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IEEE Standard for a Method to Calculate Near Real-Time Emissions of Information and Communication Technology Infrastructure

IEEE Communications Society

Developed by the
Green ICT Standards Committee

IEEE Std 1922.2™-2019

IEEE

STANDARDS

IEEE Standard for a Method to Calculate Near Real-Time Emissions of Information and Communication Technology Infrastructure

Developed by the

Green ICT Standards Committee
of the
IEEE Communications Society

Approved 7 November 2019

IEEE SA Standards Board

Abstract: Rules for the near real-time calculation of pollutant emissions allocated to the use of Information and Communications Technology (ICT) infrastructure (servers, network, etc.) are specified in this standard. Emissions in this standard are defined as gaseous and particle emissions caused by the generation of electricity consumed during the ICT infrastructure use phase.

Keywords: emissions, ICT infrastructures, IEEE 1922.2™, near real-time, use phase

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Introduction

This introduction is not part of IEEE Std 1922.2-2019, IEEE Standard for a Method to Calculate Near Real-Time Emissions of Information and Communication Technology Infrastructure.

A large part of the life-cycle emissions attributed to the information and communication technologies (ICT) are associated to the electricity consumption. Because electricity generation may greatly differ between regions, it is usually recommended to compute emissions of a service with the regional electricity emission factor corresponding to the region where the electricity is consumed by the service. Such recommendation is present in the GHG Protocol, ITU, ETSI, and ISO standards and guidelines. Another characteristic of electricity generation is that, for a given region, the sources of electricity usually varies in time leading to a variation in the regional emission factor. However, due to the lack of historical and real-time data on electricity generation, it was not possible to consider the temporal aspect in the calculation of emissions. Over the recent years such data are becoming available for an increasing number of regions. Thus, it becomes possible to consider the variation in electricity generation in the calculation of emissions.

Beyond the use of regional data, the objective of this standard is to provide a method using temporal and regional data to calculate the emissions of ICT. While it is expected the standard will be mainly used to calculate carbon dioxide or greenhouse gas emissions, it could also be applied to other pollutant emissions (e.g., nitrogen oxide, sulfur oxide, particulate matter, etc.). That is why it is referred to "emissions" in a global manner instead of specifying "GHG emissions."

This standard differs from existing ones (GHG Protocol, ETSI, ITU, etc.) mainly by considering the temporal dynamicity of electricity consumption and generation in the calculation of the ICT use phase emissions. Concretely, it is proposed to use more precise emission factors in the calculation of ICT emissions due to electricity consumption: while existing standards recommend to use emission factors based on annual average emissions, this standard recommend to use emission factors that better fit with the temporal changes in electricity consumption by ICT and regional production by power plants.

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IEEE Standard for a Method to Calculate Near Real-Time Emissions of Information and Communication Technology Infrastructure

1. Overview

1.1 Scope

This standard specifies rules for the near real-time calculation of pollutant emissions allocated to the use of information and communications technology (ICT) infrastructure (servers, network, etc.). Emissions in this standard are defined as gaseous and particle emissions caused by the generation of electricity consumed during the ICT infrastructure use phase.

1.2 Purpose

The purpose of this standard is to enable near real-time assessment of ICT infrastructure use phase emissions by taking into account temporal variations of emissions related to electricity generation.

2. Definitions

For the purposes of this document, the following terms and definitions apply. The *IEEE Standards Dictionary Online* should be consulted for terms not defined in this clause. [1]

direct emissions: The emissions related to the consumption of electricity by the ICT system during its use stage.

electrical losses: Electricity lost during the transmission and distribution of electricity between the power plants and the ICT system. The amount can be defined as the difference between the electricity produced by the power plants and the electricity consumed by the ICT system. Electrical losses are often expressed as percent losses over an electrical network and applied equally to all consumers of the network.

emission factor: Rate of emission per unit of electricity that is consumed (e.g., in $kgCO_2e/kWh$ or $kgPM_{2.5}/kWh$).

[1] *IEEE Standards Dictionary Online* is available at: http://dictionary.ieee.org. An IEEE Account is required for access to the dictionary, and one can be created at no charge on the dictionary sign-in page.