SLOVENSKI STANDARD
oSIST prEN 303 471 V1.0.0:2018

01-december-2018

Okoljski inženiring (EE) - Metodologija merjenja energijske učinkovitosti in meritve za virtualizacijo omrežnih funkcij (NFV)

Environmental Engineering (EE) - Energy Efficiency measurement methodology and metrics for Network Function Virtualisation (NFV)

Ta slovenski standard je istoveten z: **ETSI EN 303 471 V1.0.0 (2018-10)**

ICS:

19.040	Preskušanje v zvezi z okoljem	Environmental testing
27.015	Energijska učinkovitost. Ohranjanje energije na splošno	Energy efficiency. Energy conservation in general

oSIST prEN 303 471 V1.0.0:2018 **en**

Draft ETSI EN 303 471 V1.0.0 (2018-10)

Environmental Engineering (EE); Energy Efficiency measurement methodology and metrics for Network Function Virtualisation (NFV)

Reference
DEN/EE-EEPS26

Keywords
energy efficiency, energy management, ICT, 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/standards-search

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
https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx

If you find errors in the present document, please send your comment to one of the following services:
https://portal.etsi.org/People/CommiteeSupportStaff.aspx

Contents

List of figures

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables 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 (https://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.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

Foreword

This draft European Standard (EN) has been produced by ETSI Technical Committee Environmental Engineering (EE), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**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.

Introduction

The present document specifies the method and metrics to determine the energy efficiency of operational Network Function Virtualisation (NFV) applications and their associated infrastructure.

Any such implementation of NFV within the access network served is addressed by the general engineering and associated energy management KPIs of the access network itself as described in ETSI EN 305 200-2-2 [i.2], ETSI EN 305 200-2-3 [i.3] and ETSI GR NFV 001 [i.4].

1 Scope

The present document specifies the method and metrics to determine the energy efficiency of operational Network Function Virtualisation (NFV) applications and their associated infrastructure when that infrastructure is implemented outside the boundaries of the access fixed, cable and mobile networks which they serve.

The present document:

- Extends the Objective KPIs of ETSI EN 305 200-2-2 [i.2] (fixed access networks) and ETSI EN 305 200-2-3 [i.3] (mobile access networks) to assess the impact of NFV when applied to those networks as described in ETSI GR NFV 001 [i.4].
- Does not consider any assessment of energy saved by the implementation of NFV as there can be no time-stamped comparison of an operational infrastructure from which functions have been removed to a virtualized environment.

NOTE: In an ICT network (e.g. a fixed access network) comprising many Network Distribution Nodes (NDNs) with different loading levels it is not clear that there will always be an energy consumption benefit - the more relevant benefit being network and operational flexibility (such as reduced maintenance or increased reliability).

The present document:

- Does not address the operational energy efficiency of specific Information Technology Equipment (ITE) such as servers which may provide NFV facilities. Other ETSI EN documents (e.g. ETSI EN 303 470 [i.1]) have been prepared to address such factors.
- Does not specify any assessment of the overall effectiveness of an NFV implementation although it contains information in an informative annex regarding the technical milestones that would be required for this to be addressed in a future revision of the present document.

The KPIs specified are primarily intended for trend analysis - not to enable comparison between individual implementations of NFV unless the conditions of operation are "similar".

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 https://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 ES 202 336-12: "Environmental Engineering (EE); Monitoring and control interface for infrastructure equipment (power, cooling and building environment systems used in telecommunication networks); Part 12: ICT equipment power, energy and environmental parameters monitoring information model".

2.2 Informative references

The following referenced documents are not necessary for the application of the present document but they assist the 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 EN 303 470: "Environmental Engineering (EE); Energy Efficiency measurement methodology and metrics for servers".

[i.2] ETSI EN 305 200-2-2: "Access, Terminals, Transmission and Multiplexing (ATTM); Energy management; Operational infrastructures; Global KPIs; Part 2: Specific requirements; Sub-part 2: Fixed broadband access networks".

[i.3] ETSI EN 305 200-2-3: "Access, Terminals, Transmission and Multiplexing (ATTM); Energy management; Operational infrastructures; Global KPIs; Part 2: Specific requirements; Sub-part 3: Mobile broadband access networks".

[i.4] ETSI GR NFV 001: "Network Functions Virtualisation (NFV); Use Cases".

[i.5] ETSI GS NFV 003: "Network Functions Virtualisation (NFV); Terminology for Main Concepts in NFV".

[i.6] ETSI GS NFV-TST 008: "Network Functions Virtualisation (NFV) Release 2; Testing; NFVI Compute and Network Metrics Specification".

[i.7] ISO/IEC 17788: "Information technology -- Cloud computing -- Overview and vocabulary".

[i.8] Mandate M/462: "Standardisation mandate addressed to CEN, CENELEC and ETSI in the field of ICT to enable efficient energy use in fixed and mobile information and communication networks".

[i.9] CEN-CENELEC-ETSI (12-2011): "Framework Document for ESO Response to EU Mandate M/462".

NOTE: Available at https://portal.etsi.org/Portals/0/TBpages/ee/Docs/ESO%20response%20to%20M462%20phase%201%20.pdf.

3 Definitions, symbols and abbreviations

3.1 Definitions

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

Base Station (BS): radio access network component which serves one or more radio cells and interfaces the user terminal (through air interface) and a wireless network infrastructure

Base Station (BS) site: Network Distribution Node (NDN) which accommodates a Base Station (BS)

Cloud Service Customer (CSC): entity responsible for operation of a network services for cloud service users to consume

NOTE: Source: ISO/IEC 17788 [i.7] modified.

Cloud Service Provider (CSP): entity which makes cloud services available

NOTE: Source: ISO/IEC 17788 [i.7] modified.

cloud service user: end user, or applications operating on their behalf, using cloud services

NOTE: Source: ISO/IEC 17788 [i.7] modified.

core network: functional elements (that is equipment and infrastructure) that enable communication between Operator Sites (OSs) or equivalent ICT sites

Customer Premises (CP): any location which is the sole responsibility of the customer

energy efficiency: relation between the useful output (telecom service, etc.) and energy consumption

Fibre Node (FN): device which performs a media conversion between an optical fibre cable link and a coaxial cable link in a cable access network

Head-End (HE): facility for receiving television signals for processing and distribution over a cable access network

ICT equipment: equipment providing data storage, processing and transport services

NOTE: A combination of Information Technology Equipment and Network Telecommunications Equipment.

ICT site: site containing structures or group of structures dedicated to the accommodation, interconnection and operation of ICT equipment 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

Information Technology Equipment (ITE): equipment providing data storage, processing and transport services for subsequent distribution by Network Telecommunications Equipment (NTE)

Last Operators Connection point (LOC): interface to the fixed access transport networks of one or more operators from which cabling is routed to a customer network

Network Data Centre (NDC): data centre embedded within the core network

NOTE: An NDC of a cable access network may be termed a master head-end.

Network Distribution Node (NDN): grouping of Network Telecommunications Equipment (NTE) within the boundaries of an access network providing distribution of service from an Operator Site (OS)

NOTE: Where all the NTE at a given location is under common governance, any supporting infrastructure for power distribution and environmental control together with the necessary levels of resilience and security required to provide the desired service availability is included as part of the NDN.

Network Functions Virtualisation (NFV): principle of separating network functions from the hardware they run on by using virtual hardware abstraction

NOTE: Source: ETSI GS NFV 003 [i.5].

Network Functions Virtualisation Infrastructure (NFVI): totality of all hardware and software components which build up the environment in which VNFs are deployed

NOTE: Source: ETSI GS NFV 003 [i.5] modified.

Network Interface Unit (NIU): principal device within customer premises allowing user access to the services provided by the cable access network

Network Telecommunications Equipment (NTE): equipment between the boundaries of, and dedicated to providing direct connection to, core and/or access networks

Operator Site (OS): premises accommodating Network Telecommunications Equipment (NTE) providing direct connection to the core and access networks and which may also accommodate Information Technology Equipment (ITE)

NOTE 1: An OS that is only connected to the core network is considered as a Network Data Centre (NDC).