

**Environmental Engineering (EE);
Monitoring and control interface for
infrastructure equipment (Power, Cooling and
environment systems used in telecommunication networks);
Part 2: DC power system control and
monitoring information model**

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Reference

DES/EE-02037-2

Keywords

control, interface, management, power, system

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Foreword

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

The present document is part 2 of a multi-part deliverable covering Monitoring and control interface for infrastructure equipment (Power, Cooling and environment systems used in telecommunication networks), as identified below:

- Part 1: "Generic Interface";
- Part 2: "DC power system control and monitoring information model";**
- Part 3: "AC UPS power system control and monitoring information model";
- Part 4: "AC distribution power system control and monitoring information model";
- Part 5: "AC diesel back-up generator system control and monitoring information model";
- Part 6: "Air conditioning system control and monitoring information model";
- Part 7: "Other utilities system control and monitoring information model".

1 Scope

The present document applies to monitoring and control of DC power supply systems for telecommunication equipment.

The present document defines:

- The monitored and controlled DC power supply system architectures.
- The minimum set of exchanged information required at the interface, described in "natural language" in text tables.
- The XML files with tags and variables corresponding to the data in the tables.

2 References

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.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
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2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

- [1] ETSI ES 202 336-1: "Environmental Engineering (EE); Monitoring and Control Interface for Infrastructure Equipment (Power, Cooling and Building Environment Systems used in Telecommunication Networks); Part 1: Generic Interface".
- [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] ETSI EN 300 132-3: "Environmental Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 3: Operated by rectified current source, alternating current source or direct current source up to 400 V".
- [4] ETSI EN 302 099: "Environmental Engineering (EE); Powering of equipment in access network".

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

- [i.1] IEEE 802.1 to 11: "IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture".
- [i.2] ISO/IEC 10164 (all parts): "Information technology - Open Systems Interconnection".
- [i.3] ISO/IEC 8879: "Information processing - Text and office systems - Standard Generalized Markup Language (SGML)".
- [i.4] IEC 60896 (all parts): "Stationary lead-acid batteries".

3 Definitions and abbreviations

3.1 Definitions

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

NOTE: Terms referring to energy interface, equipment and distribution are described in power distribution standards EN 300 132-2 [2], EN 300 132-3 [3] for ac and dc interface and EN 302 099 [4] for access network equipment powering.

alarm: any information signalling abnormal state, i.e. different to specified normal state of hardware, software, environment condition (temperature, humidity, etc.).

NOTE: The alarm signal should be understood by itself by an operator and should always have at least one severity qualification or codification (colour, level, etc.). Example: rectifier failure, battery low voltage...

alarm loop: electrical loop which open or closed state correspond to alarm start (set) or end (clear) state

alarm message: text parts of the alarm structure

alarm structure: organized set of information fields in an alarm data frame (time stamp, set/clear, text, etc.)

battery: complete arrangement of battery cells or blocks in one string or more in parallel

battery block: battery cell (e.g. 2 V for lead-acid) connected and placed in the same container (forming 4 V, 6 V or 12 V blocks)

battery cell: basic electrochemical element (e.g. a 2 V nominal cell for a high capacity lead acid battery)

battery string: a number of serially interconnected battery blocks or cells

client post: any device (laptop, PDA, console, etc.) connected to servers via the operation system networks to perform maintenance or supervision operations

Control Unit (CU): integrated unit in an equipment to monitor and control this equipment through sensors and actuators

Control form Style Sheet (CSS): simple mechanism for adding style (e.g. fonts, colours, spacing) to Web documents. Tutorials, books, mailing lists for users, etc.

Data Gathering Unit (DGU): functional unit used for several functions:

- collect serial, digital, and analog data from several equipment;
- option to send (output) serial or digital commands;
- forward/receive information to/from the Local/Remote Management Application via agreed protocols;
- mediation between interfaces and protocols.

NOTE: This function may be integrated as part of specific equipment.

Dynamic Host Control Protocol (DHCP): protocol used for self configuration of TCP/IP parameters of a workstation assigning IP address and a subnetwork mask

NOTE: DHCP may also configure DNS.

Dynamic Name Server (DNS): associates a single domain name to an IP address

dynamic synoptic: dynamic display of geographical maps, networks, installations and equipment

Ethernet: LAN protocol

NOTE: Equivalent to IEEE 802.1 to 11 [i.1].

event: any information signalling a change of state which is not an alarm: e.g. battery test, change of state of battery charge

NOTE: The event signal should be understood by itself by an operator and should always have at least one severity qualification or codification (colour, level, etc.). It should be transmitted in a formatted structure with text message and other fields like for alarm, e.g. an event can be coded as an alarm with severity "0".

infrastructure equipment: power, cooling and building environment systems used in telecommunications centres and Access Networks locations

EXAMPLE: Cabinets, shelters, underground locations, etc.

intranet: internal company network generally using Ethernet protocol and extended IP addresses

logbook: chronological file that contains alarm and event messages may be paper or electronic

Management Information Base (MIB): dynamic data base that gathers all objects and should evolve to include automatic and manual configuration tools with self coherence tests

menu: list of possible input command choices that may be presented in different ways on a display

NOTE: Selection is normally made by a keyboard, a pointing device, a mouse or directly by finger on a sensitive screen.

object: class description of items that accept a set of properties or functions

NOTE: Generic objects can include more specific items and inherit from their properties. If correctly structured, object programming can allow the system to evolve, i.e. be more future-proof. The code should intrinsically be open and structured.

PHP: powerful tool for making dynamic and interactive Web pages

pop-up: information or command screen that appears when a menu choice is selected

NOTE: For example this may be a pop-up menu when the pointer is on a title button.

Representational State Transfer (REST): way to build an application for distributed system as www

Simple Object Access Protocol (SOAP): way to communicate between applications running on different operating systems, with different technologies and programming languages

NOTE: SOAP communicates over HTTP, because HTTP is supported by all Internet browsers and servers, SOAP traffic is not blocked by firewalls and proxy servers (see W3C).

Systems Management Function (SMF): object properties or classes with projection on CMIS application context communication

NOTE: Set of ISO system management functions according to ISO/IEC 10164 [i.2].

warning: low severity alarm

World Wide Web Consortium (W3C): consortium founded in October 1994 to develop common interoperable protocols and promote World Wide Web

NOTE: See <http://www.w3c.org>.

Windows: virtual area on the display that corresponds to a specific application

web: common name for the Internet or Intranet

XCU: CU enabled to communicate using XML interface as defined in the present document

XHTML: stricter and cleaner version of HTML. XHTML consists of all the elements in HTML 4.01 combined with the syntax of XML. It can be read by all XML browser (see W3C)

eXtensible Mark-up Language (XML): application profile or restricted form of SGML

NOTE: By construction, XML documents are conforming SGML the Standard Generalized Markup Language (ISO/IEC 8879 [i.3]). documents. XML is designed to describe data and focus on what data is. XML should be discerned from the well known Hypertext Transfer Mark-up Language (HTML) which was designed to display data and to focus on how data looks.

XML Schema Definition (XSD): new more detailed XML description compared to the previous one, the DTD

Extensible Style sheet Language (XSL): language for expressing style sheets

NOTE: It consists of two parts, a language for transforming XML documents, and an XML vocabulary for specifying formatting semantics. An XSL style sheet specifies the presentation of a class of XML documents by describing how an instance of the class is transformed into an XML document that uses the formatting vocabulary.

3.2 Abbreviations

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

CSS	Control form Style Sheet
CU	Control Unit of an equipment
DGU	Data Gathering Unit
DHCP	Dynamic Host Control Protocol
DNS	Dynamic Name Server
DTD	Document Type Definition
HTML	Hypertext Transfer Make-up Language
HTTP	Hypertext Transfer Protocol
I_{Av}	Average output load current (DC)
I_{Batt}	Total battery current (DC)
I_{Load}	Total output load current (DC)
IP	Internet Protocol
I_{Rect}	Total rectifier output current (DC)
LAN	Local Array Network
MIB	Management Information Base
MN	Management network

PHP	Hypertext Preprocessor
REST	REpresentational State Transfer
RMA	Remote Management Application
SMF	Systems Management Function
SOAP	Simple Object Access Protocol
TCP	Transmission Control Protocol for IP
W3C	World Wide Web Consortium
XCU	XML enabled CU
XML	eXtensible Markup Language (see W3C)
XSD	XML Schema Definition
XSL	Extensible Style sheet Language

4 DC power supply system

The DC system subset described in ES 202 336-1 [1] transforms AC interface from mains or AC back-up engine defined in EN 300 132-3 [3], in DC voltage on interface A defined in EN 300 132-2 [2] or EN 300 132-3 [3] for telecom centre or defined for local or remote power supply of access network equipment in EN 302 099 [4].

The DC power systems addressed by the present document are depicted in figures 1 and 2. One single control unit XCU can monitor and control several power cabinets through field bus. Field bus is outside the scope of the present document.

Mandatory monitoring/ supervision information and functions are given in annex A.

Non-mandatory (optional) monitoring/ supervision information and functions are given in annex B.

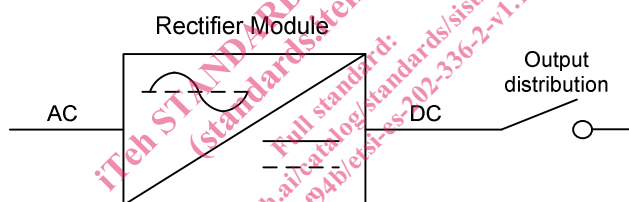


Figure 1: Simple DC power supply system with no battery backup

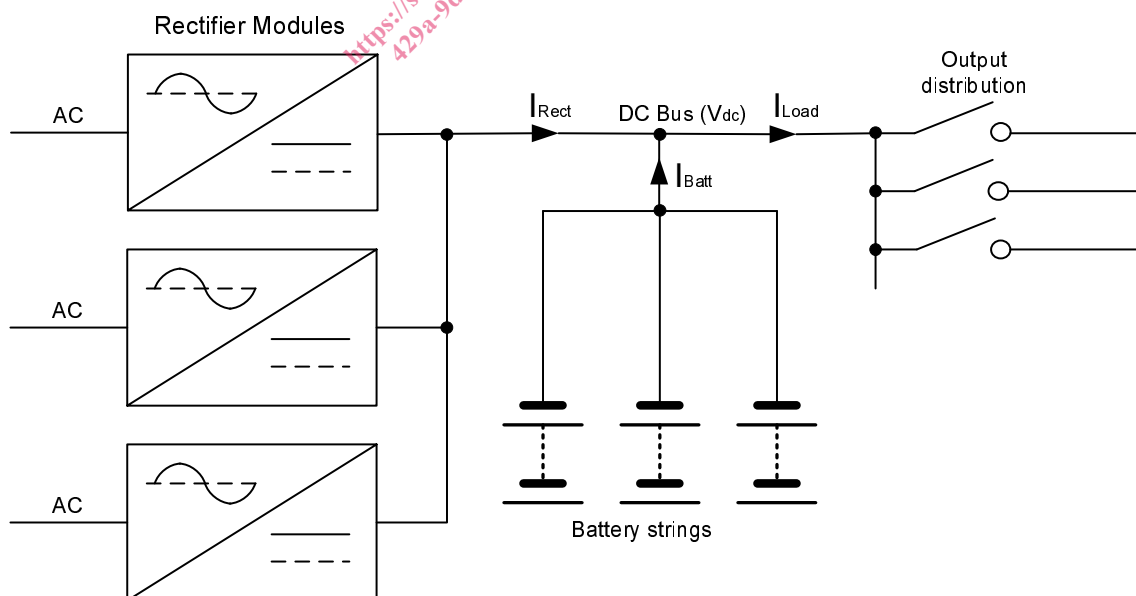


Figure 2: Modular DC power supply system with battery backup

The main elements of DC power supply systems are:

- rectifier (one or more) that converts AC voltage to DC voltage (i.e. 230 VAC to DC voltage)

NOTE: Other alternative energy sources may be used to provide DC power e.g. Photovoltaic, wind turbine, etc.

- battery (one or more strings of cells) that stores energy and can power the loads when AC interrupts or rectifiers fail. There can be test and permanent battery monitoring system to reduce the failure detection time and the MTTR
- protection and distribution (DC bus, breaker ...) to power different user loads and discriminate faults
- a system monitoring and control unit (XCU) to monitor voltage, current, power, temperature, etc., extend alarms and provide system control functionality

Several measurements are possible: rectifier states, rectifier voltage and current, battery voltage, current and temperature, user load currents ...

Several controls are possible to adjust rectifier voltage and current, to optimize the load between rectifiers for energy saving and higher reliability, to start a battery test procedure.

Table TP1 (Table Power in annex A) corresponds to mandatory data that shall be provided for a minimal DC system without back-up, and TP1x (see annex B) includes data that should be provided in addition to mandatory one.

Table TP2 (see annex B) corresponds to mandatory data that shall be provided for a common rectifier/battery DC system with back-up, and TP2x (see annex B) includes data that should be provided in addition to mandatory one.

Annex C standardizes XML coding structures for these data.

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