ETSI GS NFV-EVE 007 V3.1.1 (2017-03)

Network Functions Virtualisation (NFV) Release 3; NFV Evolution and Ecosystem; Hardware Interoperability Requirements Specification

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1 Scope

The present document develops a set of normative interoperability requirements for the Network Function Virtualisation (NFV) hardware ecosystem and telecommunications physical environment to support NFV deployment. It builds on the work originated in ETSI GS NFV 003 [i.3].

The present document focusses on the development of requirements to enable interoperability of equipment in the telecommunications environment to support NFV deployment. The following areas are examined:

- Operations
- Environmental
- Mechanical
- Cabling
- Maintenance.
- Security

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

[1] ETSI ES 205 200-2-1 (V1.2.1) (03-2014): "Access, Terminals, Transmission and Multiplexing (ATTM); Energy management; Global KPIs; Operational infrastructures; Part 2: Specific requirements; Sub-part 1: Data centres".

[2] IEC 60297-3-105:2008: "Mechanical structures for electronic equipment - Dimensions of mechanical structures of the 482,6 mm (19 in) series - Part 3-105: Dimensions and design aspects for 1U high chassis".

[3] ETSI ETS 300 119 (all parts): "Equipment Engineering (EE); European telecommunication standard for equipment practice".

[4] ETSI GS NFV 004 (V1.1.1) (10-2013): "Network Functions Virtualisation (NFV); Virtualisation Requirements".

[5] IEEE Std 1588™-2008: "IEEE Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems".

[6] IEEE Std 802.1AS™-2011: "Timing and Synchronization for Time-Sensitive Applications in Bridged Local Area Networks".

[7] NEBS™ GR-63: "NEBS™ Requirements: Physical Protection".

[8] ETSI GS NFV-SEC 009 (V1.1.1): "Network Functions Virtualisation (NFV); NFV Security; Report on use cases and technical approaches for multi-layer host administration".

[9] ETSI GS NFV-SEC 012 (V3.1.1): "Network Functions Virtualisation (NFV) Release 3; Security; System architecture specification for execution of sensitive NFV components".

[10] DMTF Specification DSP0266 V1.0.0 (2015): "Scalable Platform Management API Specification".

[11] DMTF Specification DSP8010 V1.0.0 (2015): "Scalable Platforms Management API Schema".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] ETSI GS NFV 001 (V1.1.1) (10-2013): "Network Functions Virtualisation (NFV); Use Cases".

[i.2] ETSI GS NFV 002 (V1.2.1) (12-2014): "Network Functions Virtualisation (NFV); Architectural Framework".

[i.3] ETSI GS NFV 003 (V1.2.1) (12-2014): "Network Functions Virtualisation (NFV); Terminology for Main Concepts in NFV".

[i.5] ETSI GS NFV-EVE 003 (V1.1.1): "Network Functions Virtualisation (NFV); Ecosystem; Report on NFVI Node Physical Architecture Guidelines for Multi-Vendor Environment".

[i.6] ETSI EN 300 386: "Telecommunication network equipment; ElectroMagnetic Compatibility (EMC) requirements; Harmonised Standard covering the essential requirements of the Directive 2014/30/EU".

[i.7] IEC 60950-1: "Information technology requirement - Safety - Part 1: General requirements".

[i.8] ETSI EN 300 019-1-3: "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-3: Classification of environmental conditions; Stationary use at weatherprotected locations".

[i.9] ASHRAE 3rd edition, 2012: "Thermal Guidelines for Data Processing Environment".

[i.10] ETSI GS NFV-REL 003 (V1.1.2) (07-2016): "Network Functions Virtualisation (NFV); Reliability; Report on Models and Features for End-to-End Reliability".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

delta: three phase power connection where phases are connected like a triangle

wye: three phase power connection where phases are connected like a star with all phases connected at a central "Neutral" point

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI GS NFV 003 [i.3] and the following apply:

ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
BBU	Battery Backup Unit
BMC	Basement Management Controller
CDC	Customer Data Centre
DC	Direct Current
FRU	Field Replaceable Unit
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
HTTP	HyperText Transfer Protocol
HSM	Hardware Security Module
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IP	Internet Protocol
JSON	JavaScript Object Notation
kW	kilo Watts
MANO	MANagement and Orchestration
MiFID	Markets in Financial Instruments Directive
NIC	Network Interface Controller
NID	Network Interface Device
NFV	Network Function Virtualisation
NFVI	Network Function Virtualisation Infrastructure
ODC	Operator Data Centre
OTT	Over The Top
PoP	Point of Presence
SSL	Secure Sockets Layer
TCP	Transmission Control Protocol
VNF	Virtual Network Function
VNFC	Virtual Network Function Component

4 NFV Hardware Ecosystem

4.1 Introduction

The present document develops a set of normative interoperability requirements for the NFV hardware ecosystem and telecommunications physical environment to support NFV deployment. The intent is to develop a reference that enables compatibility between hardware equipment provided by different hardware vendors and suppliers. The environment in which NFV hardware will be deployed is taken into consideration for developing this reference. Telecommunications Service Providers currently have the following hardware office environments:

- Central Office
- Access Node
- Transport Node
- Data Centre
- Hybrids (e.g. Central Office partitioned into or converted to a Data Centre)

It is expected that the bulk of the NFV environment will be deployed in Data Centres; this evolution supports the move towards a Cloud based environment. The focus of this document is primarily on Data Centre environments; however it also applies to the setup of an NFV Point of Presence (POP) in any of the above environments.

4.2 Data Centres

A Data Centre [1] is defined as follows:

"structure, or group of structures, dedicated to the centralized accommodation, interconnection and operation of information technology and network telecommunications equipment providing data storage, processing and transport services together with all the facilities and infrastructures for power distribution and environmental control together with the necessary levels of resilience and security required to provide the desired service availability."

According to ETSI ES 205 200-2-1 [1], a data centre is divided into Operator Data Centre (ODC) and Customer Data Centre (CDC). An ODC is a facility embedded within the core network. The facility, therefore, is considered as a service provider's asset. A CDC is, on the other hand, a facility that is not directly connected to the core network. The facility is reachable with access networks. It is considered as a large branch office, a corporate headquarter, and a data centre operated by an Over-The-Top (OTT) provider. A Data Centre is also considered a place where Network Function Virtualisation Infrastructure (NFVI) nodes would be installed [i.1] and [i.2].

Figure 1 shows how a central office, Operator Data Centre, and Customer Data Centre are mapped onto the use case #2 [i.1].

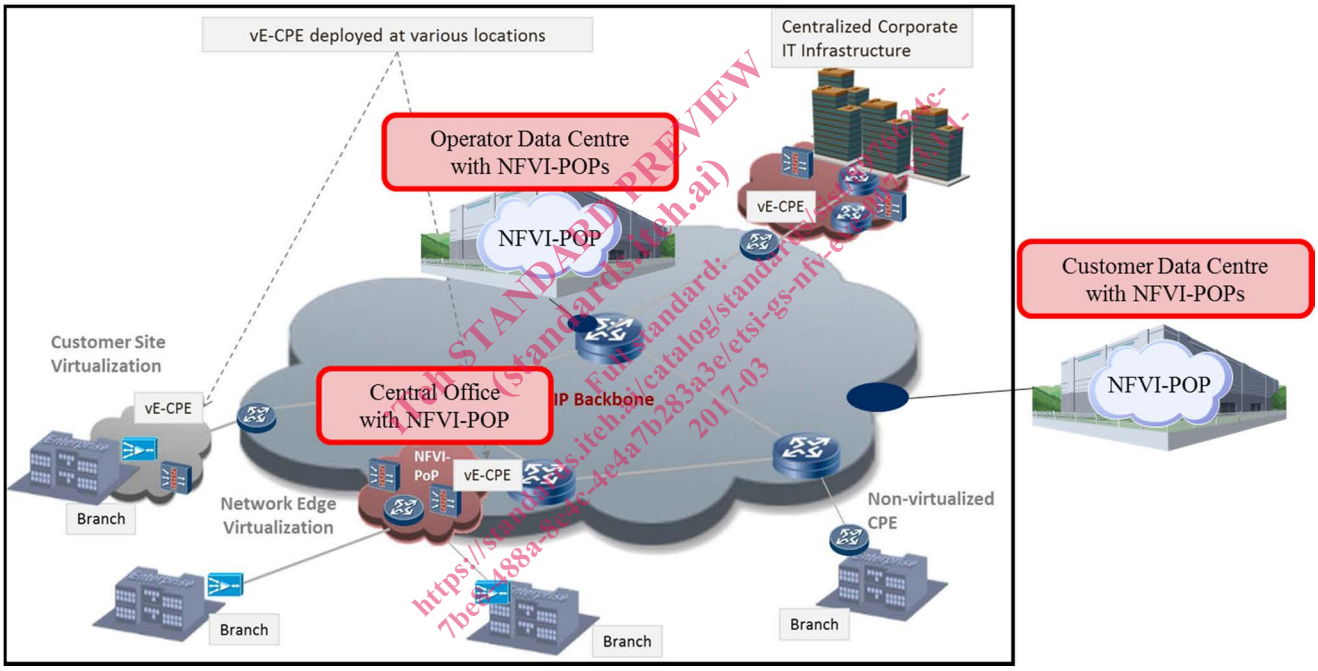

Figure 1: NFVI Node Profiles

4.3 Hardware Interoperability Environment

The main features for the NFV hardware ecosystem are depicted as follows.

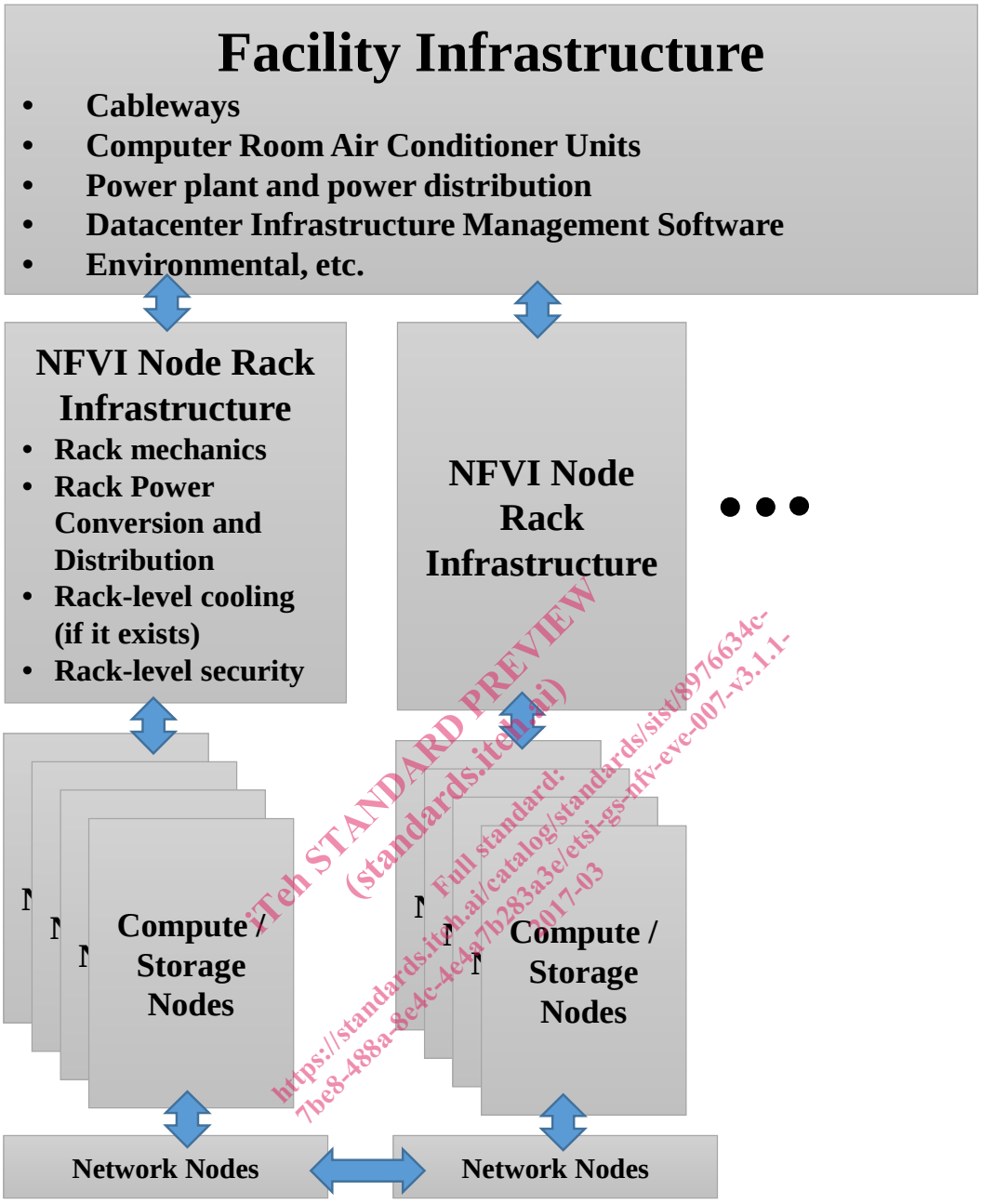

Figure 2: Facility Infrastructure Overview

The main components of this ecosystem view are described as follows:

- Facility Infrastructure - the infrastructure (hardware/software/environmental/mechanical provided by the POP site. All NFVI equipment within the POP is subject to interfacing within the constraints of the facility infrastructure. Some elements of the facility infrastructure may include cableways, computer room air conditioning units, power plant and power distribution, infrastructure management software and environmental conditions.

- NFVI Node Rack Infrastructure - the rack, and associated rack infrastructure that provides power, cooling, physical security and rack-level hardware management to the compute, storage and networking nodes. Typical elements for NFVI node rack infrastructure may include rack mechanics, power conversion and power distribution, cooling, and rack-level physical security measures (door locks, etc.). Multiple rack infrastructures may exist within the NVFI POP - one for each equipment rack deployed.

- Compute/Storage nodes - the NFV nodes that provide compute and storage functions to the NFVI. Multiple compute or storage nodes may exist per rack. It is assumed that these nodes draw power from the rack infrastructure and exist within the environmental and mechanical constraints of the rack infrastructure.