



Network Functions Virtualisation (NFV); Architectural Framework

Disclaimer

This document has been produced and approved by the Network Functions Virtualisation (NFV) ETSI Industry Specification Group (ISG) and represents the views of those members who participated in this ISG.
It does not necessarily represent the views of the entire ETSI membership.

Reference

RGS/NFV-002

Keywords

architecture, NFV

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

The present document can be downloaded from:

<http://www.etsi.org>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at

<http://portal.etsi.org/tb/status/status.asp>

If you find errors in the present document, please send your comment to one of the following services:

http://portal.etsi.org/chaicor/ETSI_support.asp

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2014.

All rights reserved.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are Trade Marks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

GSM® and the GSM logo are Trade Marks registered and owned by the GSM Association.

Contents

Intellectual Property Rights	5
Foreword.....	5
Modal verbs terminology.....	5
1 Scope	6
2 References	6
2.1 Normative references	6
2.2 Informative references.....	6
3 Definitions and abbreviations.....	7
3.1 Definitions.....	7
3.2 Abbreviations	7
4 Overview	7
4.1 Document Structure and Purpose	7
4.2 Summary of Objectives of NFV	8
4.3 Approach	8
5 NFV Framework and Scope	9
5.1 General	9
5.2 High-Level NFV Framework	10
6 Network Services in NFV	11
6.1 Introduction to Network Services in NFV.....	11
6.2 Virtualisation of Functional Blocks for Network Services.....	11
6.3 Implications of NFV.....	13
7 NFV Reference Architectural Framework	13
7.1 Introduction	13
7.2 Architectural Functional Blocks.....	13
7.2.1 Overview of the Functional Blocks	13
7.2.2 Virtualised Network Function (VNF).....	14
7.2.3 Element Management (EM).....	14
7.2.4 NFV Infrastructure.....	15
7.2.4.1 NFV Infrastructure Definition.....	15
7.2.4.2 Hardware Resources.....	15
7.2.4.3 Virtualisation Layer and Virtualised Resources.....	15
7.2.5 Virtualised Infrastructure Manager(s).....	16
7.2.6 NFV Orchestrator	16
7.2.7 VNF Manager(s).....	16
7.2.8 Service, VNF and Infrastructure Description.....	16
7.2.9 Operations Support Systems and Business Support Systems (OSS/BSS)	17
7.3 Reference Points.....	17
7.3.1 Virtualisation Layer - Hardware Resources - (VI-Ha).....	17
7.3.2 VNF - NFV Infrastructure (Vn-Nf)	17
7.3.3 NFV Orchestrator - VNF Manager (Or-Vnfm).....	17
7.3.4 Virtualised Infrastructure Manager - VNF Manager (Vi-Vnfm)	17
7.3.5 NFV Orchestrator - Virtualised Infrastructure Manager (Or-Vi).....	17
7.3.6 NFVI - Virtualised Infrastructure Manager (Nf-Vi)	17
7.3.7 OSS/BSS - NFV Management and Orchestration (Os-Ma).....	18
7.3.8 VNF/EM - VNF Manager (Ve-Vnfm).....	18
8 Study Items in NFV Reference Architectural Framework	18
8.1 Introduction	18
8.2 Virtualisation Layering and NFVI Support.....	18
8.3 VNF Software Architecture.....	19
8.4 NFV Management and Orchestration.....	19
8.5 Performance	19

8.6	Reliability	20
8.7	Security	20
9	Conclusions and Recommendations.....	20
	History	21

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<http://ipr.etsi.org>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

This Group Specification (GS) has been produced by ETSI Industry Specification Group (ISG) Network Functions Virtualisation (NFV).

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**may not**", "**need**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

1 Scope

The present document describes the high-level functional architectural framework and design philosophy of virtualised network functions and of the supporting infrastructure. The document also defines the scope of the NFV Industry Specification Group (ISG) activities to realize this framework.

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.

The following referenced documents are necessary for the application of the present document.

- [1] ETSI GS NFV 003: "Network Functions Virtualisation (NFV); Terminology for Main Concepts in NFV".
- [2] ETSI GS NFV 004: "Network Functions Virtualisation (NFV); Virtualisation Requirements".
- [3] ETSI GS NFV 001: "Network Functions Virtualisation (NFV); Use Cases".

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] NFV White paper: "Network Functions Virtualisation, An Introduction, Benefits, Enablers, Challenges & Call for Action. Issue 1".

NOTE: Available at http://portal.etsi.org/NFV/NFV_White_Paper.pdf.

- [i.2] ETSI TS 123 002: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Network architecture (3GPP TS 23.002)".

NOTE: Available at <http://www.3gpp.org/ftp/Specs/html-info/23002.htm>.