

NFV MANO

CONTENTS

This course uses as a starting point the main ETSI NFV architecture with its building blocks, and then focuses its attention on the Management and Orchestration (MANO) functions. While still keeping the big picture and real-world use cases in view, it describes the three main sub-components of MANO (NFVO, VNFM and VIM) and explains how they are used to construct a Network Service (NS) comprising virtualized as well as physical network functions (VNFs and PNFs) connected with virtual network links (VLs).

PREREQUISITES

Working knowledge of computer and telecommunications systems as well as understanding of the ETSI NFV architecture corresponding to the course “NFV Architecture and Principles”.

NOTE: The course is under development and the content may be subject to changes.

ETSI NFV

- NFV Architecture
- ETSI Reference Points
- Network Services
- PNFs and VNFs
- Virtual Links and Connection Points
- Cloud Native vs Hypervisor Virtualization

MANO Functions and RESTful APIs

- NFV Orchestrator (NFVO)
- VNF Manager (VNFM)
- Virtualized Infrastructure Manager (VIM)
- NFVO/VNFM/VIM
 - Responsibilities
 - Stored Data
- Reference Points vs Interfaces
- Main Functionality of Interfaces
- RESTful API Approach
- HTTP Request Line Construction
- HTTP Commands

The NFV Network Service

- NS Data Model
- Descriptor vs Instance (Info) Data Models
- Service Access Points (SAP) Data
- VNF and PNF Data
- Profiles for VNF/PNF/NS
- Virtual Links and Link Ports
- VNF Forwarding Graphs
- Example: Voice over 5G

Network Service Instantiation

- The Role of Descriptors
- The Role of Deployment Flavours (DF)

- The Role of Instantiation Levels
- How Profiles are Constructed
- Run-Time NS Instance Data
- NS Instantiation Flow
- VNF Instantiation Flow

On-Boarding Network Services and Functions

- VNF Packages
- VNFD/NSD/PNFD Files
- TOSCA, YAML and CSAR
- VNF Onboarding Flow
- NS Onboarding Flow

Scaling

- Scaling In/Out
- Scaling Up/Down
- NS Scaling
- VNF Scaling
- Who Decides Scaling
- Who Performs Scaling
- Scaling Methods
 - Instantiation Levels
 - Scaling Aspect Steps

Performance and Fault Management (PM & FM)

- PM/FM Operations per MANO Interface
- What Can Be Measured (PM)
- What Can Trigger Alarms (FM)
- Subscriptions and Notifications
- Corresponding HTTP Requests/Responses
- PM Jobs and Thresholds (PM)

Acceleration Technologies

- SR-IOV
- DPDK
- Host and VM Acceleration
- Hypervisor vs Container Acceleration

End-to-End MANO

- SDN in the NFV Architecture
- Network Slicing
- Multiple NFVOs and VIMs
- WAN Infrastructure Manager (WIM)

Open Source MANO Examples

- OSM
- ONAP