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Environmental Engineering (EE); Energy Efficiency measurement methodology and metrics for servers

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Foreword

This European Standard (EN) has been produced by ETSI Technical Committee Environmental Engineering (EE).

National transposition dates	
Date of adoption of this EN:	11 March 2019
Date of latest announcement of this EN (doa):	30 June 2019
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 December 2019
Date of withdrawal of any conflicting National Standard (dow):	31 December 2019

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).

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Introduction

The present document specifies a metric for the assessment of energy efficiency of computer servers using reliable, accurate and reproducible measurement methods, which take into account the recognized state of the art.

The present document formalizes the tools, conditions and calculations used to generate a single figure of merit of a single computer server representing its relative efficiency and power impact. The metric is targeted for use as a tool in the selection process of servers to be provisioned.

For comparisons, evaluations should be conducted across similar server types or categories. The efficiency metric is targeted for use in a pass/fail selection process by differentiating the ability of servers to be provisioned for general purpose operations. The present document does not prescribe the levels or values for acceptance but prescribes a standard method of evaluation that energy efficiency programs would use to establish such criteria.

As there are many operational deployments of servers resulting in a range of specialized equipment and configurations for a single server product, a metric that evaluates provisioning impacts to general purpose operations may not be applicable. ICT equipment and servers in particular, are generally customized and commissioned on site for deployment. As with most IT equipment, new technologies are regularly introduced, which may require product level customization or an industry wide tool upgrade to more appropriately represent the efficiency of the servers. The present document categorizes servers to address applicability, configuration groupings to represent a family of servers to address the broad range of custom configurations possible within each server product family, and tool revision control to ensure comparability and consistency of the resulting metric value.

The present document is based upon the Server Efficiency Rating Tool™ (SERT™) of the Standard Performance Evaluation Corporation (SPEC) and takes into account:

- the Eco-design Technical Assistance Study on Standards for ErP Lot 9 Enterprise Servers and Enterprise Data Storage;
- activity related to the analysis of output of Server Efficiency Rating Tool (SERT™) measurements and deployed power by The Green Grid;
- ENERGY STAR® for Computer Servers [i.2].

The present document defines energy efficiency metrics and measurement methodology for server equipment under standardization mandate M/462 of the European Commission [i.3].

1 Scope

The present document specifies a metric using the Server Efficiency Rating Tool (SERT™), test conditions and product family configuration for the assessment of energy efficiency of computer servers using reliable, accurate and reproducible measurement methods. The metric applies to general purpose computer servers with up to four processor sockets and with their own dedicated power supply.

NOTE 1: The term "socket" also applies to design in which processors are installed without sockets (e.g. soldered products).

The metric applies to a computer server model and to a computer server product family, including type and count of CPU, memory, storage, power supplies, cooling (e.g. fans) and any other add-on hardware expected to be present when deployed.

The present document defines:

- an energy efficiency metric to support procurement or market entry requirements;
- requirements for equipment to perform the measurements and analysis;
- requirements for the measurement process;
- requirements for the management of the metric calculation;
- operation or run rules to configure, execute, and monitor the testing;
- documentation and reporting requirements;
- a validation process for the metric using the Deployed Power Assessment.

The present document is not applicable to:

- fully fault tolerant servers;
- High Performance Computing (HPC) systems;
- hyper-converged servers;
- large scale servers;
- servers with integrated APA(s);
- networking equipment including network servers;
- server appliances;
- storage device including blade storage and storage servers.

NOTE 2: Products whose feature set and intended operation are not addressed by active mode testing parameters are excluded from this evaluation method. The above list shows products for which SERT™ efficiency evaluations are not appropriate.

The present document does not address home servers and small servers that fall under the scope of mandate M/545 [i.8].

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/>.

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

- [1] CENELEC EN 62623:2013: "Desktop and notebook computers. Measurement of energy consumption".
- [2] Standard Performance Evaluation Corporation (SPEC): "Server Efficiency Rating Tool (SERT) version 2 Run and Reporting Rules".

NOTE: Available at <https://www.spec.org/ser2/SERT-runrules.pdf>.

- [3] Standard Performance Evaluation Corporation (SPEC): "Server Efficiency Rating Tool (SERT) version 2 User Guide".

NOTE: Available at <https://www.spec.org/ser2/SERT-userguide.pdf>.

- [4] IEEE 802.3™: "IEEE Standard for Ethernet".

NOTE: Available at <https://standards.ieee.org/findstds/standard/802.3-2015.html>.

- [5] IEEE 802.3az™: "Energy Efficient Ethernet".

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.

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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] CENELEC EN 60297 series: "Mechanical structures for electrical and electronic equipment. Dimensions of mechanical structures of the 482,6 mm (19 in) series".
- [i.2] ENERGY STAR®: "Product Specification for Computer Servers".
- [i.3] Standardization mandate M/462: "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.4] ETSI EN 300 119 series: "Equipment Engineering (EE); European telecommunication standard for equipment practice".
- [i.5] Standard Performance Evaluation Corporation (SPEC): "Server Efficiency Rating Tool (SERT) version 2 Design Document".

NOTE: Available at <https://www.spec.org/ser2/SERT-designdocument.pdf>.

[i.6] SERT Client Configurations (JVM Options).

NOTE: Available at https://www.spec.org/ser2/SERT-JVM_Options-2.0.html.

[i.7] SERT Result File Fields.

NOTE: Available at <https://www.spec.org/ser2/SERT-resultfilefields.html>.

[i.8] Mandate M/545: "Commission Implementing Decision of 6.1.2016 on a standardisation request to the European standardisation organisations as regards computers and computer servers, in support of the implementation of Commission Regulation (EU) No 617/2013 of 26 June 2013, implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for computers and computer servers".

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