



Network Functions Virtualisation (NFV); Use Cases

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
DGS/NFV-009
Keywords
NFV, use case

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

Individual copies of the present document can be downloaded from:
<http://www.etsi.org>

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the 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/chaircor/ETSI_support.asp

Copyright Notification

No part may be reproduced except as authorized by written permission.
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2013.
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
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	9
5 Use Case #1: Network Functions Virtualisation Infrastructure as a Service.....	10
5.1 Motivation	10
5.2 Description	11
5.3 Virtualisation Target.....	13
5.4 Coexistence of Virtualised and Non-Virtualised Network Functions	14
5.5 Problem description/Issues	14
6 Use Case #2: Virtual Network Function as a Service (VNFAaaS)	15
6.1 Motivation	15
6.2 Description	16
6.2.1 Virtualisation of the CPE (vE-CPE) - Functional description	16
6.2.2 Virtualisation of the PE (vPE) - Functional description	18
6.3 Virtualisation Target.....	18
6.4 Coexistence of Virtualised and Non-Virtualised Network Functions	19
6.4.1 Partial Virtualisation.....	19
6.4.2 Mixed Virtualisation Scenarios.....	19
6.5 Problem description/Issues	20
7 Use Case #3: Virtual Network Platform as a Service (VNPAaaS)	21
7.1 Motivation	21
7.2 Description	21
7.3 Virtualisation Target.....	23
7.4 Coexistence of Virtualised and Non-Virtualised Network Functions	23
7.5 Problem description/Issues	23
8 Use Case #4: VNF Forwarding Graphs.....	23
8.1 Motivation	23
8.2 Description	24
8.3 Virtualisation Target.....	27
8.4 Coexistence of Virtualised and Non-Virtualised Network Functions	27
8.5 Problem description/Issues	27
9 Use Case #5: Virtualisation of Mobile Core Network and IMS.....	28
9.1 Motivation	28
9.2 Description	28
9.3 Virtualisation Target.....	30
9.4 Coexistence of Virtualised and Non-Virtualised Network Functions	30
9.5 Problem description/Issues	32
10 Use Case #6: Virtualisation of Mobile base station	33
10.1 Motivation	33
10.2 Description	33
10.3 Virtualisation Target.....	34
10.4 Coexistence of Virtualised and Non-Virtualised Network Functions	35
10.5 Problem description/Issues	35

11	Use Case #7: Virtualisation of the Home Environment	36
11.1	Motivation	36
11.2	Description	37
11.3	Virtualisation Target.....	38
11.4	Coexistence of Virtualised and Non-Virtualised Network Functions	39
11.5	Problem description/Issues	41
12	Use Case #8: Virtualisation of CDNs (vCDN).....	42
12.1	Motivation	42
12.2	Description	42
12.3	Virtualisation Target.....	43
12.4	Coexistence of Virtualised and Non-Virtualised Network Functions	44
12.5	Problem description/Issues	44
13	Use Case #9: Fixed Access Network Functions Virtualisation.....	44
13.1	Motivation	44
13.2	Description	45
13.2.1	Challenges.....	46
13.3	Virtualisation Target.....	47
13.4	Coexistence of Virtualised and Non-virtualised Network Functions	48
13.5	Problem description/Issues	49
	History	50

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).

1 Scope

The scope of the present document is to describe use cases of interest for Network Functions Virtualisation (NFV).

2 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.

2.1 Normative references

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".

2.2 Informative references

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] Recommendation ITU-T Y.3510 (05-2013):"Cloud Computing Infrastructure Requirements".

- [i.3] NIST SP 800-146, Badger et al.: "Draft Cloud Computing Synopsis and recommendations", (May 2011), pg. 7-2.

- [i.4] Recommendation ITU-T Y.3501 (05-2013): "Cloud computing framework and high level requirements".

- [i.5] Recommendation ITU-T Y.3501 (05-2013): "Cloud computing framework and high level requirements", appendix I.3 "NaaS general use case", pg 15.

- [i.6] Black's Law Dictionary.

- [i.7] ATIS Telecom Glossary.

NOTE: Available online at <http://www.atis.org/glossary/definition.aspx?id=1828>.

- [i.8] IETF RFC 4026 Andersson, L. March 2005: "Provider Provisioned Virtual Private Network (VPN) Terminology".

NOTE: Available at <http://tools.ietf.org/html/rfc4026>.

- [i.9] NIST SP 800-145: "The NIST Definition of Cloud Computing".