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TECHNICAL SPECIFICATION

**Access, Terminals, Transmission and Multiplexing (ATTM);
Broadband Deployment and Energy Management;
Part 4: Access Networks;
Sub-part 1: Fixed access networks (excluding cable)**

Reference

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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 4, sub-part 1 of a multi-part deliverable. Full details of the entire series can be found in part 1 [i.10].

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 increasing interaction between the different elements of the Information Communication Technology (ICT) sector (hardware, middleware, software, services, etc.) supports the concept of convergence in which:

- a variety of multi-service packages can be delivered over a common infrastructure;

- a variety of infrastructures is able to deliver these packages;

- a single multi-service-package may be delivered over several different infrastructures.

As a result of this convergence, the development of new services, applications and content there is an increasing demand for bandwidth, reliability, quality and performance. The consequent increase in the demand for energy which implications for cost and, in some cases, availability. It is therefore important to maximize the energy efficiency of network equipment at all levels.

New technologies and infrastructure strategies are expected to enable operators to decrease the energy consumption, for a given level of service, of their existing and future infrastructures thus decreasing their costs. This requires a common understanding among market participants that only standards can produce.

The present document is Part 4, sub-part 1 of a multi-part set which has been produced by ETSI Technical Committee Access, Terminals, Transmission and Multiplexing (ATTM) in close collaboration with CENELEC via the Co-ordination Group on Installations and Cabling (CGIC). The document set offers a contribution to the required standardization process by establishing an initial basis for work on ICT networks and transmission engineering, with active collaboration from a number of other ETSI and CENELEC Technical Bodies. When complete, the document set contains information that has been jointly evolved to present developments in installations and transmission implementation, and describing their progress towards energy efficiency in next generation networks (NGN).

The present document analyses the work on Fixed Access Networks whilst details of each of the other parts of the document set can be found in Part 1 [i.10]. Clearly the energy efficiencies of Operator Sites, Data Centres, the Core Networks and Customer Network Infrastructures are also important in maximizing the end-to-end energy efficiency of broadband communications and these issues are covered in other parts of the document set. However, Access Networks differ from the other network components in that they are likely to include a very large number of locations each consuming a relatively low amount of energy. Not only do such small installations tend to be inefficient in their power utilization but when multiplied by their number, their total energy usage becomes considerable. Thus any energy saving which can be achieved becomes significant when the number of sites is taken into account.

1 Scope

The present document details measures which may be taken to improve the energy efficiency of access networks for broadband deployment. The present document:

- identifies the standardization bodies working on diverse aspects of the access networks infrastructures interfaces, cabling, installation, operation, etc.;

- outlines some of the principal access network topographies and their differences in respect of energy consumption;

- provides strategic analysis of energy consumption trends within access networks.

This enables the proper implementation of services, applications and content on an energy efficient infrastructure, though it is not the goal of the present document to provide detailed standardized solutions for network architecture.

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 reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

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

Not applicable.

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] "EC Code of Conduct on Energy Consumption of Broadband Equipment" V5.

[i.2] Recommendation ITU-T G.984.1 (03/2008): "Gigabit-capable passive optical networks (GPON): General characteristics".

[i.3] Recommendation ITU-T G.984.2 (03/2008): "Gigabit-capable passive optical networks (GPON): Physical Media Dependent (PMD) layer specification".

[i.4] Recommendation ITU-T G.984.3 (04/2012): "Gigabit-capable passive optical networks (GPON): Transmission convergence layer specification".

[i.5] Recommendation ITU-T G.984.5 (10/2009): "Enhancement band for gigabit capable optical access networks".

[i.6] Recommendation ITU-T G.984.6 (05/2012): "Gigabit-capable passive optical networks (GPON): Reach extension".