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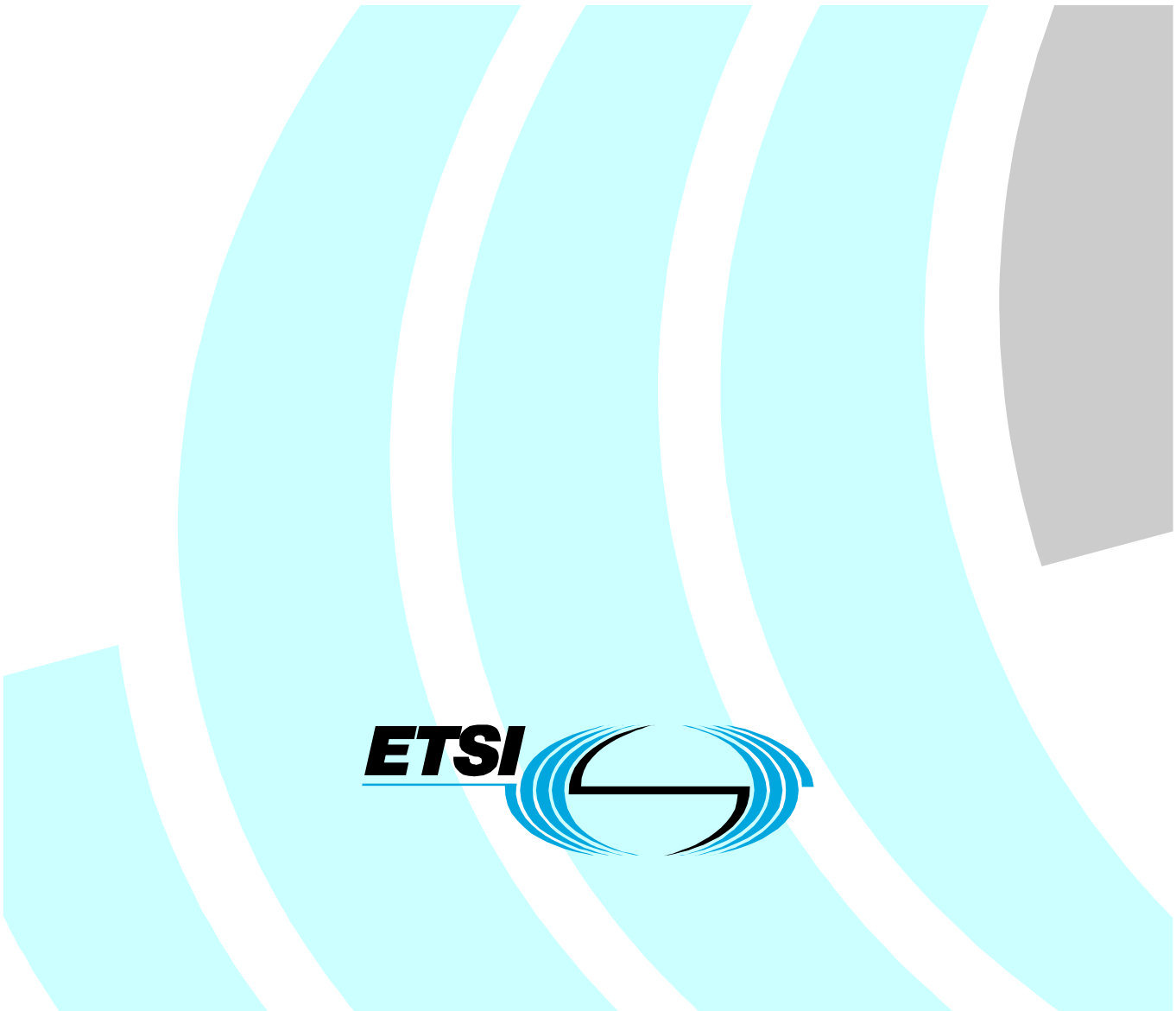
*ETSI Standard*

# Access and Terminals (AT); Digital Access to the Public Telephone Network; Line power requirements for IP terminals



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# Contents

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# Foreword

This ETSI Standard (ES) has been produced by ETSI Technical Committee Access and Terminals (AT), and is now submitted for the ETSI standards Membership Approval Procedure.

# Introduction

It was decided that ETSI would produce a specification identifying the requirements for IP terminals that are powered by the LAN network (802.3 data interface or MDI).

In the IEEE specification mentioned in IEEE P802.3af [1], the following is specified:

1) Characteristics of the power supplied via the 802.3 data interface by the PSE (Power Sourcing Equipment). The PSE is able to decide whether the PD needs power or not by means of a detection algorithm and PD signature.

2) Characteristics of the terminal (PD - Powered Device). Different classes of PDs are defined based on power consumption. Each PD must present a signature in order to receive power and could optionally present a signature for classification according to power consumption.

The present document adopts all the physical characteristics of the PSE and the PD as specified in the IEEE specifications to keep the ETSI specification in line with the IEEE requirements.

Since the specification in IEEE P802.3af [1] does not specify nor address the issue of PSE power supply interruptability or reliability, the present document includes requirements for a mechanism that will address the provisioning of emergency power to PDs in situations where the PSE primary power supply fails. This is in addition to the PSE and PD requirements adopted as per IEEE P802.3af [1].

The intention with the additional requirements is to provide a standard that will bridge the gap that exists in the reliability of provisioning of power in emergency conditions between:

a) a traditional PSTN telephony network (where reliable and uninterrupted remote powering is provided); and

b) a 802.3 network with remote powering of IP terminals (implemented in accordance with IEEE P802.3af [1]) that does not cover the interruptability and reliability of provisioning of power.

With the requirements as specified in the present document a basic mechanism (minimum requirement) is provided that will make it possible to implement an 802.3 network (with remote powering) and ensure basic operations in power fail emergency conditions, while optionally an advanced mechanism (optional requirement) is provided to make optimum use of the PD classifications as specified in the IEEE P802.3af [1].

# 1 Scope

The present document specifies the requirements for line powering of IP Terminals connected to 802.3 interfaces.

The present document is applicable to IP terminals connected to public networks and to customer premises equipment providing interfaces for the connection of IP terminals. The present document deals with an existing specification for powering requirements of IP terminals (see IEEE P802.3af [1]).

IP terminals could range from card readers, line powered security cameras to IP telephone terminals.

The provisioning of power from public networks for IP terminals is also specified.

# 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.

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

[1] IEEE P802.3af: "Data Terminal Equipment (DTE) Power via Media Dependent Interface (MDI); Supplement to: Information technology, Telecommunications and information exchange between systems, Local and metropolitan area networks, Specific requirements Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications".

# 3 Definitions and abbreviations

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in IEEE P802.3af [1] and the following apply:

**Powered Device (PD):** device that is either drawing power or requesting power by participating in the PD detection algorithm

NOTE: A PD may draw some or all of its power from the MDI.

**Media Dependant Interface (MDI):** the 802.3 data interface where the PD is connected on the one side and where the power and data is provided on the other side of the interface

**Power Sourcing Equipment (PSE):** equipment that provides the power to the link section (the link section is the point-to-point medium connection between an PD and a PSE), equipment that can supply power to the PD

**PSE Controller:** an element or network management station external to the PSE which performs control functions

**Policy Controller:** management station that determines which ports receive priority power

## 3.2 Abbreviations

For the purposes of the present document, the abbreviations defined in IEEE P802.3af [1] and the following apply:

| | |
|---|---|
| LAN | Local Area Network |
| MDI | Media Dependant Interface |
| PD | Powered Device |
| PSE | Power Sourcing Equipment |

# 4 Line power specification for IP terminals

## 4.1 Overview

The present document considers the elements that are required, and the methods used to combine these elements into a mechanism that will ensure that uninterrupted and reliable power is provided to IP terminals connected to an 802.3 network via the MDI.

### 4.1.1 Element requirements

The technical and functional requirements of four elements are described separately in the present document. In order to ensure optimum interoperability, the requirements of some of the elements are adopted from the IEEE standard mentioned in [1]. These are the Powered Device (PD) and the Power Sourcing Equipment (PSE).

The newly defined elements are the PSE Controller and Policy Controller. Although these are described as separate elements, the intelligence to perform the respective functions could be embedded in the PSE. In certain cases, specific actions may fulfil the requirements of a Policy or PSE Controller.

### 4.1.2 Power management mechanism

This clause describes the mechanism used to manage power in the case of failure and or the recovery of the primary power supply to the PSE. The provision of power to the PDs will be managed by the Policy Controller in conjunction with the PSE Controller and the PSE. The present document makes provision for the formulation of a powering policy that may be implemented during power failure. The following conditions are covered.

#### 4.1.2.1 Power failure

In this clause the case of power failure of the primary power supply to the PSE and the provisioning of back-up power is discussed. Once on back-up power (limited power mode) the available power is managed according to a minimum requirement and optional advanced requirements. The minimum requirement is based on pre-defining of priority ports that will receive power during limited power mode. The optional requirements allows the provisioning of power to be based on a powering policy that utilizes the classification of PDs (according to power consumption) by the PSE in order to manage back-up power.

#### 4.1.2.2 Limited power

This clause discusses the power management actions of the PSE (in conjunction with PSE Controller and Policy Controller) while the PSE is in limited power mode. A basic minimum requirement is specified, as well as optional advanced requirements. Specific events are specified for each of the requirements of power failure management.

#### 4.1.2.3 Power recovery

This clause covers the condition where the primary power to the PSE is restored and power is provided on all ports and to any classof PD.

## 4.2 Power Sourcing Equipment (PSE) requirements

All physical characteristics of the PSE will be in accordance with IEEE P802.3af [1], unless specifically mentioned.

### 4.2.1 Output power

#### 4.2.1.1 Normal power

During normal power provisioning, the provision of power shall be in accordance with IEEE P802.3af [1].

#### 4.2.1.2 Limited power

The PSE is considered to be in the limited power mode when primary power supply to the PSE has failed and the PSE is powered by a back-up power supply.

##### 4.2.1.2.1 Minimum requirement

During limited power, power shall be provided on ports designated as emergency only.

##### 4.2.1.2.2 Optional requirement

The PSE shall provide enough power on each port, that could be permanently or temporarily designated as emergency, to power a pre-selected class of PD in accordance with a powering policy to be implemented by the Policy Controller.

The present document does not define the powering policy that is used to select or determine the number or the class of PDs that are to be supplied with power, or not.

If, in an emergency situation, the PSE power is derived from a source in other networks, for which other more restrictive emergency conditions/regulations/standards apply, then it may not be possible for the PSE to comply with the present document.

### 4.2.2 Back-up power supply

In order to maintain a limited supply of power to PDs required to function in an emergency power situation (when the primary power to the PSE fails), it is necessary that the PSE is backed up by an emergency power unit, batteries/generator.

The back-up power supply is brought into use when the normal supply to the PSE fails. The backup supply may not be able to supply the full load and/or may be available for a duration limited by battery or fuel tank capacity. The PSE Controller may be able to determine an estimate of the remaining capacity.

The present document does not define the type of back-up power.

The present document does not define the time period that back-up power must be provided.

### 4.2.3 Policy Controller requirements

The Policy Controller is a management station that determines which ports receive priority power.

#### 4.2.3.1 Minimum requirement

During system commissioning, emergency ports that must continue to receive power in the case of failure of primary power supply (to the PSE), shall be designated.

#### 4.2.3.2 Optional requirement

The Policy Controller may implement a powering policy that utilizes the classification of PDs (according to power consumption) to decide what class (es) of PDs are to be powered during limited power mode, and on which ports.

The present document does not define whether the association is with user (wherever his number is call forwarded to), terminal telephone number, terminal IP address, or physical port number. The Policy and PSE Controllers must be able to map (whether automatically or by manual input) between the physical port and the IP address of the device on that port, and handle the case of a subsidiary (possibly unmanaged) hub being connected to a port.

- The port to address mapping is required if priority terminals are defined by physical port.
- The address to port mapping is required if priority terminals are defined by IP address.

The Policy Controller must be able to maintain the list detailing which of the ports are permanently or temporarily assigned as normal ports and which are assigned as emergency ports. The Policy Controller must be able to maintain a list detailing what classes of PDs are to be powered. This includes the accepting, deleting and updating of entries into the list.

The present document does not define how the Policy Controller must accept, maintain or update a list detailing which ports under its control are emergency and which are normal, or what classes of PDs are to be powered.

### 4.2.4 PSE Controller requirements

The PSE Controller is an element or network management station external to the PSE that performs control functions. The intelligence could however be embedded in the PSE.

The functions of the PSE can include, but are not limited to:

- Instructs the PSE to switch off/on power to the PDs.
- Monitor power fail.
- Monitor power recovery.

### 4.2.5 PSE power fail management mechanism

#### 4.2.5.1 At loss of primary PSE power

When the normal power supply to the PSE fails (or on command from the PSE Controller), the PSE must switch to limited power mode. The time period that elapses after the power has failed and before the PSE switches to limited power mode is not specified. When the PSE is in limited power mode, the PSE Controller must manage and distribute available power to the PDs as follows:

NOTE: When power is removed from the MDI, then data should not be switched off. PDs that rely on their own (local) power or alternate power sources must still be able to continue operating.

##### 4.2.5.1.1 Minimum requirement

Remove power on ports not designated as emergency. Provide power on all ports designated as emergency.

##### 4.2.5.1.2 Optional requirement

Remove or provide power to PDs and on ports in accordance with the powering policy.

#### 4.2.5.2 During limited power mode

##### 4.2.5.2.1 Minimum requirement

When a PD is plugged in on a port not designated as emergency, then no power is provided. When a PD is plugged into a port designated as emergency, then power shall be provided.

##### 4.2.5.2.2 Optional requirement

When a PD is plugged in on a port, power is initially provided in order for the PSE to do a PD detection. Power shall then continue to be provided or removed according to the powering policy.

### 4.2.6 PSE power recovery

When the normal power supply to the PSE recovers, the PSE must exit the limited power mode and restore power to all ports as per the normal power mode where provisioning of power shall be in accordance with IEEE P802.3af [1].

The time period that elapses after the primary power to the PSE has been restored and before the PSE exits the limited power mode is not specified.

## 4.3 PD requirements

A PD is a device drawing some or all of its power from the MDI. In the context of the present document the device will normally be an IP telephone, but could also be an access control card reader, a security camera, or a portable music player that recharges its batteries while downloading the day's music. IP telephones could include address book, Web browser, and multimedia functions.

### 4.3.1 Physical characteristics

All the physical characteristics of a PD shall be according to IEEE P802.3af [1].

### 4.3.2 Emergency PD classification

During limited power mode, PDs connected to emergency ports will be powered.

In a power emergency situation, and depending on the powering policy implemented according to the advanced power fail management option, the supplier of the power may choose to supply only a specific class of PD and disconnect other classes of PDs.

In order to reduce PD consumption to a minimum, the powering policy may determine that only Class 1 PDs shall be powered. In this case the owner/user of an IP telephone that is required to remain operational under power emergency conditions must select a Class 1 PD. If a Class 1 PD cannot be selected, then local power must be provided.

Should the powering policy determine that only a specific class of PD is to be powered, then the PD may reduce power consumption to a different class as soon as local power failure is detected. Should the powering policy determine that a specific port(s) must remain operational, irrespective of the power consumption, then the owner/user of an IP telephone that is required to remain operational under power emergency conditions, need not select a Class 1 PD as an emergency PD, since all PD classes will be powered when connected to a port assigned as emergency.

The present document attempts to support devices which normally operate from a local power supply or the MDI in a higher classbut which can switch (automatically or manual) to a lower class possibly with limited functionality.

## 4.4 Safety requirements

There are no safety requirements in the present document. Safety standards are published by CENELEC.

# History

| Document history | | | |
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| V1.1.1 | May 2003 | Membership Approval Procedure | MV 20030718: 2003-05-20 to 2003-07-18 |
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