



**Access, Terminals, Transmission and Multiplexing (ATTM);  
Energy management; Operational infrastructures; Global KPIs;  
Part 2: Specific requirements;  
Sub-part 3: Mobile broadband access networks**

*Full standard available for preview at  
https://standards.iteh.ai/catalog/standards/sls/305-200-2-3-1.1.0-06  
4032-b9e9-429c6d7c905b/etsi-en-305-200-2-3-1.1.0-06*

---

Reference

DEN/ATTM-007

---

Keywords

broadband, energy management, ICT,  
sustainability

**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>

---

**Copyright Notification**

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2018.

All rights reserved.

**DECT™**, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members.

**3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

**oneM2M** logo is protected for the benefit of its Members.

**GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

# Contents

Intellectual Property Rights .....	6
Foreword.....	6
Modal verbs terminology.....	7
Introduction .....	7
1 Scope .....	9
2 References .....	9
2.1 Normative references .....	9
2.2 Informative references.....	9
3 Definitions, symbols and abbreviations .....	10
3.1 Definitions.....	10
3.2 Symbols.....	12
3.3 Abbreviations .....	12
4 Energy management of mobile access networks.....	13
4.1 General .....	13
4.1.1 Mobile broadband access networks .....	13
4.1.2 Mobile access network technologies.....	13
4.1.3 Energy consumption .....	14
4.1.4 Task effectiveness.....	15
5 Global KPI ( $KPI_{EM}$ ) for mobile access networks .....	15
5.1 General .....	15
5.1.1 Global KPI ( $KPI_{EM}$ ) for mobile access networks.....	15
5.1.2 Objective KPIs.....	16
5.1.2.1 Energy consumption ( $KPI_{EC}$ ) .....	16
5.1.2.2 Task effectiveness ( $KPI_{TE}$ ) .....	16
5.1.2.2.1 General .....	16
5.1.2.3 Energy re-use .....	16
5.1.2.4 Renewable energy ( $KPI_{REN}$ ) .....	17
5.2 Scale .....	17
5.3 Utilization and evolution .....	17
5.4 Definition of boundaries.....	18
5.5 Formulae.....	18
5.5.1 Global KPI ( $KPI_{EM}$ ) for mobile access networks.....	18
5.5.1.1 General .....	18
5.5.1.2 Definition of terms .....	18
5.5.1.3 Clarity .....	18
5.5.1.4 Criteria .....	18
5.5.2 Objective KPI for mobile access networks .....	19
5.5.2.1 Energy consumption ( $KPI_{EC}$ ) .....	19
5.5.2.1.1 Formula .....	19
5.5.2.1.2 Definitions of terms .....	19
5.5.2.1.3 Clarity.....	19
5.5.2.1.4 Criteria.....	19
5.5.2.2 Task Effectiveness ( $KPI_{TE}$ ) .....	20
5.5.2.2.1 Formula .....	20
5.5.2.2.2 Definitions of terms .....	20
5.5.2.2.3 Clarity.....	20
5.5.2.2.4 Criteria.....	20
5.5.2.3 Renewable energy ( $KPI_{REN}$ ) .....	20
5.5.2.3.1 Formula .....	20
5.5.2.3.2 Definitions of terms .....	20
5.5.2.3.3 Clarity.....	20
5.5.2.3.4 Criteria.....	21
5.6 Measurement points and procedures .....	21

5.6.1	Objective KPIs for mobile access networks .....	21
5.6.1.1	Energy consumption ( $KPI_{EC}$ ) .....	21
5.6.1.1.1	Measurement points.....	21
5.6.1.1.2	Measurement procedures .....	21
5.6.1.2	Task effectiveness ( $KPI_{TE}$ ) .....	21
5.6.1.2.1	Measurement points.....	21
5.6.1.2.2	Measurement procedures .....	21
5.6.1.3	Renewable energy ( $KPI_{REN}$ ) .....	22
5.6.1.3.1	Measurement points.....	22
5.6.1.3.2	Measurement procedures .....	22
5.7	Reporting.....	22
<b>Annex A (informative): History of network schematics.....</b>		<b>23</b>
History .....		24

**ITeH STANDARD PREVIEW**  
 (standards.iteh.ai)

Full standard:  
<https://standards.iteh.ai/catalog/standards/sist/d90eae7b-0bdb-4032-b9e9-429c6d7e905b/etsi-en-305-200-2-3-v1.1.1-2018-06>

---

## List of figures

<a href="#">Figure 1: Updated schematic of fixed and mobile communication networks .....</a>	<a href="#">13</a>
<a href="#">Figure 2: Mobile access network implementations .....</a>	<a href="#">14</a>
<a href="#">Figure 3: Schematic of mobile access network energy consumption .....</a>	<a href="#">15</a>

**iTeh STANDARD PREVIEW**  
(standards.iteh.ai)

Full standard:  
<https://standards.iteh.ai/catalog/standards/sist/d90eae7b-0bdf-4032-b9e9-429c6d7e905b/etsi-en-305-200-2-3-v1.1.1-2018-06>

# 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 Access, Terminals, Transmission and Multiplexing (ATTM), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

The present document is part 2, sub part 3 of a multi-part deliverable covering Global Key Performance Indicators for energy management of operational broadband deployment infrastructures as identified below:

Part 1: "General requirements";

**Part 2: "Specific requirements";**

Sub-part 1: "ICT sites";

Sub-part 2: "Fixed broadband access networks";

**Sub-part 3: "Mobile broadband access networks";**

Part 3: "ICT sites";

Part 4: "Design assessments".

## 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

Energy costs continue to rise, a trend that will continue in the future, while broadband penetration is introducing new active equipment to the network architecture. In this context, and to reflect other environmental aspects of sustainability, it is vital that the main telecommunication operators implement effective general engineering of fixed and mobile broadband networks and sites provisioning, managing or using those networks (i.e. ICT sites) in order to respond to critical issues of energy consumption while proposing essential solutions to broadband deployment. To guide this process, it is essential that metrics are defined, termed Global Key Performance Indicators (KPIs), that enable energy usage to be managed more effectively.

The Global Key Performance Indicators of the ETSI EN 305 200 [i.1] series address operational infrastructures and do not consider design or operation of individual components comprising those infrastructures.

The ETSI EN 305 200 [i.1] series of standards comprises:

- ETSI EN 305 200-1 [i.2]: a generic requirements document addressing Global KPIs for operational infrastructures;
- a sub-series ETSI EN 305 200-2 that defines the Global KPIs, and drives energy management targets, for specific operational networks and sites and which describes how the Global KPIs are to be applied (which may be used to support future regulatory objectives):
  - ETSI EN 305 200-2-1 [i.3]: ICT sites;
  - ETSI EN 305 200-2-2 [i.4]: Fixed broadband access networks;

NOTE: Excluding cable access networks.

- ETSI EN 305 200-2-3 (the present document): Mobile broadband access networks.

The standards do not define weightings of Objective KPIs or targets or limits for Global KPIs but may contain information on values that have been used by certain organizations.

- a sub-series ETSI EN 305 200-3 [i.5] including ETSI EN 305 200-3-1 [i.6] that defines particular implementations of Global KPIs within ICT sites based on the requirements of ETSI EN 305 200-2-1[i.3], and which may define levels of performance to simplify and provide clearer understanding of Global KPIs allowing the evaluation of performance of energy use management in ICT sites.

The standards do not define weightings of Objective KPIs or targets or limits for Global KPIs but may contain information on values that have been used by certain organizations.

- a sub-series ETSI EN 305 200-4 including ETSI EN 305 200-4-4 [i.7] that defines design assessments of Global KPIs, and drives energy management targets, for specific operational networks and sites and which describes how the Global KPIs are to be applied (which may be used to support future regulatory objectives).

These standards may be considered to be a contribution to the application of ISO 50001 [i.8] in relation to the development of policy for the continuous improvement of energy management and will accelerate.

- the availability of operational infrastructure architectures and network implementations that use energy more efficiently;
- the definition and attainment objectives for other environmental aspects of sustainability for operational broadband networks.

The present document specifies the requirements for a Global KPI for energy management ( $KPI_{EM}$ ) and their underpinning Objective KPIs for the mobile access networks of broadband deployment. The requirements are mapped to the general requirements of ETSI EN 305 200-1 [i.2].

**ITeH STANDARD PREVIEW**  
(standards.iteh.ai)

Full standard:  
<https://standards.iteh.ai/catalog/standards/sist/d90eae7b-0bdc-4032-b9e9-429c6d7e905b/etsi-en-305-200-2-3-v1.1.1-2018-06>



---

# 1 Scope

The present document specifies the requirements for a Global KPI for energy management ( $KPI_{EM}$ ) and their underpinning Objective KPIs addressing the following objectives for the mobile access networks of broadband deployment:

- energy consumption;
- task effectiveness;
- renewable energy.

The requirements are mapped to the general requirements of ETSI EN 305 200-1 [i.2].

Energy management of mobile access networks comprises a number of independent layers. The present document addresses performance of infrastructures that supports the normal function of hosted ICT equipment within the mobile access network (e.g. power distribution, environmental control, security and safety). The present document does not address other layers such as performance of ICT equipment itself, performance of usage of available processing power, and layers related to final service delivered (e.g. processing power required per itemized outcome) or overlay layers (e.g. energy consumption required per itemized outcome).

The environmental impact and management of different energy sources are outside the scope of the present document.

Within the present document:

- clause 4 describes the energy parameters for mobile access networks together with inclusions/exclusions of different energy contributions;
- clause 5 specifies the requirements for measurement, calculation, classification and reporting of  $KPI_{EM}$ .

---

## 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.

- [1] ETSI EN 303 472: "Environmental Engineering (EE); Energy Efficiency measurement methodology and metrics for RAN equipment".

### 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.

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 305 200 series : "Access, Terminals, Transmission and Multiplexing (ATTM); Energy management; Operational infrastructures; Global KPIs".
- [i.2] ETSI EN 305 200-1: "Access, Terminals, Transmission and Multiplexing (ATTM); Energy management; Operational infrastructures; Global KPIs; Part 1: General requirements".
- [i.3] ETSI EN 305 200-2-1: "Access, Terminals, Transmission and Multiplexing (ATTM); Energy management; Operational infrastructures; Global KPIs; Part 2: Specific requirements; Sub-part 1: ICT Sites".
- [i.4] 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.5] ETSI EN 305 200-3: "Access, Terminals, Transmission and Multiplexing (ATTM); Energy management; Operational infrastructures; Global KPIs; Part 3: ICT Sites".
- [i.6] ETSI EN 305 200-3-1: "Access, Terminals, Transmission and Multiplexing (ATTM); Energy management; Operational infrastructures; Global KPIs; Part 3: ICT Sites; Sub-part 1: DCEM".
- [i.7] ETSI EN 305 200-4-4: "Integrated broadband cable telecommunication networks (CABLE); Energy management; Operational infrastructures; Global KPIs; Part 4: Design assessments; Sub-part 4: Cable Access Networks".
- [i.8] ISO 50001: "Energy management systems - Requirements with guidance for use".
- [i.9] 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.

---

## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

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

**access network:** functional elements (that is equipment and infrastructure) that enable communication between an Operator Site (OS) and a customer network

**backhaul infrastructure:** functional elements connecting a base station to an operator site

**cable access network:** access network provided by cable operators comprising optical fibre and metallic cabling providing direct connection to customer premises

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

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

**Base Station (BS):** Network Telecommunications Equipment (NTE) which serves one or more cells within a coverage area of a mobile access network

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

**energy consumption:** total consumption of energy by an operational infrastructure

**energy management:** combination of reduced energy consumption and increased task effectiveness, re-use of energy and use of renewable energy

**extended base station site:** base station site which is served under typical operating conditions by on-site generation of electricity

**Global KPI:** KPI, combining two or more Objective KPIs, which reflects the overall energy management performance of an operational infrastructure