

Chapter 2.2: SDN-NFV

- SDN overview
- SDN case study
- Vision and NFV
- NFV vs SDN
- NFV-MANO use case

Software-Defined Networking



An approach to network management

- enables dynamic, programmatically efficient network configuration
- improve network performance and monitoring
- reducing both CapEX and OpEX

History of SDN



2008:

- Software-Defined Networking (SDN)
- NOX Network Operating System
- First OpenFlow switch interface

2011:

- Open Networking Foundation (~69 members)
- Board: Google, Yahoo, Verizon, DT, Microsoft, Facebook.
- Members: Cisco, Juniper, HP, Dell, Broadcom, IBM,.....

Now:

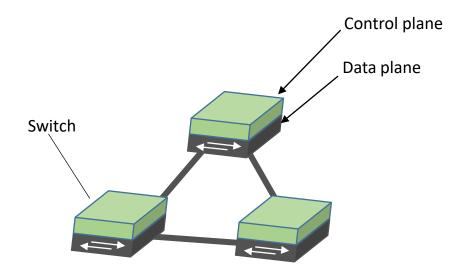
- Commercialized: ACI, NSX, Nuage, Contrail....
- Opensource: OpenDaylight, Tungsten Fabric, ONOS, OVN,...

2004:

- Research on new management paradigms
- Forwarding and Control Element Separation (ForCES)

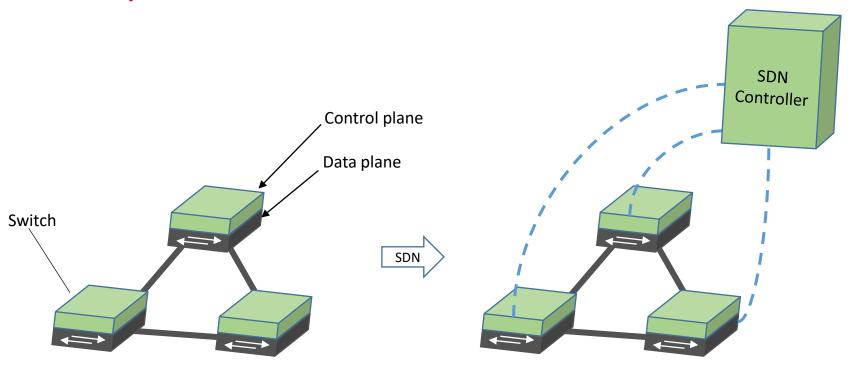


SDN Specification

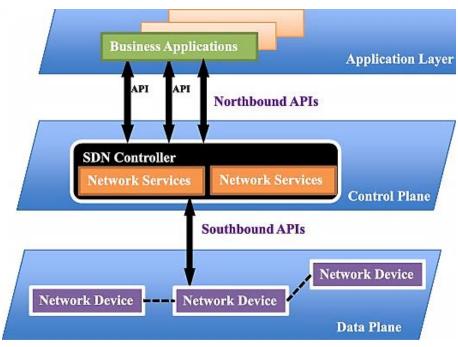


Tranditional switches

SDN Specification



SDN Components

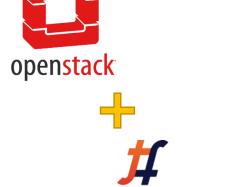


Source: researchgate.net

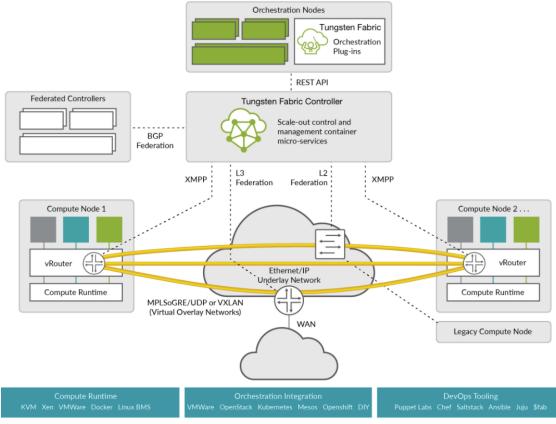
SDN Landscape



Case study

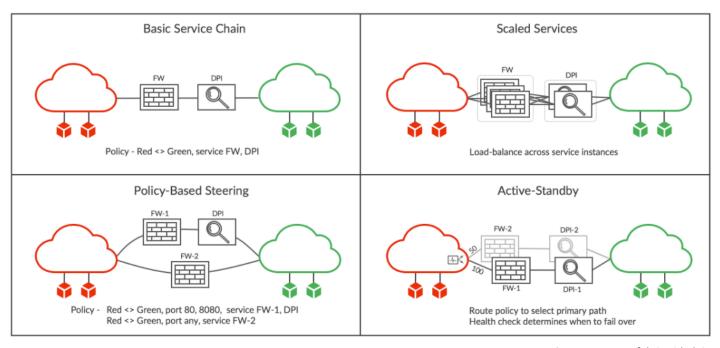


tungstenfabric



Source: docs.tungsten.io

Service function chaining

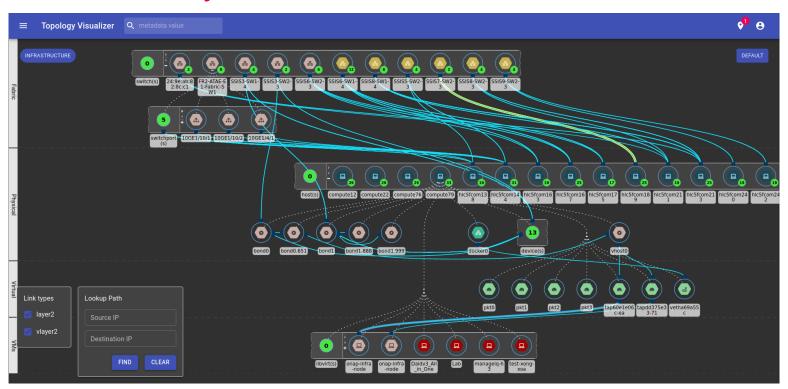


Source: tungstenfabric.github.io

Achievement

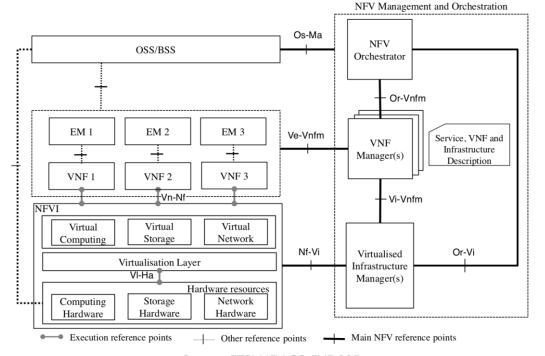
- ✓ Monitor, auto discover network topology
- ✓ Support Service Function Chaining
- ✓ Provision/configure network device automatically
- ✓ Live migrate virtual machine quickly
- ✓ Migrate Apps from old compute to SDN compute with zero downtime.
- ✓ Support multi-platform: Openstack, Kubernetes, VMware

Auto discovery



Vision - Network Functions Virtualization

(NFV)



- OSS/BSS: operations support system/business support system

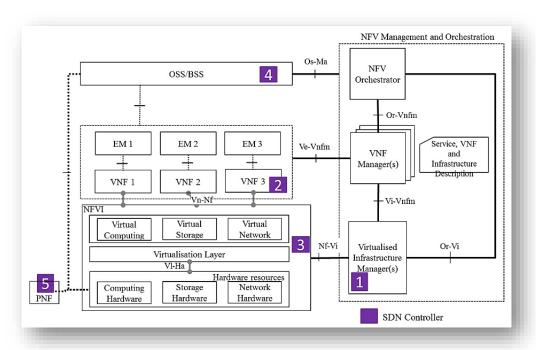
- EM: Element Manager

- VNF: Virtual Network Function

- NFVI: NFV Infrastructure

Source: ETSI NFV GS-EVE 005

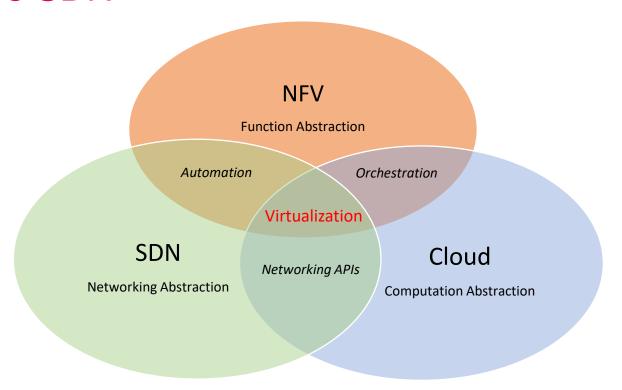
Where is SDN in NFV architecture?



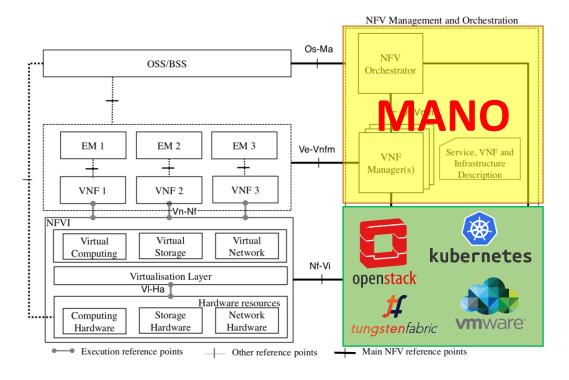
Source: https://www.etsi.org/deliver/etsi_gs/NFV-EVE/001_099/005/01.01.01_60/gs_NFV-EVE005v010101p.pdf

- 1. The SDN controller is merged with the Virtualised Infrastructure Manager functionality.
- 2. The SDN controller is Virtualised as a VNF.
- 3. The SDN controller is part of the NFVI and is not a VNF.
- 4. The SDN controller is part of the OSS/BSS.
- 5. The SDN controller is a PNF.

NFV vs SDN



NFV-MANO



Other usecases

- 1. Distributed NFV -> Multi-access Edge Computing (MEC)
- 2. NFV provision 5G
- 3. NFV with IoT platform and SDN controller
- 4. NFV with AI controller

Practice

- Create 2 Linux virtual machines and install openvswitch
- Use openvswitch to setup Vxlan network between 2 virtual machines
- Test ping Vxlan network, use Tcpdump or Wireshark to capture traffic between 2 virtual machines
- Point out the advantages and disadvantages of using
 Vxlan network in datacenter



