

ETSI ES 202 336-5 V1.1.1 (2010-04)

ETSI Standard

**Environmental Engineering (EE);
Monitoring and Control Interface for Infrastructure Equipment
(Power, Cooling and Building Environment Systems
used in Telecommunication Networks);
Part 5: AC diesel back-up generator system control and
monitoring information model**

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Reference

DES/EE-02037-5

Keywords

control, interface, management, power, system

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Sous-Préfecture de Grasse (06) N° 7803/88

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Foreword

This ETSI Standard (ES) has been produced by ETSI Technical Committee Environmental Engineering (EE).

The present document is part 5 of a multi-part deliverable covering Monitoring and Control Interface for Infrastructure Equipment (Power, Cooling and Building 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";
- Part 8: "Remote Power Feeding System control and monitoring information model".

1 Scope

The present document applies to monitoring and control of AC diesel back-up generator system for telecommunication equipment.

The document defines:

- The monitored and controlled back-up generator system architectures.
- The minimum set of exchanged information required at the interface, described in "natural language" in text tables.
- The XML 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.

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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 ES 202 336-2: "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".
- [3] ETSI EN 300 132-2: "Environmental Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 2: Operated by direct current (dc)".
- [4] 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".
- [5] ISO/IEC 10164: "Information technology -- Open Systems Interconnection -- Systems Management".

- [6] ISO/IEC 8879: "Information processing -- Text and office systems -- Standard Generalized Markup Language (SGML)".

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] ETSI TR 102 336: "Environmental Engineering (EE); Power and cooling system control and monitoring guidance".
- [i.2] ETSI TR 102 121: "Environmental Engineering (EE); Guidance for power distribution to telecommunication and datacom equipment".
- [i.3] IEEE 802.1 to 11: "LAN/MAN Standards".
- [i.4] ETSI ES 202 336-4: "Environmental Engineering (EE); Monitoring and Control Interface for Infrastructure Equipment (Power, Cooling and Building Environment Systems used in Telecommunication Networks); Part 4: AC distribution power system control and monitoring information model".

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 [3] for 48 Vdc and EN 300 132-3 [4] for ac and dc lower than 400 V.

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, etc.

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.)

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

Control form Style Sheet (CSS): simple mechanism for adding style (e.g. fonts, colours, spacing) to Web documents

NOTE: Tutorials, books, mailing lists for users, etc.

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

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.3].

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

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 [5].

warning: low severity alarm

Web: common name for the Internet or Intranet

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

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>.

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 [6]). documents.XML is designed to describe data and focus on what data is. XML must 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:

AC	Alternating Current
CU	Control Unit of an equipment
DGU	Data Gathering Unit
HTML	Hypertext Transfer Make-up Language
HTTP	Hypertext Transfer Protocol
IP	Internet Protocol
LAN	Local Array Network
MTTR	Mean Time To Repair
PLC	Programmable Logic Controller
RMA	Remote Management Application
TCP	Transmission Control Protocol for IP
XCU	XML enabled CU
XML	eXtensible Markup Language (see W3C)

4 Back-up generator system control and monitoring presentation

Some telecom or datacom site (datacenters) are powered by the public AC mains and are often backed-up by one or several generators when the mains voltage is either interrupted or out of predefined ranges of voltage, frequency or distortion.

The starting order may also come from the permanent power subsystem when a persistent battery discharge is observed.

The back-up generator described in ES 202 036-1 [1] is generally of diesel type and with AC interface output as defined in EN 300 132-3 [4].

The back-up generator is generally connected to the AC distribution power system that is monitored by interface ES 202 336-4 [i.4]. More information is given on the place of these back-up generators in the power system inside a telecom or data center in TR 102 121 [i.2].

It is possible that XCU be the same for back-up generator and AC distribution.

The back-up generator is composed of several well defined functions or circuits:

- engine (speed, temperature, speed, safety circuitry, etc.);
- alternator and power circuit (voltage, frequency, current);
- fuel tank and supply to the engine;
- water and air cooling circuit (fluid temperature, levels, circulation pumps, air, louvers, fans control, etc.);
- oil circuit (pressure, levels, preheating, etc.);
- starting devices system (battery voltage, starting speed, battery charger, etc.);
- electrical auxiliary circuit (auxiliary protection devices, power contactors, etc);
- a system monitoring and control unit (XCU) to monitor the back-up generator, extend alarms and provide system control functionality.

NOTE 1: AC mains may be monitored by the diesel generator control unit and/or by the AC distribution CU.

NOTE 2: A diesel generator system may comprise several XCU. An XCU can monitor and control each diesel generator, and be interfaced to the AC distribution XCU that monitors the public AC mains and transfer starting signal to diesel generator XCU in case of AC mains failure. Another option is that each equipment transfers information (alarm, measurement, etc.) to a DGU that may be associated with one of the equipment e.g. the diesel generator.

A permanent monitoring is performed even when engine is stopped to reduce the MTTR.

In addition, automatic starting/running test procedures and reports are very important for engine training and health check-up.

The Diesel AC back-up generator systems addressed by the present document are depicted in figure 1.