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Sistemi generatorjev vetrne turbine – 25-3. del: Komunikacije za spremljanje in nadzor vetrnih elektrarn – Modeli za izmenjavo informacij

Wind turbines – Part 25-3: Communications for monitoring and control of wind power plants – Information exchange models

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Title: Wind turbines - Part 25-3: Communications for monitoring and control of wind power plants – Information exchange models

Introductory note

This CDV contains a solution for communications for monitoring and control of wind power plants. IEC 61400-25 defines wind power plant specific information, the mechanisms for information exchange and the mapping to communication protocols.

IEC 61400-25 consists of the following parts, under the general title Communications for monitoring and control of wind power plants:

- Part 25-1 Overall description of principles and models
- Part 25-2: Information models Part 25-3: Information exchange models
- Part 25-4: Mapping to communication profilesist-en-61400-25-3-2007
- Part 25-5: Conformance testing

The documents have been drawn up by IEC TC88 Project Team 25, consisting of experts from many of the large vendors as well as representatives of utilities, consultants and suppliers of third-party products.

All parts are distributed for comments and voting simultaneously, as committee drafts for voting (CDV).

No major technical changes have been made as a result of the comments and proposals received on the CD (88/215/CD), most comments having been editorial.

ATTENTION	ATTENTION
CDV soumis en parallèle au vote (CEI) et à l'enquête (CENELEC)	Parallel IEC CDV/CENELEC Enquiry

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4	Part 25-3:
5	Communications for monitoring and control of wind power plants –
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2		INTERNATIONAL ELECTROTECHNICAL COMMISSION
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5		WIND TURBINES –
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7		Part 25-3:
8 9		Information exchange models
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10		FOREWORD
12 13 14 15 16 17 18 19 20	1)	The IEC (International Electrotechnical Commission) is a worldwide organisation for standardisation comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardisation in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organisations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organisation (ISO) in accordance with conditions determined by agreement between the two organisations.
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38 39	Tł pa	is committee draft for voting of the International Standard IEC 61400-25-3 has been pre- red by IEC technical committee 88: Wind turbines Project team 25.

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This publication has been drafted in accordance with the ISO/IEC Directives, Part 2. 40

IEC 61400-25 consists of the following parts, under the general title Communications for 41 monitoring and control of wind power plants: 42

- Overall description of principles and models¹ 43 Part 25-1:
- Information models¹ 44 Part 25-2:
- 45 Part 25-3: Information exchange models¹
- Part 25-4: Mapping to communication profile¹ 46
- Conformance testing¹ 47 Part 25-5:
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¹ To be published

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INTRODUCTION

This part of IEC 61400-25 is part of a set of specifications. IEC 61400-25 defines communication architecture for wind power plants. This architecture has been chosen to provide abstract definitions of classes and services such that the specifications are independent of specific protocol stacks, implementations, and operating systems. The mapping of these abstract classes and services to communication stacks is outside the scope of IEC 61400-25-3 and may be found in IEC 61400-25-4.

8 This part of IEC 61400-25 defines functions and services of the model of the information ex-9 change of intelligent electronic devices in wind power plants. The services are referred to as 10 the **abstract communication service interface** (ACSI) The ACSI has been defined so as to

11 be independent of the underlying communication systems.

- 12 The abstract information exchange interface is defined in terms of
- 13 a hierarchical class model of all information that can be accessed via a communication
 14 network
- 15 services that operate on these classes, and
- 16 parameters associated with each service
- The ACSI description technique abstracts away from all the different approaches to implementthe cooperation of the various devices.
- 19 These abstract service definitions shall be mapped into concrete object definitions that are to 20 be used for a particular protocol.

NOTE 1 Abstraction in ACSI has two meanings. First, only those aspects of a real device (for example, a rotor) or a real function that are visible and accessible over a communication network are modelled. This abstraction leads to the hierarchical class models and their behaviour defined in IEC 61400-25-2. Second, the ACSI abstracts from the aspect of concrete definitions on how the devices exchange information; only a conceptual cooperation is defined. The concrete information exchange is defined in IEC 61400-25-4.

NOTE 2 Performance of IEC 61400-25 implementations are application specific. The standard does not guarantee
 a certain level of performance. That's out of the scope. However there is no underlying limitation in the communica tions technology to prevent high speed application (millisecond level responses).

NOTE 3 The standard IEC 61400-25 has a close relation with other IEC projects like IEC 61850 Addendum 1
 (Communication networks and systems in substation, Power Quality Monitoring), IEC 62350 (Communications Systems for Distributed Energy Resources (DER)), and IEC 62344 (Hydroelectric power plants – Communication for monitoring and control).

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 Information exchange models

7 **1 Scope**

8 The focus of IEC 61400-25 is on the communications between wind power plant components 9 such as wind turbines and actors such as SCADA Systems. Internal communication within 10 wind power plant components is outside the scope of this standard.

11 IEC 61400-25 is designed for a communication environment supported by a client-server 12 model. Three areas are defined, that are modelled separately to ensure the scalability of im-13 plementations: (1) wind power plant information models, (2) information exchange model, and 14 (3) mapping of these two models to a standard communication profile.

15 The wind power plant information model and the information exchange model, viewed together, constitute an interface between client and server. In this conjunction, the wind power 16 plant information model serves as an interpretation frame for available wind power plant data. 17 The wind power plant information model is used by the server to offer the client a uniform. 18 component-oriented view of the wind power plant data. The information exchange model re-19 20 flects the whole active functionality of the server. IEC 61400-25 enables connectivity between 21 a heterogeneous combination of client and servers from different manufacturers and suppli-22 ers.

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As depicted in Figure 1 IEC 61400-25 defines mainly a server with the following aspects:

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- information provided by a real application of a wind power plant component, e. g.,
 "wind turbine rotor speed" or "total power production of a certain time interval" is modelled and made available for access. The information modelled in the standard is defined in part IEC 61400-25-2.
- 28 services to exchange values of the modelled information defined in part IEC 61400 29 25-3
- 30 **mapping to** a communication profile, providing a protocol stack to carry the ex-31 changed values from the modelled information (part IEC 61400-25-4)

32 IEC 61400-25 only defines how to model the information, information exchange and mapping 33 to specific communication protocols. The standard excludes a definition of how and where to 34 implement the communication interface. However, the objective of the standard is that the in-35 formation associated with a single wind power plant component (such as the wind turbine) is 36 accessible through a corresponding logical device.

- This part of IEC 61400-25 specifies an abstract interface (the abstract messages) describing
 information exchange between a client and a server for
- 39 data access and retrieval
- 40 device control
- 41 event reporting and logging
- 42 publisher/subscriber
- 43 self-description of devices (device data dictionary)

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1 - data typing and discovery of data types

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1 2 Normative references

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

- 5 IEC 61400-25-1, Communications for monitoring and control of wind power plants Overall
 6 description of principles and models²
- 7 IEC 61400-25-2, Communications for monitoring and control of wind power plants Informa 8 tion models³
- 9 IEC 61850-7-2:2003, Communication networks and systems in substations Part 7-2: Basic
- 10 communication structure for substations and feeder equipment Abstract communication ser-
- 11 vice interface (ACSI)

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² Under preparation

³ Under preparation

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1 3 Terms and definitions

2 For the purpose of this document, the following terms and definitions apply.

3 **3.1**

4 actor

role a system plays in the context of monitoring and control, while it is not directly involved in
wind power plant operation, such as Supervisory Control and Data Acquisition System
(SCADA). There are a lot of other designations e.g. Central Management System (CMS),
Monitoring and Control System, Remote Control System.

9 3.2

10 alarm

- 11 wind power plant state information. Statement of safety intervention by the wind turbine con-
- 12 trol system (on/off/warning/acknowledged).

13 **3.3**

- 14 command
- 15 controllable data for system behaviour (enable/disable, enumeration).

16 **3.4**

17 communication function

used by an actor to configure, perform and monitor the information exchange with wind powerplants, e.g. operational and management function.

20 **3.5**

21 control

- 22 operational function used for changing and modifying, intervening, switching, controlling, pa-23 rameterisation and optimising of wind power plants.
 - https://standards.iteh.ai/catalog/standards/sist/8196ab35-ab02-4a2e-9f69-
- 24 **3.6**

25 data retrieval

26 operational function used for archiving, exporting and restoring of wind power plant data.

27 **3.7**

28 diagnostics

29 management function used to set up and provide for self-monitoring of wind power plant com-30 ponents.

31 **3.8**

- 32 event
- 33 wind power plant state information. State transition (status, alarm, command).

34 **3.9**

- 35 function
- 36 a function is a task that is performed in the control centre or the wind power plant. Generally,
- 37 a function consists of sub functions that exchange data with each other. Depending on the
- 38 function definition, functions themselves exchange data with other functions.

39 **3.10**

40 **IED**

- intelligent Electronic Device e.g. wind turbine controller. An IED may have connections as a
 client, or as a server, or both, with other IED. An IED is, therefore, any device incorporating
 one or more processors, with the capability to receive data from an external sender or to send
- 43 one or more processors, with the capability to rece
 44 data to an external receiver.