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Okoljski inženiring (EE) – Napajanje opreme v dostopovnem omrežju

Environmental Engineering (EE); Powering of equipment in access network

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Environmental Engineering (EE).

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1 Scope

The present document describes the principles for powering of telecommunications equipment in access network and contains requirements for the powering systems, laying down:

- the characteristics of the input and output interfaces of the power units;
- the power back-up conditions for TE including a power unit;
- the management data, necessary to guarantee the availability of the service and to ensure the maintenance of the power units.

The present document takes into account the characteristics of access network equipment for which the limits of responsibility in the installation or design of the power plants are very different than for equipment of telecom centre: it goes from "complete integration of the power plant in the TE" till "remote power feeding from a distant power plant".

The present document applies for the powering of all equipment of the access network (copper, fiber or radio networks) located outside telecommunications centres. The access network is defined as the part of the telecommunications network, which is comprised between the customer terminal installation and the first exchange (switching unit). The customer terminal and the switching unit are excluded of the application field of the present document.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

- [1] ETSI ETS 300 132-1: "Equipment Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 1: Operated by alternating current (ac) derived from direct current (dc) sources".
- [2] ETSI EN 300 132-2: "Environmental Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 2: Operated by direct current (dc)".
- [3] Void.
- [4] CENELEC EN 60950-1: "Information technology equipment - Safety - Part 1: General requirements".
- [5] IEC 60950-21: "Safety of information technology equipment - Part 21: Remote power feeding".
- [6] CENELEC HD 472 S1 (1989): "Nominal voltages for low-voltage public electricity supply systems".
- [7] CENELEC HD 625.1: "Insulation coordination for equipment within low-voltage systems - Part 1: Principles requirements and tests".
- [8] CENELEC EN 50310: "Application of equipotential bonding and earthing in buildings with information technology equipment".
- [9] CENELEC EN 60896-2: "Stationary lead-acid batteries - General requirements and method of test - Part 2: Valve regulated types".
- [10] ETSI EN 300 019-1-1: "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-1: Classification of environmental conditions; Storage".

- [11] ETSI EN 300 019-1-3: "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-3: Classification of environmental conditions; Stationary use at weatherprotected locations".
- [12] ETSI ETS 300 019-1-4: "Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-4: Classification of environmental conditions; Stationary use at non-weatherprotected locations".
- [13] ETSI EN 300 019-1-8: "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-8: Classification of environmental conditions; Stationary use at underground locations".
- [14] ETSI EN 300 253: "Environmental Engineering (EE); Earthing and bonding configuration inside telecommunications centres".
- [15] ITU-T Recommendation K.35: "Bonding configurations and earthing at remote electronic sites".
- [16] ETSI EG 201 212: "Electrical safety; Classification of interfaces for equipment to be connected to telecommunication networks".
- [17] ITU-T Recommendation K.45: "Resistibility of access network equipment to overvoltages and overcurrents".

3 Definitions and abbreviations

3.1 Definitions

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

access network: part of a telecommunications network between the customer terminal installation and the first switching unit

local powering: powering principle of a telecommunications equipment by a (dedicated) power unit implemented in the same location

remote powering: power feeding of a telecommunications equipment by a remote power circuit

NOTE: Such a circuit consists of a remote power unit, distribution wiring, and fed receivers.

Remote Feeding Telecommunication (RFT) circuit: secondary circuit within the equipment, intended to supply or receive dc power via a telecommunication network at voltages equal to or exceeding the limits for TNV circuits, and on which overvoltages from telecommunication networks are possible

RFT-C circuit: RFT circuit which is so designed and protected that under normal operating conditions and single fault conditions the currents in the circuit do not exceed defined values

RFT-V circuit: RFT circuit which is so designed and protected that under normal operating conditions and single fault conditions the voltages are limited and the accessible area of contact is limited

centralized powering: remote powering in which the remote feeding source is located in a telecommunications centre

cluster powering: remote powering of a cluster of equipment (1 to n items of equipment), in which the remote feeding source is located outside a telecommunications centre

Remote Power Unit (RPU): power unit, connected to the mains or from a centralized power plant, which supplies distant telecommunications equipment

distant power receiver: power equipment electrically connected to a Remote Power Unit

NOTE: Its function is to supply telecommunications equipment situated at the same location. It may be combined with the item of telecommunications equipment itself.

Local Power Unit (LPU): power supply equipment whose function is to supply a telecommunication equipment situated at the same location

NOTE: It is generally locally connected to the mains and provides dc or ac voltage output to feed telecommunication equipment.

SELV circuit: See EN 60950-1 [4].

TNV circuit: See EN 60950-1 [4].

hazardous voltage: See EN 60950-1 [4].

primary circuit: See EN 60950-1 [4].

secondary circuit: See EN 60950-1 [4].

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ac	alternating current
CH	Customer's Home
dc	direct current
FTTB	Fibre To The Building
FTTC	Fibre To The Curb
FTTCab	Fibre To The Cabinet
FTTH	Fibre To The Home
LPU	Local Power Unit
ONU	Optical Network Unit
RFT	Remote Feeding Telecommunication
RPU	Remote Power Unit
TC	Telecommunication's Centre
TE	Telecom Equipment
TNV	Telecommunication Network Voltage
UPS	Uninterruptible Power Supply

4 Powering configurations

The main characteristic feature of the different powering architectures of access network equipment is the location of the following two functions:

- the point of connection to the mains; and
- the place of power back-up.

The total network can be divided in three main parts:

- 1) the Telecommunication Centre (TC);
- 2) the field (the undefined area between the Telecom Centre and the Customer's Home);
- 3) the Customer's Home (CH).

Powering architectures

Equipment of access network can be powered remotely from a telecommunications centre (centralized powering) or from a power supply node (cluster powering), or locally from the mains (local powering). Inside these three main powering architectures, several configurations of powering are used. They are summarized in the clauses 4.1 to 4.2 and in the figures 1, 2 and 3 by the acronyms PW1 to PW 9 (for powering).

Power back-up

For the telephone service, which needs to provide an available service even in the case of a mains outage, a power back-up unit is located either in the remote power source or in the equipment powered. The clauses 4.1 to 4.2 detail the different installation configurations.

Location of the Telecom Equipment (TE)

On the figures 1, 2 and 3 of the following clauses, the TE in access network is schematically represented in the field. These figures mean that the TE can be implemented in different types of locations:

- in a customer's office;
- in a building, public or private;
- in an indoor cabinet;
- in a street cabinet;
- on a pole cabinet;
- in a telecommunications manhole, etc.

The TE provides services for several customers or for one professional customer.

On figure 3, the TE can be located at customer's home and provides services for only one private customer.

Power interfaces

Six power-feeding interfaces are mentioned in the following clauses: They are as follows:

- I_0 = Power interface between a -48 V power plant and the fed equipment in a telecom centre. It fits with the interface "A" according to EN 300 132-2 [2].
- I_1 = Power interface between the public mains (commercial ac) and the fed equipment. It fits with the voltage defined in HD 472 [6].
- I_2 = Power interface at the output of a remote power source.
- I_3 = Power interface at the input of a distant power receiver interface, in remote powering.
- I_4 = Power interface between a local power unit and the fed equipment, in local powering. It fits with the interface "A" according to EN 300 132-2 [2] or with the interface defined in clauses 6.2 to 6.4.
- I_5 = Power interface between the public mains (commercial ac) or emergency power (UPS, diesel generator) or interface "A" according to ETS 300 132-1 [1] and the fed equipment in a telecom centre. It fits with the voltage defined in HD 472 [6].

4.1 Remote powering

4.1.1 Centralized powering

The different power supply configurations are detailed in figure 1. The output of the power source is defined at interface I_2 . It comes from a TE (PW1a) or from a specific remote power unit (RPU in PW1b). Interface I_0 corresponds to the input of the RPU. The remote power unit consists of protection and distribution devices and, possibly, power conversion equipment. Interface I_5 corresponds to Interface I_1 and is located in the telecommunication centre.

In some cases, the TE of the access network may be equipped with a battery providing additional power in periods of heavy traffic (PW3). This battery is recharged by the remote power supply during periods of light traffic.

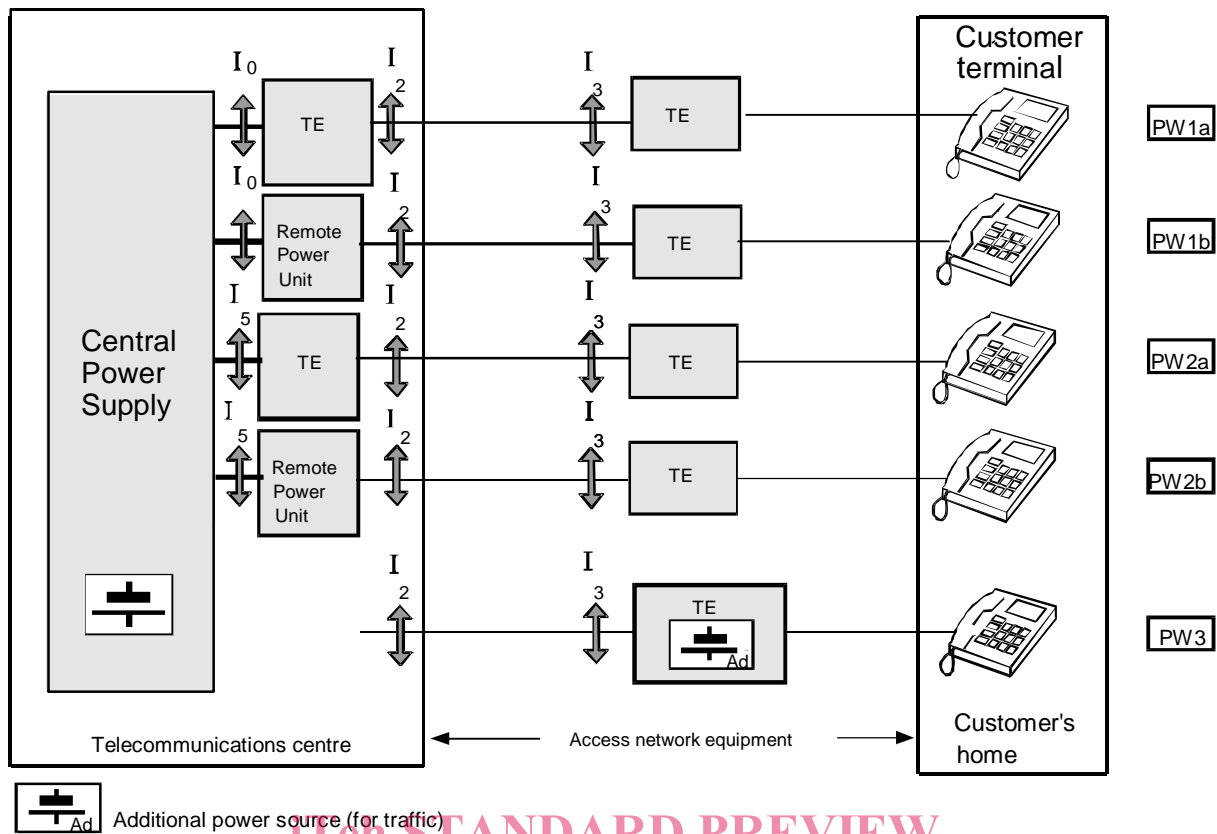


Figure 1: Centralized powering
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4.1.2 Cluster powering

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The different possible power supply configurations are detailed in figure 2. The remote power source, called Remote Power Unit (RPU), serves a group of distant telecommunications equipment, from 1 to n . The RPU is installed in a location (building, outdoor cabinet, manhole, etc.) which is distinct from the TE's building, cabinet or manhole. The telephone service is backed up by batteries located either at the remote power unit (remote powering with back-up at source, PW4) or in the telecommunications equipment (remote powering with local back-up, PW5).

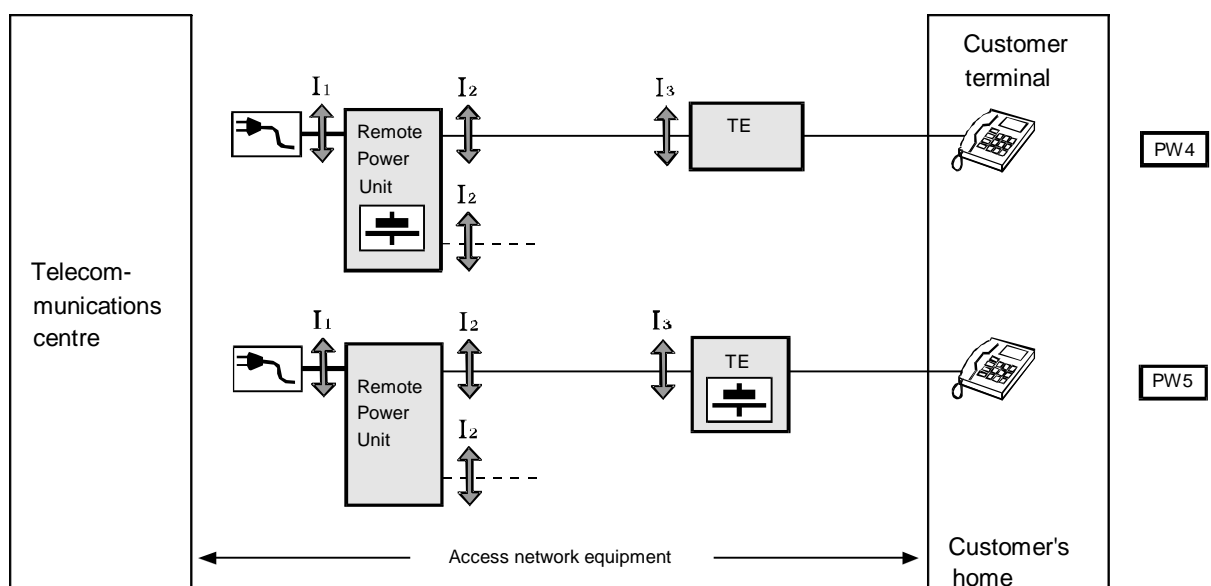


Figure 2: Cluster powering