



NFV and Openstack

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ETSI NFV member: Steering Committee and Software Architecture co-chair

ATIS SDN-NFV member

Agenda

1- Definition de NFV ?

2- Specifications ETSI NFV & Use Cases

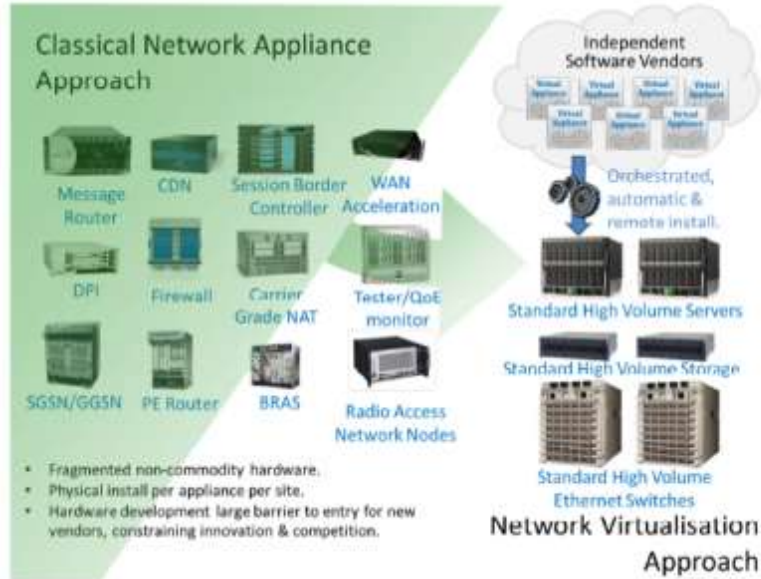
3- ETSI NFV, Openstack et OPNFV

4- HP Helion & Openstack



1- What is NFV: Network Function Virtualization

virtualize network functions: from Home or Enterprise Gateway to Access/Core telecom network & Data centers



Leverage IT virtualization techniques for telco functions

- Use standard servers and storage
- Applicable to telco network functions
- Initiative from Tier 1 Operators & Vendors launched as a new Industry Specification Group (ISG) in ETSI

Key Benefits

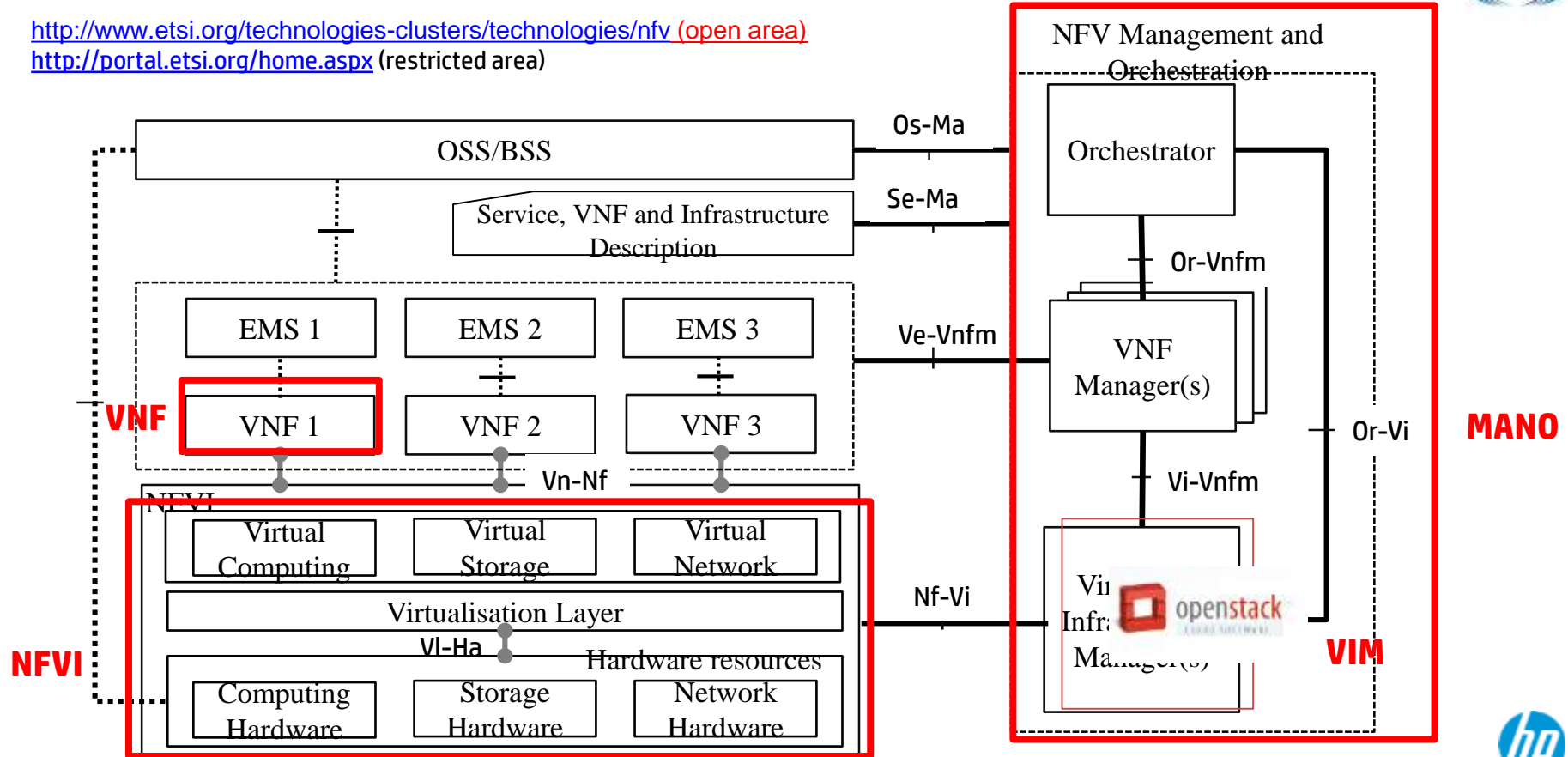
- Reduced equipment costs
- Faster time to market
- Resource sharing
- Targeted service introduction
- More flexible, programmatic operations

ETSI NFV architecture & interfaces



<http://www.etsi.org/technologies-clusters/technologies/nfv> (open area)

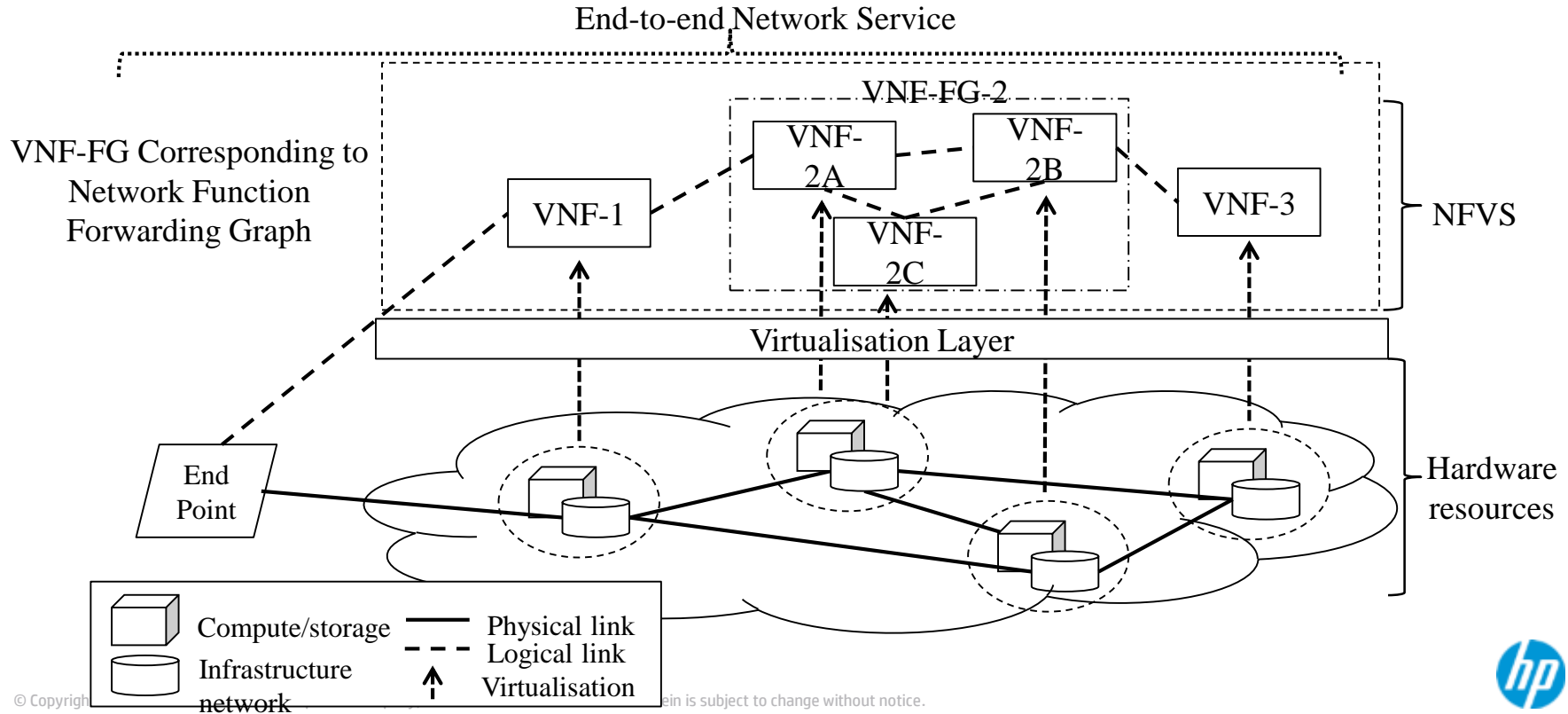
<http://portal.etsi.org/home.aspx> (restricted area)



ETSI NFV – E2E Network Service with NFV



=> Compose VNF and PNF to create Network Services



ETSI NFV Use Cases

- Large Telecom Networks
- Regulated
- Roaming Services



| Use Case | Description |
|----------|--|
| #1 | Network Functions Virtualisation Infrastructure as a Service |
| #2 | Virtual Network Platform as a Service (VNPaaS) |
| #3 | Virtual Network Function as a Service (VNFaaS) |
| #4 | Virtualisation of Mobile Core Network and IMS |
| #5 | Virtualisation of Mobile base station |
| #6 | Virtualisation of the Home Environment |
| #7 | Service Chains (VNF Forwarding Graphs) |
| #8 | Virtualisation of CDNs (vCDN) |
| #9 | Fixed Access Network Functions Virtualisation |

- Growing data/video traffic
- Unpredictable peaks
- Enterprise SLAs
- Government security
- Emergency services
- etc

Use Case: 3GPP IMS MRF

Telco Grade Media Server Environment

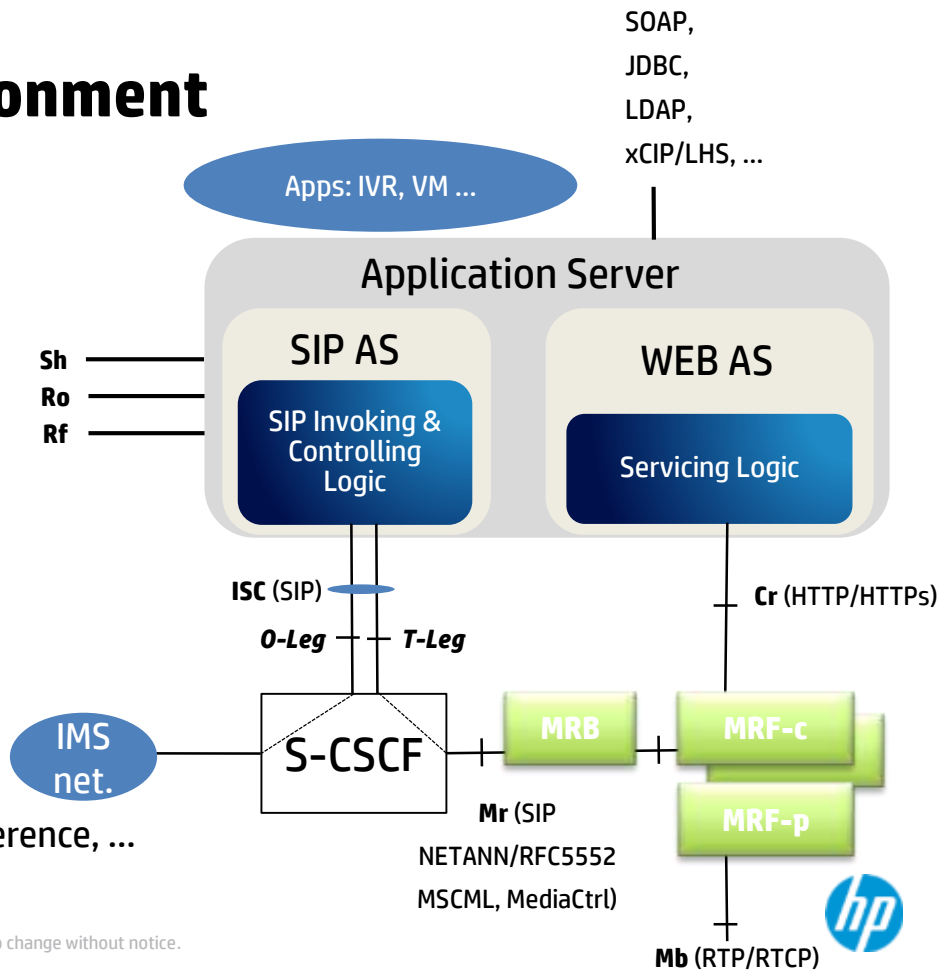
The AS interfaces

- ISC **SIP** to invoke & control interactive multimedia apps
- Sh **Diameter** interface to HSS for subscriber profile
- Ro **Diameter** towards Online charging system
- Rf **Diameter** towards Offline charging system

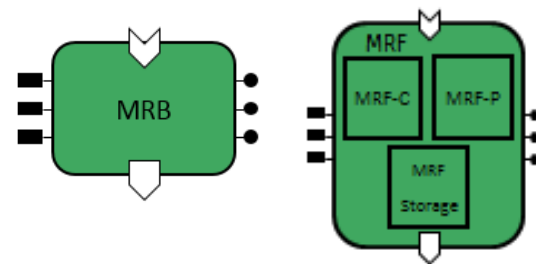
The MRF interfaces

- Mr **SIP** for Media server control (Netann, etc.)
- Mb **RTP/RTCP** for media processing and interaction
- Cr **HTTP, HTTPS, VoiceXML, REST** for app interaction

Supports applications like IVR, Voice Mail, Voice-Video conference, ...
Includes multiple codecs support, real time transcoding ...

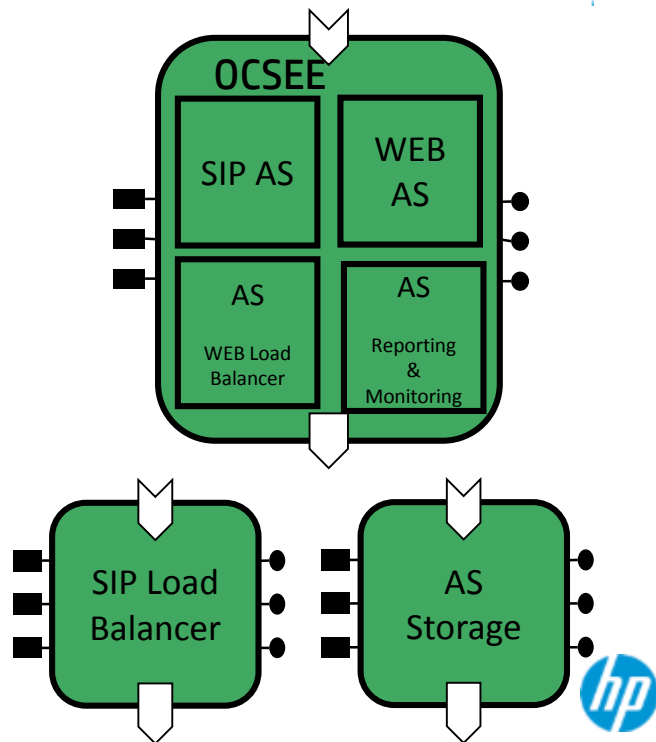


Ex#: IMS MSE/MRF modeling into VNF



The Multimedia Services Environment is decomposed into “VNF” or “VNFC” :

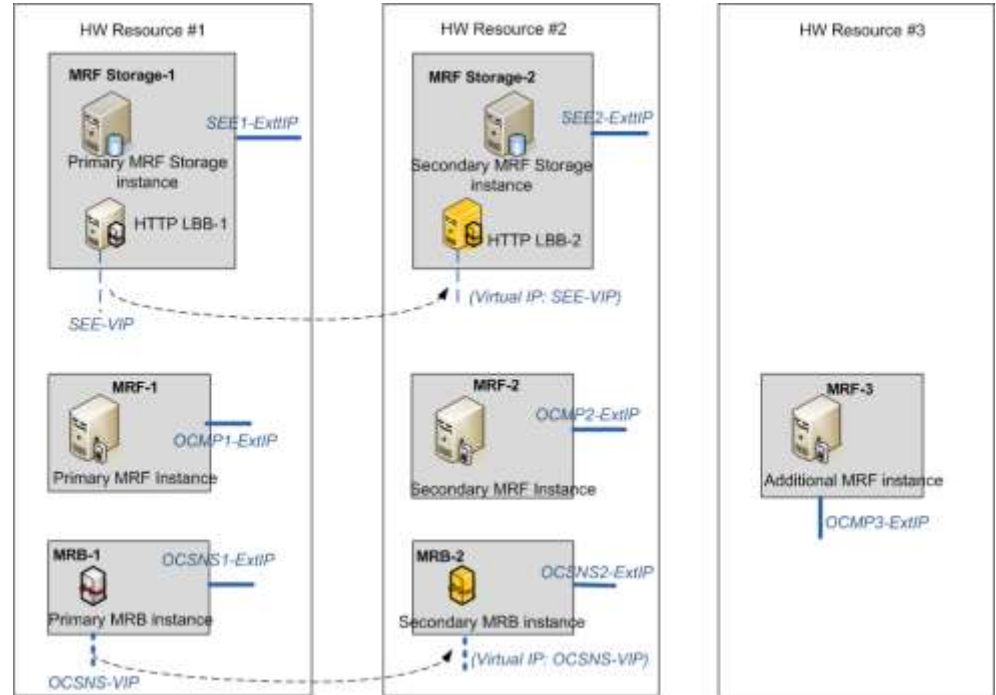
- The IMS MRF VNF that groups the MRB and the MRF (composite VNF) composed of MRF-C, MRF-P and MRF Storage VNFC
- The OCSEE Application server that includes a SIP AS function, a J2EE container, an internal WEB LB and a Reporting and Monitoring function, is it considered as VNFC (VNF Components)
- The SIP Load Balancer is aimed to load balance the incoming SIP Session towards several SIP AS instances. It's a signalling function that supports the ISC IMS interface
- AS storage is an external storage for the AS data (SIP & WEB)



Ex#: IMS MRF VNF Descriptors (VNFD)

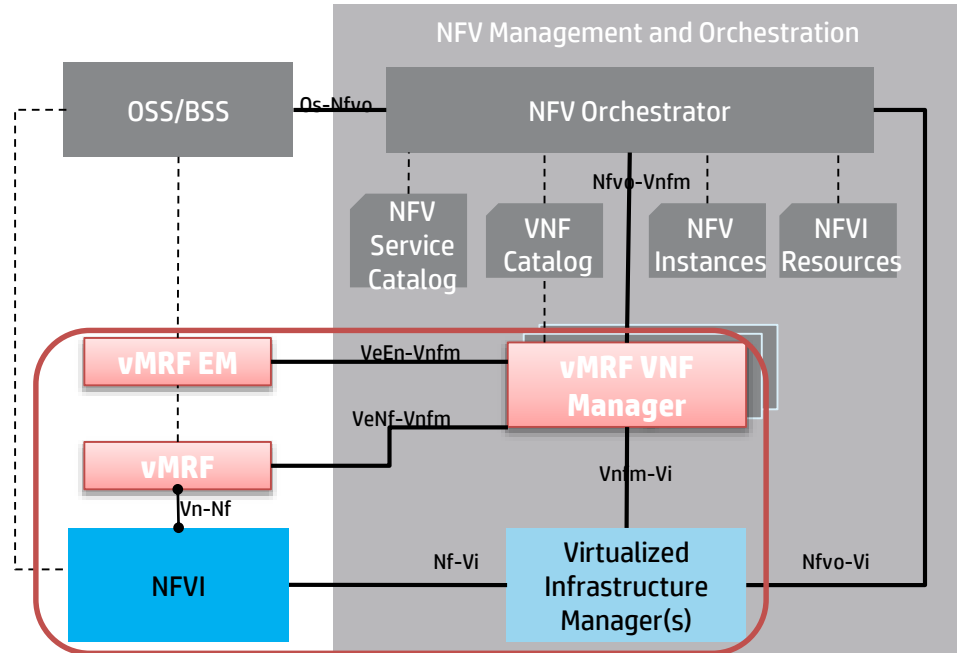
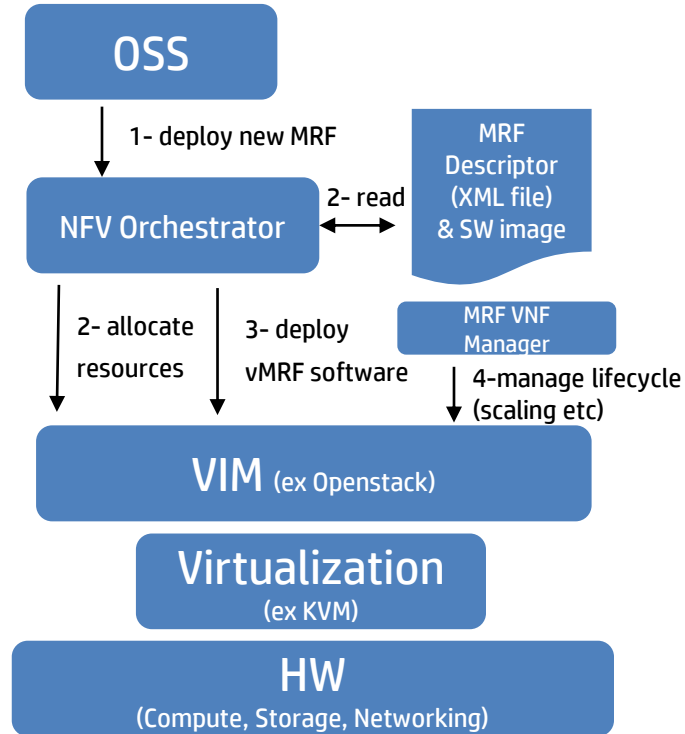
The IMS MRF VNFD includes the description of the MRF cluster

- MRB network & application configuration
- MRF instances number
- MRF storage instances number
- Affinity rules
- Anti-affinity rules
- IP QoS network constraints for each vLAN (Bandwidth, Jitter, Delay, Packet Loss Tolerance)
- etc



Ex#: Architecture & Lifecycle simplified

3GPP IMS MSE/MRF

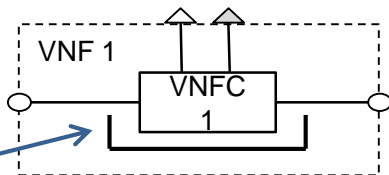


ETSI NFV SWA - VNF architecture



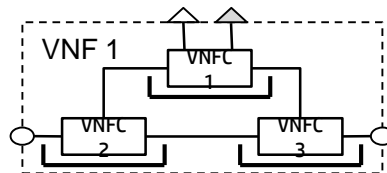
Virtual container

- 1 VNFC = 1 container
- virtualization container (not just hypervisor)

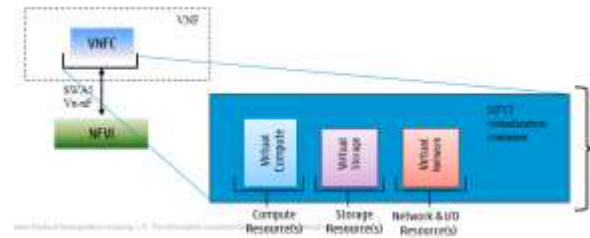


VNF w/ single component

OR

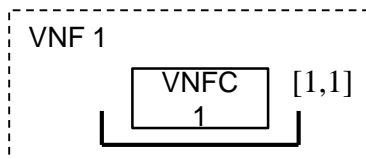


VNF w/ multiple components



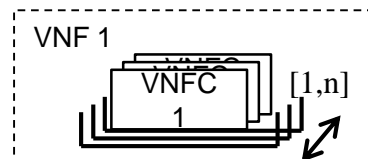
Scalability

- Scale in/out
- Scale up/down
- Autoscale, etc



non-parallelizable VNFC

OR



parallelizable VNFC
(min. and max. # of instances)

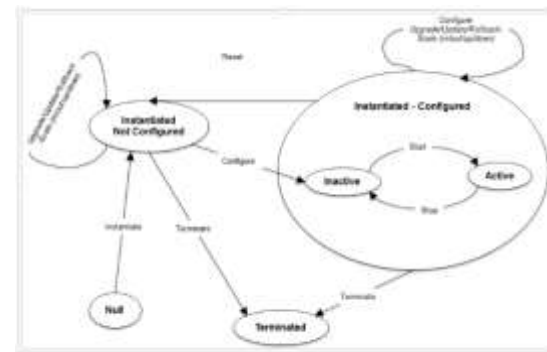
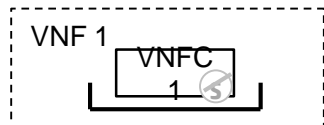


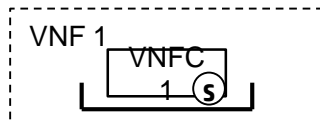
Figure 26: VNF instance state transitions

VNF State Diagram



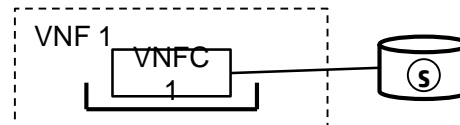
stateless VNFC

OR



stateful VNFC

OR

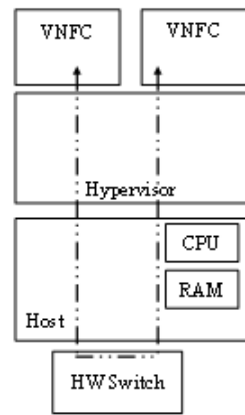


VNFC w/ externalized state

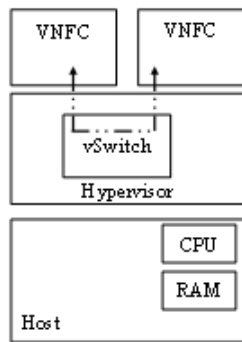


ETSI SWA - VNFC to VNFC Communications

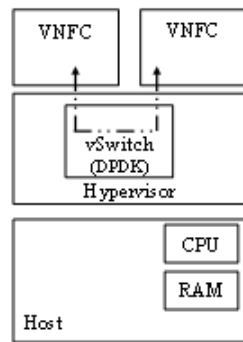
An example of requirements



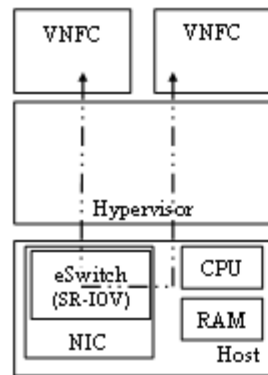
Scenario #1



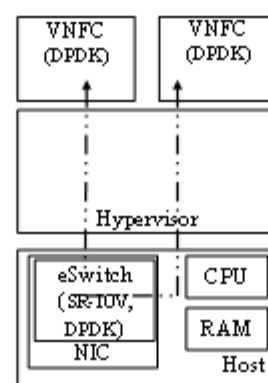
Scenario #2



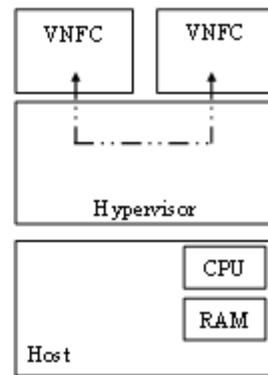
Scenario #3



Scenario #4



Scenario #5



Scenario #6

Affinity

Affinity
DPDK support

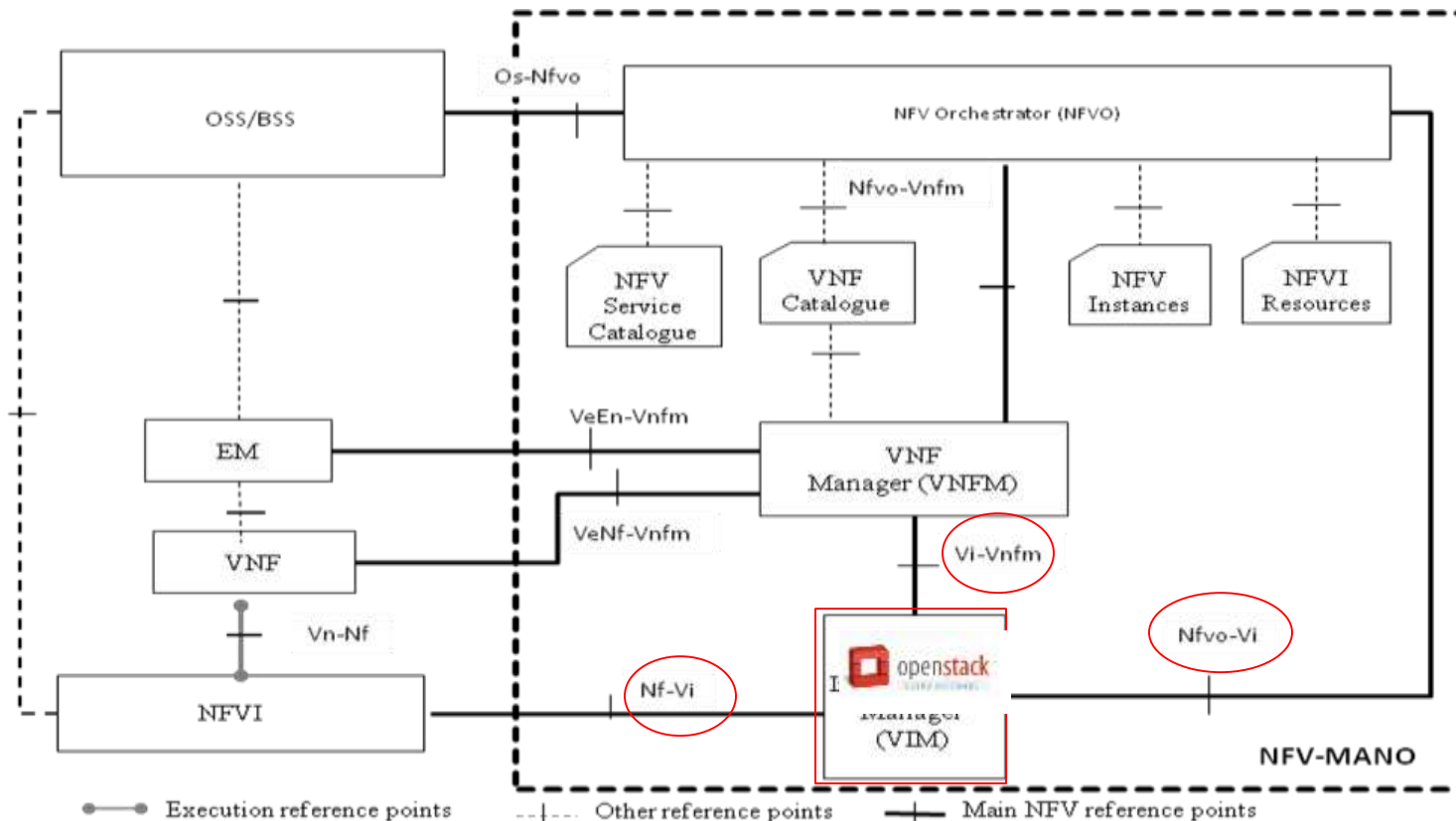
SRIOV support

DPDK support
SRIOV support

Affinity

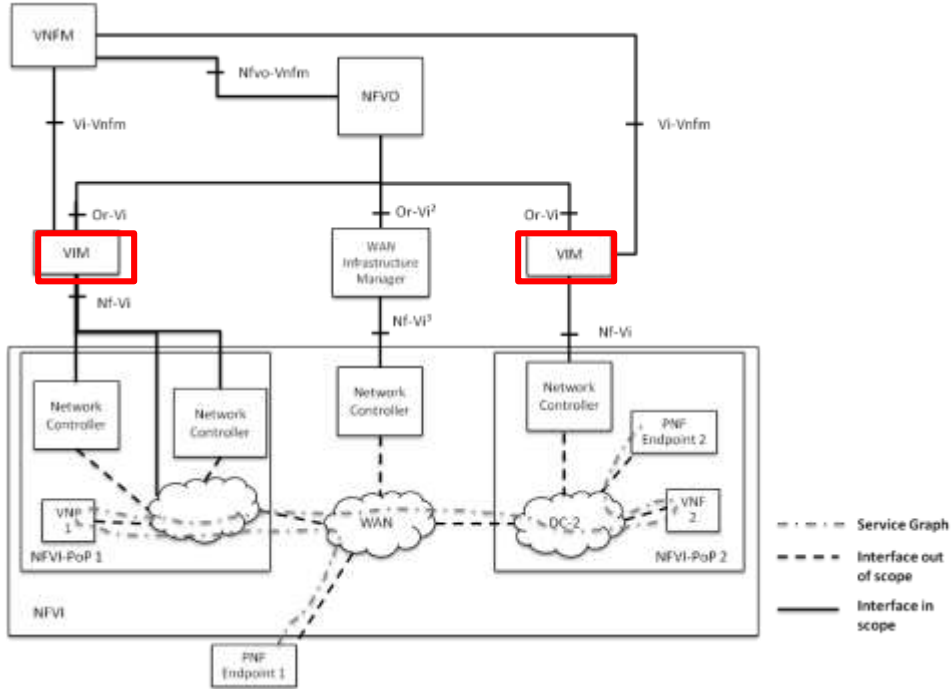
ETSI NFV Management & Orchestration

MANO



Multiple VIM & NW Controller

Key Highlights:

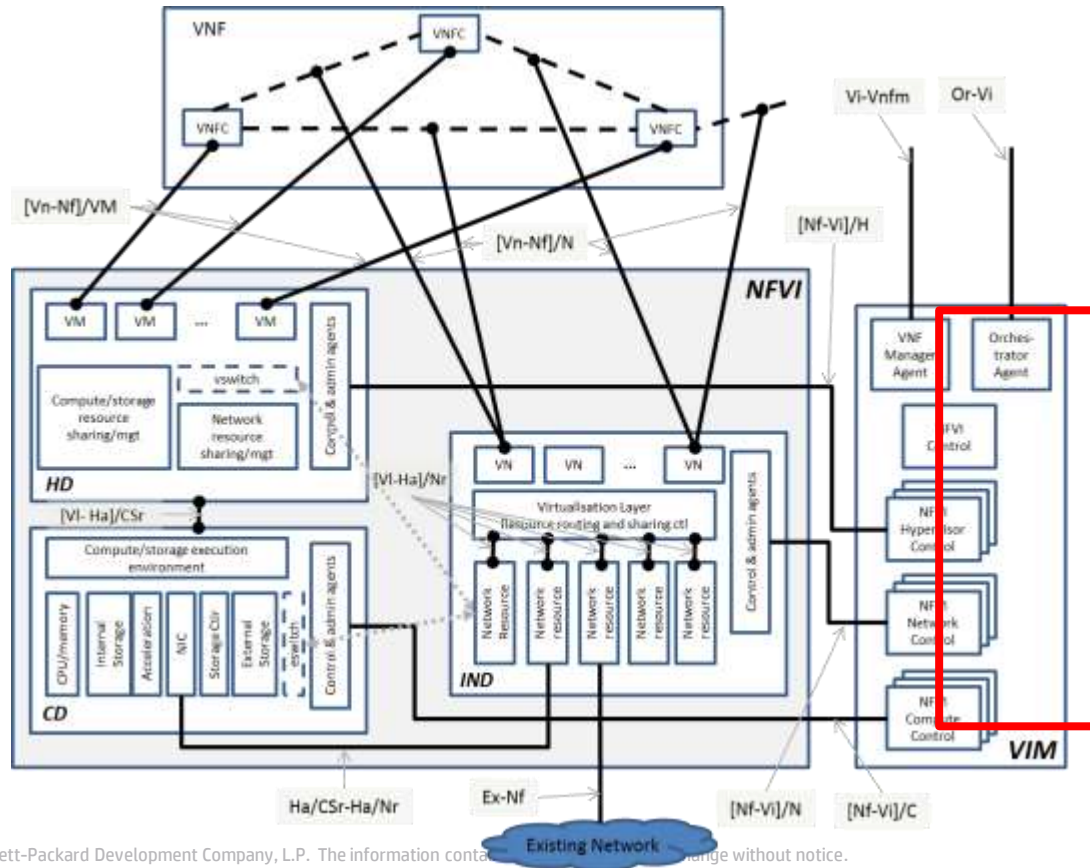


- VNFM & NFVO could be across multiple NFVI Domains, ie multiple VIM
- VIM could interface multiple Network Controllers
- NFVO could request a “WAN manager” to bridge 2 PoP, PoP1 & PoP2 via a WAN. Meaning NFVO not only interface with VIM but also with WAN manager
- VNFM does not interact with WAN manager, only to NFVO and VIM
- WAN can support PNF

Source: MANO GS



ETSI NFV INF – NFVI architecture & Interfaces

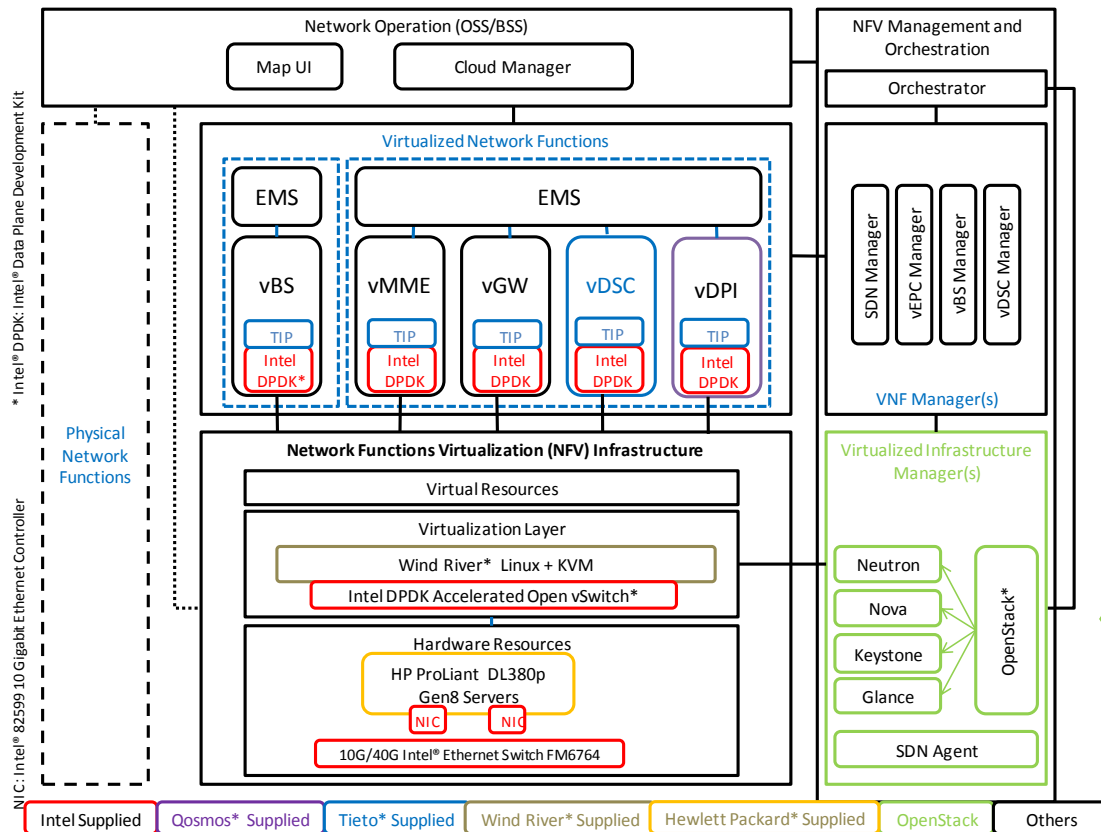


POC#6: Virtualized Mobile Network with Integrated DPI

Telefonica
Intel
Tieto
Qosmos
Wind River Systems
HP

vEPC and vDPI
Openstack
SDN
DPDK
=> **Accelerated ETSI NFV in a multi-vendor environment**

Demo
MWC'14



Openstack

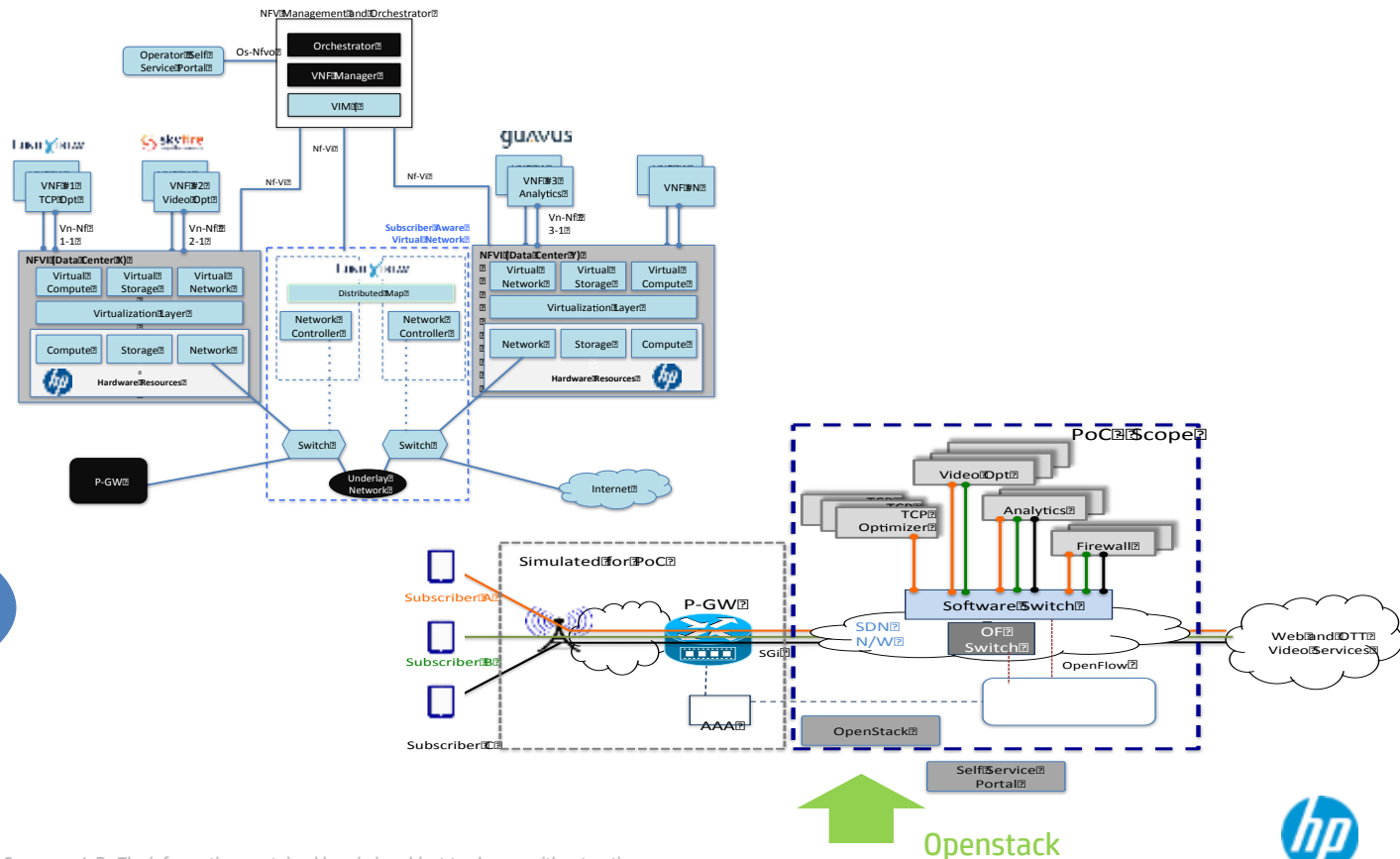


POC#15: Subscriber Aware Sgi/Gi-LAN Virtualization

Telenor
ConteXstream
SkyFire Networks
Guavus
Redhat
HP

SDN based service chaining
Across multi-Openstack
domains

Demo
SDN world Congress
Oct'14



POC #23 - E2E Orchestration of Virtualized LTE Core- Network Functions

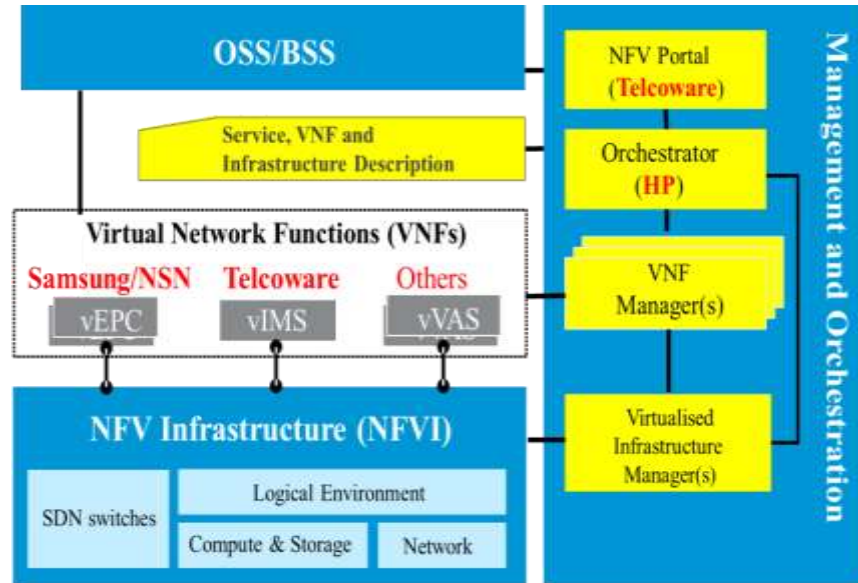
& SDN-based Dynamic Service Chaining of VNFs using VNF-FG

NFV#7

SKT
HP
Samsung
Telcware

Multi-vendor Fully orchestrated &
automated vEPC – vIMS on
Openstack & SDN based
infrastructure

Demo
SKT R&D Lab
SDN World Congress



SK Telecom LTE Network & Test-bed

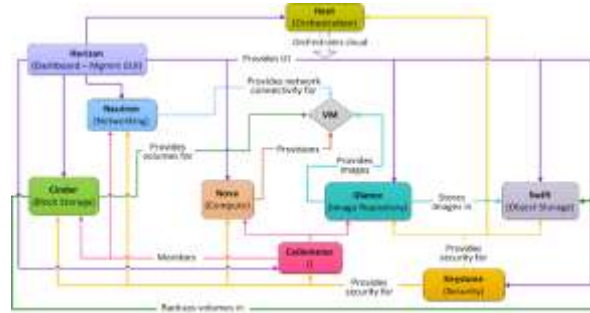
Openstack



NFV & OpenStack ?? Ex Security



Over 1.7M lines of code



Many blocks interact with Keystone
Keystone is not the only entity that deals with security

Keystone deals with security & policies, but NFV will need end to end security & policies across end to end network, at ?NFVO level :
how to synchronize?

etc

? How can I ensure there is no security breach in 1.7M lines ?

? How does Openstack prevent back doors ?

? How does Openstack support secure boot, certified VM?

? How can I define security rules for an SDN application to change a flow table on an SDN switch that is provided by a IaaS Provider that may change along the life of the service ?

? How can I ensure that the memory I am sharing will not be accessed by somebody else ?

? Can I present the system admin to access my personal data

etc

ETSI NFV and Openstack



ETSI NFV

Telecom Large WW community

Specs ETSI NFV

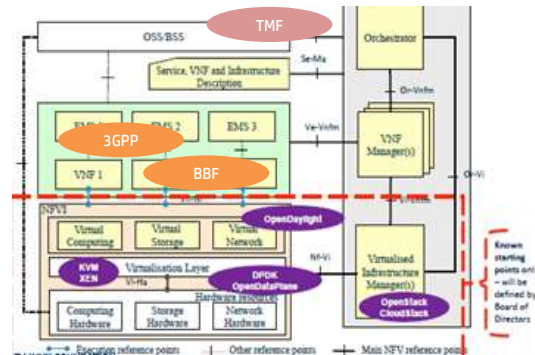
Scope: Telco Cloud (ie Openstack) +

VNF + VNF & NS Orchestration

POCs

⇒ Gap Analysis with SDO and Opensource
“Liaison”

⇒ Many “Liaison”



Cloud Large WW community

Opensource Code

Scope: Enterprise Cloud



OPNFV

Open Platform For NFV – www.opnfv.org

Launched Sept 30th, 2014

Chairman: Prodip Sen, HP

PLATINUM MEMBERS

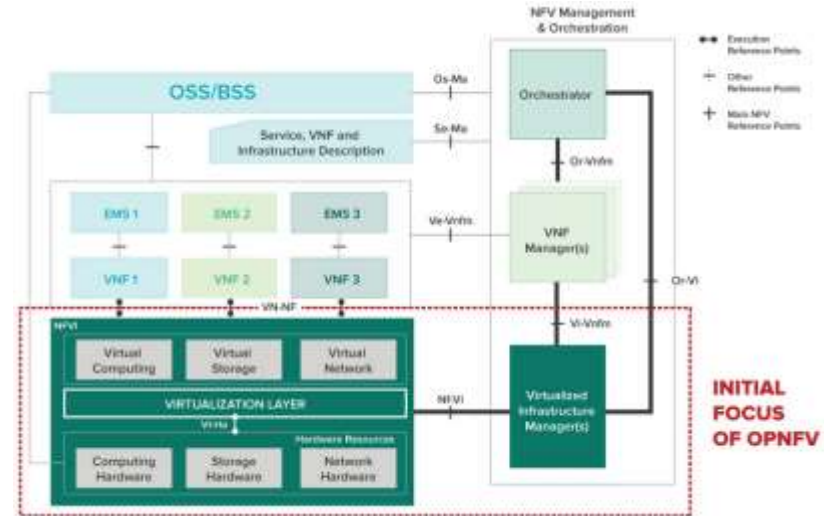


SILVER MEMBERS



OPNFV is a carrier-grade, integrated, open source reference platform for NFV

Work with upstream SDO (ETSI NFV) and Opensource (Openstack, OpenDaylight, KVM, Xen ect)



HP Open NFV & HP Helion



HP OpenNFV PR in Feb'14 : a new BU, new Products and OpenNFV Labs

OSS Layer

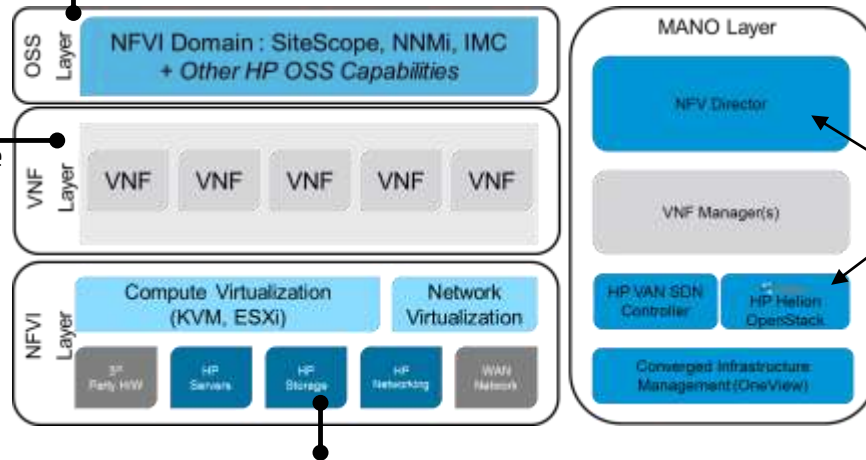
- Full OSS Suite from basic fault to service level management based on IMC & SiteScope

VNF Layer

- HP vHSS, vMRF, vSR and other key Network related Services Software available for virtualized environment deployment
- An ecosystem of partners

NFVI Layer

- Broader Hardware Support for high performance packet processing
- Hardware/Software features integrated for high speed packet processing (SR-IOV support in OneView/CS8)
- Native SDN Support with all HP Networking portfolio
- Common Networking Environment for Networking using Comware7 stack



MANO Layer

- HP NFV Director : ETSI Based NFV Orchestrator for full life-cycle management
- HP Helion OpenStack provides necessary OpenStack API support for NFV, and a carrier grade cloud management functionality
- HP SDN Controller
- Converged Infrastructure Management using a single tool – OneView

HP NFV Director

ETSI NFV Orchestrator with embedded VNF Manager

Model Driven vs Script Driven

A common point to ensure consistent management and behavior of VNFs and NSs

- Automatically manages the end-to-end service across VNF, VNF-FGs, and NSs
- Supports multiple VNF across multiple sites
- Handles provisioning and monitoring functions

Designed to meet the evolving ETSI specifications

- Full NFV orchestrator functionality, interfaces, and interaction models
- Includes VNF manager functionality and works with external (VNF-supplied) VNF managers

Supporting the journey to NFV

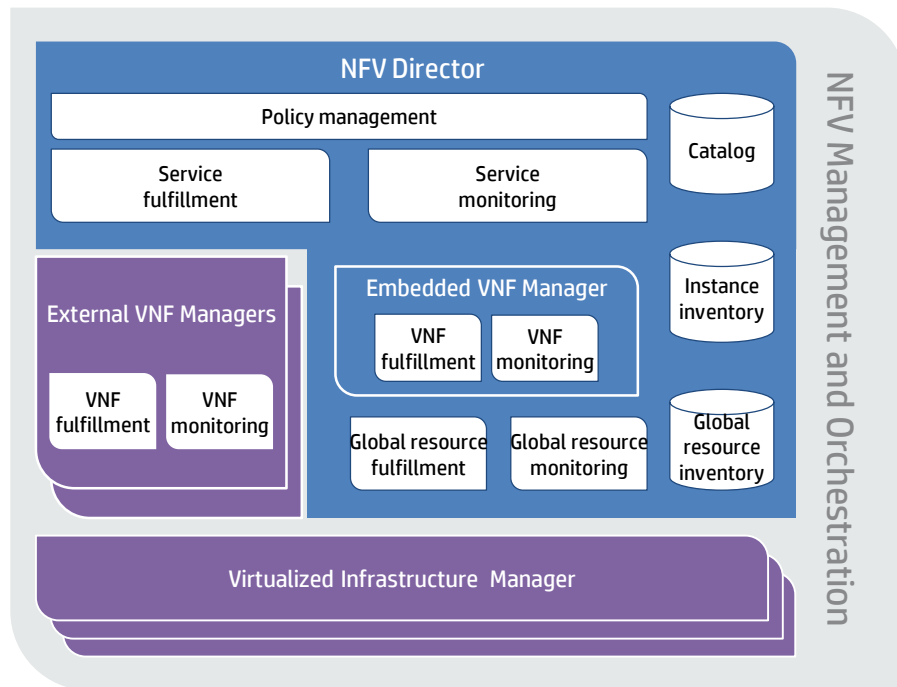
- Handles virtual and physical network functions and hybrid services
- Supports networks consisting of traditional and SDN domains

Open and multivendor

- Supports integration with any VNF, VIM, and OSS using open APIs

Modular and extensible

- Start small and grow
- Flexible integration with OSS, EMS, VNF, and infrastructure

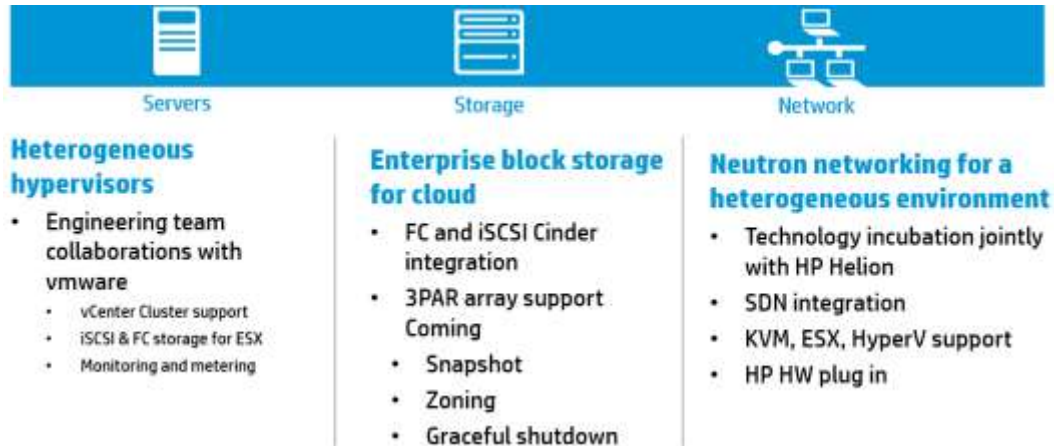


HP contributions to OpenStack®

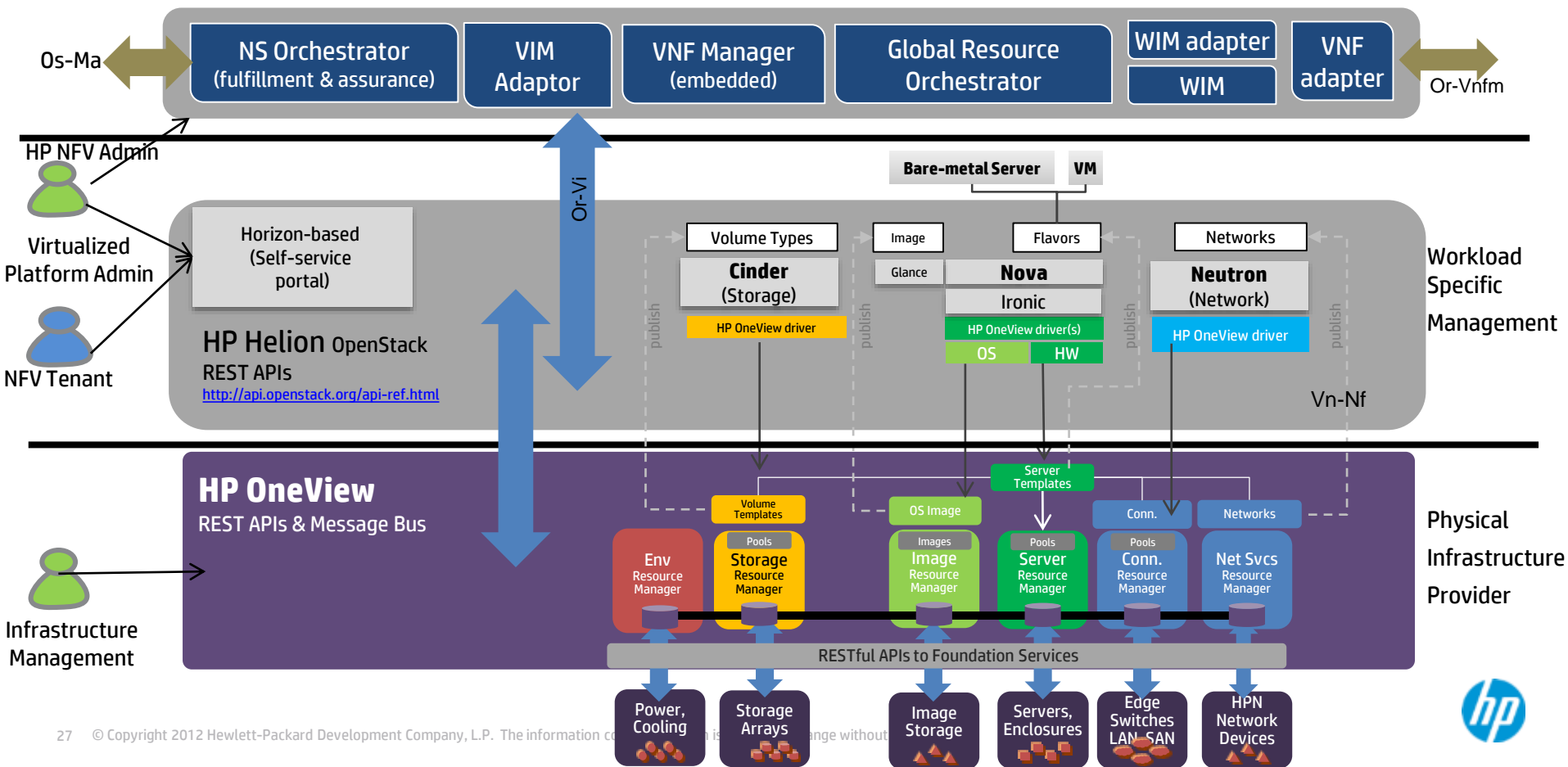
- Board member: Eileen Evans, VP Opensource
- 3 technical committee member: Monty Taylor, Sean Dague and Devananda van der Veen
- Number #1 contributor by number of employees to Havana release, and second to Icehouse
- Number #2 in number of commits for Havana & Icehouse
- **Incl Continuous integration**, testing, and deployment **lead** of OpenStack commits
- & Openstack developer infrastructure, dashboard, bare metal provisioning, open integration suite, quality assurance, database as a service, etc



Some other Examples ...



HP NFV Management Software Stack



Summary

Network Function Virtualization (NFV) is driving CSP requirements towards Openstack
Via ETSI NFV specifications and OPNFV open source project

HP is heavily involved and leading governance and contributions in ETSI NFV and other
SDO, as well as Opensource community incl Openstack, OpenDaylight and OPNFV

HP is committed to NFV and Openstack, with HP OpenNFV and HP Helion Openstack for
public, private, hybrid and NFV cloud





Thank You

More on www.hp.com/go/nfv