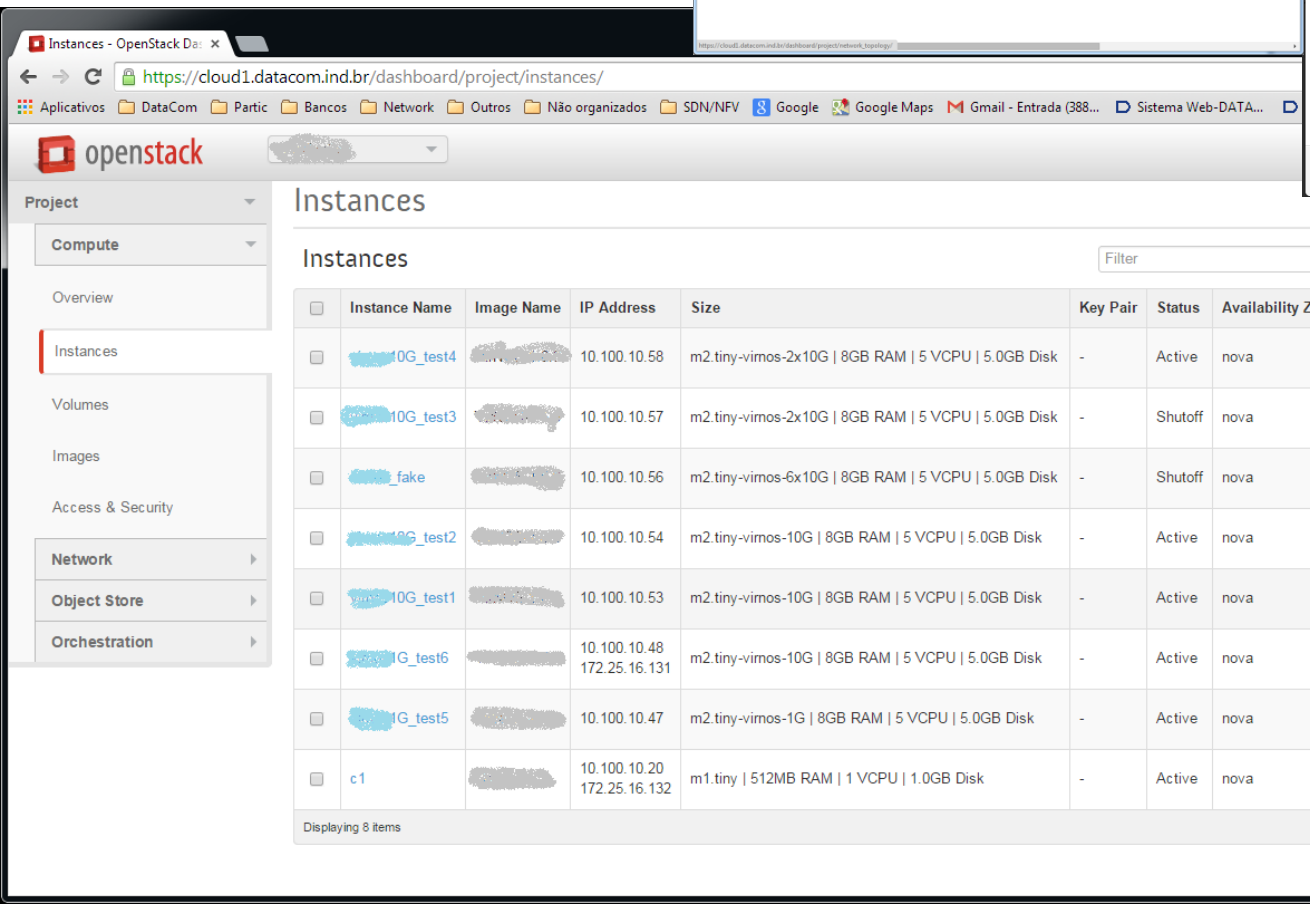


Project vCPE

- Single vCPE @ BER 10^-9
  - up to 2,5Gbps FD => 7,44 Mpps
- Each Server @ BER 10^-9
  - 8 x vCPE @ 1GB FD => 8 x 2,45 Mpps
- We can get more performance out of the server!







Next Steps

- Evolve our testing environment concerning scalability and use cases tests
- OPNFV
- OPENSTACK => Juno Oct/2014; Kilo Apr/2015
- SDN + NFV
- PoCs and ideas are welcomed!

Thank you!

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[4] ETSI NFV ISG Architectural Framework: www.etsi.org/deliver/etsi_gs/NFV/001_099/002/01.01.01_60/gs_NFV002v010101p.pdf

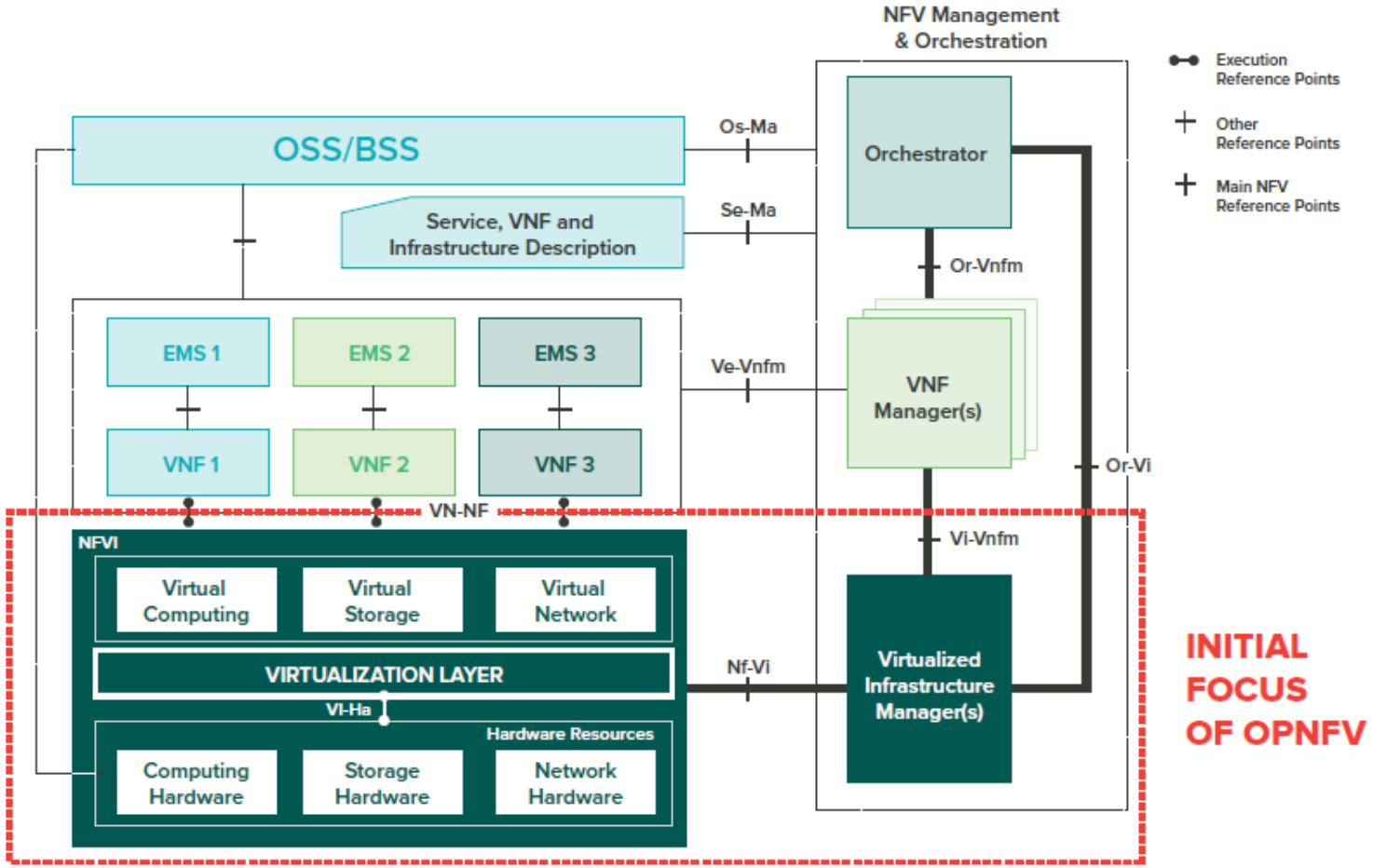

Figure 1: NFV Reference Architectural Framework

Figure from OPNFV White Paper

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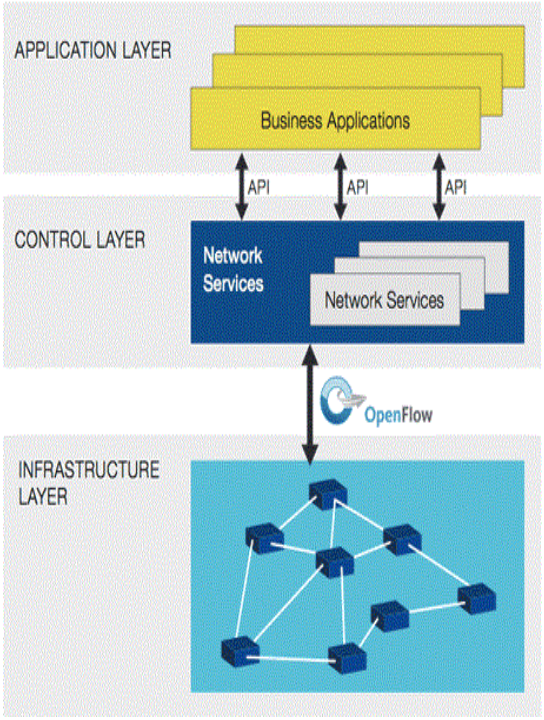
OPEN NETWORKING FOUNDATION

Software Defined Network (SDN) definition

The physical separation of the network control plane from the forwarding plane, and where a control plane controls several devices.

The SDN architecture is:

- **Directly programmable**
  - Podemos *programar* o nosso control plane, criando novas regras em L2, L3 e MPLS
- **Agile**
  - Como o control plane agora pode gerenciar diversos planos de encaminhamento, alterando as regras eu posso reconfigurar instantaneamente o comportamento da minha rede
- **Centrally managed**
  - Grande potencial para abstrações
- **Programmatically configured**
  - Podemos *programar* as ações de config, OAM, segurança, otimização
- **Open standards-based and vendor-neutral**
  - Modelo de negócio Open Source



https://www.opennetworking.org/index.php?option=com_content&view=article&id=686&Itemid=272&lang=en

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