

SDN and NFV Architecture and Operations

Instructor Led | Duration: 3 Days | Course Number: NWV_304

Network Functions Virtualization (NFV) standards are still evolving as the telco industry grapples with this significant technology transformation. Software-Defined Networking (SDN) is a relatively new concept within the telco industry and has recently gained traction. NFV proposes to leverage standard IT virtualization technology to consolidate network equipment types onto industry standard high-volume servers, switches and storage. SDN proposes to take the traditional implementation of the networking and dis-assemble it. SDN is a collection of technologies that split the data, control and management planes of the network. The course provides a technical overview of NFV and SDN – in terms of the architecture, requirements, challenges, operations, and management – and how they relate and complement one another.

Intended Audience

This course is intended for a personnel in engineering and operations roles who are looking for a technical introduction to Network Functions Virtualization (NFV) and Software-Defined Networking (SDN).

Learning Objectives

After completing this course, the student will be able to:

- Sketch the NFV reference architecture and building blocks
- Sketch end-to-end operational scenarios for vEPC, vCPE
- Identify the Key NFV requirements and benefit
- Discuss the role and performance aspects of the virtualization layer
- Define the NFV building blocks: Virtualization of Compute, Network and Storage
- Show how OpenStack can be an NFV VIM
- List and describe performance enhancements techniques
- Sketch the SDN architecture
- Discuss the Southbound Protocols and their roles
- Describe the requirements on the Northbound API
- Identify SDN Use Cases applicable to a network operator
- Illustrate how NFV and SDN work with each other

Suggested Prerequisites

- Technology Primer: Cloud and Virtualization (Instructor Led)
- Technology Primer: NFV (Instructor Led)
- Technology Primer: OpenStack (Instructor Led)

Course Outline

1. SDN and NFV Architecture

- 1.1. SDN architecture
- 1.2. SDN Principles
- 1.3. NFV components
 - 1.3.1. NFVI, VNF
 - 1.3.2. EMS, OSS and BSS
 - 1.3.3. MANO

2. NFV Infrastructure

- 2.1. NFV infrastructure deployment
- 2.2. OpenStack components
- 2.3. Heat and infrastructure Orchestration
- 2.4. NFVI Domain

[Lab: OpenStack](#)

3. NFV Application - VNF

- 3.1. VNF functional architecture
- 3.2. VNF composition, VNF states
- 3.3. Virtual functions software options
- 3.4. VM live migration

[Lab: Management and Orchestration Demo](#)

4. NFV Management - MANO

- 4.1. Orchestrator, Catalog
- 4.2. Network service creation
- 4.3. NFV descriptors
- 4.4. Onboarding
- 4.5. Lifecycle management
- 4.6. VNF forwarding graphs

5. NFV Deployment Scenarios

- 5.1. NFV service models
- 5.2. Use Case for NFV deployment
 - 5.2.1. vIMS, vEPC, vPE

6. Deployment Considerations

- 6.1. Life of data packet
- 6.2. Performance
 - 6.2.1. DPDK and SR-IOV
 - 6.2.2. Scheduling and OS enhancements
- 6.3. Elasticity and scaling in NFV

7. SDN Controllers

- 7.1. SDN Pplanes and functions
- 7.2. OpenFlow protocol
- 7.3. SDN controller deployment options

8. SDN Protocols and Interworking

- 8.1. NETCONF and YANG
- 8.2. SDN for transport and WAN networks
- 8.3. WAN interworking protocols

9. Network Orchestration with SDN

- 9.1. Intra-Data center
 - 9.1.1. Integration with VIM
- 9.2. Inter-Data center
 - 9.2.1. Integration with WIM
- 9.3. Service function chaining

[Lab: SDN Controller Demo](#)

10. Putting It All Together

- 10.1. End-to-end deployment scenario
- 10.2. End-to-end instantiation scenario