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

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Access, Terminals, Transmission and Multiplexing (ATTM).

The present document is part 2, sub-part 3 of a multi-part deliverable covering the Energy management; Operational infrastructures; Implementation of Global KPIs, as identified below:

ETSI EN 305 200-1: "General requirements";

ETSI TS 105 200-2: "Specific requirements":

Sub-part 1: "ICT Sites";

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

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

Sub-part 4: "Cable Access Networks";

ETSI TS 105 200-3: "ICT Sites";

ETSI EN 305 200-4: "Design assessments".

NOTE: Part 2 of this series has also been produced as EN and ES.

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

ICT energy needs and costs will continue to increase in the future, while new mobile generations will be deployed and will introduce new active dedicated equipment in the global network architecture.

In this context, and to reflect environmental aspects of sustainability, it is essential for telecommunications network operators to implement effective general engineering of 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. To guide this process, it is essential that metrics are defined that enable energy usage to be managed more effectively.

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

The present document specifies the deployment of Global KPIs for energy management (*KPI_{EM}*) for the mobile access networks of broadband deployment specified in ETSI EN 305 200-2-3 [2].

NOTE: The data traffic measured in the present document does not account for non-"Subscriber Identity Module" (SIM) traffic. This can be considered in a future revision of both ETSI EN 305 200-2-3 [2] and the present document.

The mobile access network described in ETSI EN 305 200-2-3 [2] includes all the active components or parts of the access network.

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1 Scope

The reporting of Global KPIs in accordance with ETSI EN 305 200-2-3 [2] requires the collection of data to enable the calculation of the following aspects:

- Objective KPI relating to task efficiency (KPI_{TE}) based on *data_volume* and total energy consumption (KPI_{EC}).
- Objective KPI relating to the use of renewable energy (KPI_{REN}).

The present document supports the requirements of ETSI EN 305 200-2-3 [2] providing a framework for, and detailing, the implementation procedures including any necessary techniques for estimation of energy consumption together with clarification and treatment of different types of data volume.

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 EN 305 200 series: "Access, Terminals, Transmission and Multiplexing (ATTM); Energy management; Operational infrastructures; Global KPIs".
- [2] 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".

2.2 Informative references

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

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI EN 305 200-2-3 [2] and the following apply:

Access Gateway (AG): gateway that interworks a significant number of analogue lines to a packet network

BaseBand Unit (BBU): mobile access network equipment that processes baseband signal, connected to one or more Remote Radio Units through optical fibre or metallic cabling, or by microwave links

downstream: relative location in the mobile access network in the direction of User Equipment

Fixed Wireless Access (FWA): means of providing internet connectivity that uses wireless network technology rather than fixed lines

fronthaul infrastructure: portion of a mobile access network telecommunications architecture including the intermediate links between the BaseBand Units and Remote Radio Units

Management Information Base (MIB): database allowing management of ICT devices using Simple Network Management Protocol (SNMP)

Mobile Network Operator (MNO): provider of wireless communications services that owns or controls all the elements necessary to sell and deliver services to an end user including radio spectrum allocation, wireless network infrastructure, backhaul infrastructure, billing, customer care, provisioning computer systems and marketing and repair organizations

Multi-access Edge Computing (MEC): network architecture that supports increases in data processing and storage at the edge of the of a mobile access network (closer to end-user) to reduce latency

Remote Radio Unit (RRU): radio transceiver equipment connected to a BaseBand Unit

upstream: relative location in the mobile access network in the direction of an Operator Site

3.2 Symbols

For the purposes of the present document, the symbols given in ETSI EN 305 200-2-3 [2] apply.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI EN 305 200-2-3 [2] and the following apply:

AG	Access Gateway
BBU	BaseBand Unit
FWA	Fixed Wireless Access
MEC	Multi-access Edge Computing
MIB	Management Information Base
MNO	Mobile Network Operator
QoS	Quality of Service
RRU	Remote Radio Unit
SIM	Subscriber Identity Module
SMPA	Switched Mode Power Amplifier
SNMP	Simple Network Management Protocol

4 Global KPIs of ETSI EN 305 200-2-3

4.1 Mobile broadband access networks

The network schematic used in the present document is shown in Figure 1 (amended from that of ETSI EN 305 200-2-3 [2]).

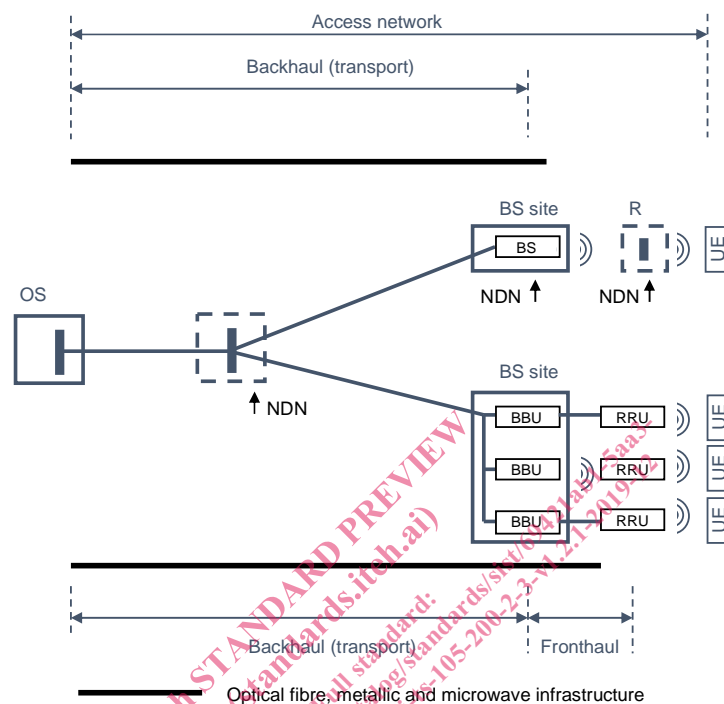


Figure 1: Mobile access network implementations

Within the mobile access network, the term Network Distribution Node (NDN) is employed to describe a variety of aggregations of Network Telecommunications Equipment (NTE) at locations within the backhaul network (also known as transport network) between the Operator Site (OS) and the Base Station site accommodating a Base Station or BaseBand Units (BBU). The BBUs are shown connected over the fronthaul links to Remote Radio Units (RRUs).

BS sites, repeaters (R) and RRUs are shown as specific examples of NDNs.

Figure 1 shows certain NDNs within dashed boxes to indicate that they are:

- optional;
- not restricted in number to the configurations shown.

The present document also considers the use of small cell and Fixed Wireless Access (FWA) implementations.

4.2 KPIs for energy management

4.2.1 Global KPI (KPI_{EM}) for mobile access networks

From ETSI EN 305 200-2-3 [2], KPI_{EM} is a combination of two separate KPIs, in a common assessment period, as follows:

- 1) the Objective KPI for task effectiveness expressed as KPI_{TE} (see clause 4.2.2.2);
- 2) the Objective KPI for renewable energy contribution expressed as KPI_{REN} (see clause 4.2.2.3);