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Part 4: IT Equipment Energy Efficiency for servers (ITEEsv)

Technologies de l'information — Centres de traitement de données — Indicateurs de performance clés —

Partie 4: Efficacité énergétique des appareils de technologies de l'information (TI) concernant les serveurs

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by ISO/IEC JTC 1, *Information technology*, SC 39, *Sustainability for and by Information Technology.*

A list of all the parts in the ISO 30134- series can be found on the ISO website.

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Introduction

The global economy is now reliant on information and communication technologies and the associated generation, transmission, dissemination, computation and storage of digital data. All markets have experienced exponential growth in that data, for social, educational and business sectors and, whilst the internet backbone carries the traffic there are a wide variety of data centres at nodes and hubs within both private enterprise and shared/collocation facilities.

The historical data generation growth rate exceeds the capacity growth rate of the information and communications technology hardware and, with less than half (in 2014) of the world's population having access to an internet connection, that growth in data can only accelerate. In addition, with many governments having 'digital agendas' to provide both citizens and businesses with ever-faster broadband access, the very increase in network speed and capacity will, by itself, generate ever more usage (Jevons Paradox). Data generation and the consequential increase in data manipulation and storage are directly linked to increasing power consumption.

With this background it is clear that data centre growth, and power consumption in particular, is an inevitable consequence and that growth will demand increasing power consumption despite the most stringent energy efficiency strategies. This makes the need for Key Performance Indicators (KPIs) that cover the effective use of resources (including but not limited to energy) and the reduction of CO_2 emissions essential.

In order to determine the overall resource effectiveness or efficiency of a data centre, a holistic suite of metrics is required. For the resource effectiveness or efficiency of data centre infrastructure, power usage effectiveness (PUE) was defined as ISO/IEC 30134-2. PUE will be utilized to measure and improve energy efficiency of data centre infrastructure, such as cooling systems and power supply systems. For data centres which own not only infrastructure but also IT equipment, it is also necessary to measure and improve resource effectiveness or efficiency of IT equipment. A data centre, which provides only infrastructure to the customer, can be called a co-location data centre or housing service provider. For these data centres, PUE is essential. However, a data centre which owns and provides a server, storage, and network equipment is called a hosting or cloud service provider. These service providers can manage IT equipment and improve resource effectiveness or efficiency of a data centre by improving energy effectiveness or efficiency of IT equipment which they own. This document specifies the IT Equipment Energy Efficiency for servers (ITEEsv) in a data centre which specifies a method for measuring the energy effectiveness or efficiency of server equipment in a data centre. A data centre which owns servers can use this document to determine the energy effectiveness or efficiency of their current server equipment and to improve energy effectiveness or efficiency by including energy effectiveness or efficiency in their procurement requirements when replacing servers or expanding server capacity. IT equipment installed in a data centre consists of servers, storage systems, and network equipment. But it is difficult to calculate the summarized value of the energy effectiveness or efficiency among different types of IT equipment since the metrics for measuring their performance are different and simple addition or average is not an appropriate method for summarizing. ITEEsv defines the method to obtain average energy effectiveness or efficiency for servers.

This document is part of a series of International Standards for such KPIs and has been produced in accordance with ISO/IEC 30134-1, which defines common requirements for a holistic suite of KPIs for data centre resource usage effectiveness or efficiency.

The ISO/IEC 30134- series does not specify limits or targets for any KPI and does not describe or imply, unless specifically stated, any form of aggregation of individual KPIs into a combined nor an overall KPI for data centre resource usage effectiveness or efficiency.

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Information technology — Data centres — Key performance indicators —

Part 4: IT Equipment Energy Efficiency for servers (ITEEsv)

1 Scope

This document specifies Information Technology Equipment Energy Efficiency for servers (ITEEsv), a key performance indicator (KPI) which quantifies the energy efficiency characteristics of servers in a data centre. ITEEsv can be calculated using a choice of pre-existing or context specific server performance benchmarks. ITEEsv intends to assist in improving the aggregate energy effectiveness of servers in a given data centre.

This document:

a) defines ITEEsv;

b) describes the purpose of ITEEsv;

c) describes how to use ITEEsv;

d) describes reporting of ITEEsv.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 30134-1:2016, *Information technology — Data centres — Key performance indicators — Part 1: Overview and general requirements*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 30134-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1.1
Information Technology Equipment Energy Efficiency for servers
ITEEsv
maximum performance per kW of all servers or a group of servers in a data centre

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3.1.2
server
functional unit that provides services to workstations, to personal computers or to other functional units in a computer network

Note 1 to entry: Services may be dedicated services or shared services.

[SOURCE: IEC 60050-732:2010, 732-01-12, modified: Note 2 deleted]

3.2 Abbreviated terms

For the purposes of this document the abbreviated terms given in ISO/IEC 30134-1 and the following apply:

CPU Central Processing Unit

ITEEsv IT Equipment Energy Efficiency for servers

SERT Server Efficiency Rating Tool

SMPE Server Maximum Performance

SMPO Server Maximum Power

4 Relevance of ITEEsv

ITEEsv is a KPI which describes the maximum performance per kW of all servers or a group of servers in the data centre based upon a specification or potential performance of these servers. ITEEsv reflects the energy effectiveness capability of servers, not the energy effectiveness at a real operating situation of the servers.

Server energy effectiveness or efficiency is a combination of

a) the capacity to do work per unit energy (capability);

b) the amount of time the server is actually doing work (utilization);

c) the ability of the server to reduce the energy use when the workload is reduced (power management).

ITEEsv accounts for capability [list item a)] and is used to quantify the effects of introducing servers which have high capability per unit energy. The other aspects are addressed in ISO/IEC 30134-5. Data centres with larger ITEEsv values, indicate, on average, installation of servers with higher energy effectiveness or efficiency.

NOTE ITEEsv does not involve data centre infrastructure such as air conditioning, or operation of IT equipment. IT equipment in the data centre includes servers, storage systems, and network equipment. ITEEsv only addresses servers.

ITEEsv is a KPI intended for self-improvement of a given data centre or a part of a data centre, not for comparison among different data centres. ITEEsv should not be used to set regulation for a data centre or individual server.

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