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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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Secretary: A.C. van der Giessen	THIS DOCUMENT IS STILL UNDER STUDY AND SUBJECT TO CHANGE. IT SHOULD NOT BE USED FOR REFERENCE PURPOSES. RECIPIENTS OF THIS DOCUMENT ARE INVITED TO SUBMIT, WITH THEIR COMMENTS, NOTIFICATION OF ANY RELEVANT PATENT RIGHTS OF WHICH THEY ARE AWARE AND TO PROVIDE SUPPORTING DOCUMENTATION.	

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 profile
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**

WIND TURBINES

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

Version: 61400-25-3_R0-4 Draft1CDV_2005-07-11

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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WIND TURBINES –

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

FOREWORD

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 for Standardisation (ISO) in accordance with conditions determined by agreement between the two organisations.

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6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

This committee draft for voting of the International Standard IEC 61400-25-3 has been prepared by IEC technical committee 88: Wind turbines Project team 25.

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

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[1]

Part 25-2: Information models[1]

Part 25-3: Information exchange models[1]

Part 25-4: Mapping to communication profile[1]

Part 25-5: Conformance testing[1]

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[1] To be published

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.

This part of IEC 61400-25 defines functions and services of the model of the information exchange of intelligent electronic devices in wind power plants. The services are referred to as the **abstract communication service interface** (ACSI) The ACSI has been defined so as to be independent of the underlying communication systems.

The abstract information exchange interface is defined in terms of

– a hierarchical class model of all information that can be accessed via a communication network

– services that operate on these classes, and

– parameters associated with each service

The ACSI description technique abstracts away from all the different approaches to implement the cooperation of the various devices.

These abstract service definitions shall be mapped into concrete object definitions that are to 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 communications 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).

WIND TURBINES –

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

1 Scope

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

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

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 plant information model serves as an interpretation frame for available wind power plant data. The wind power plant information model is used by the server to offer the client a uniform, component-oriented view of the wind power plant data. The information exchange model reflects the whole active functionality of the server. IEC 61400-25 enables connectivity between a heterogeneous combination of client and servers from different manufacturers and suppliers.

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

- **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.

- **services to exchange** values of the modelled information defined in part IEC 61400-25-3

- **mapping to** a communication profile, providing a protocol stack to carry the exchanged values from the modelled information (part IEC 61400-25-4)

IEC 61400-25 only defines how to model the information, information exchange and mapping to specific communication protocols. The standard excludes a definition of how and where to implement the communication interface. However, the objective of the standard is that the information associated with a single wind power plant component (such as the wind turbine) is 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

- data access and retrieval
- device control
- event reporting and logging
- publisher/subscriber
- self-description of devices (device data dictionary)

– data typing and discovery of data types

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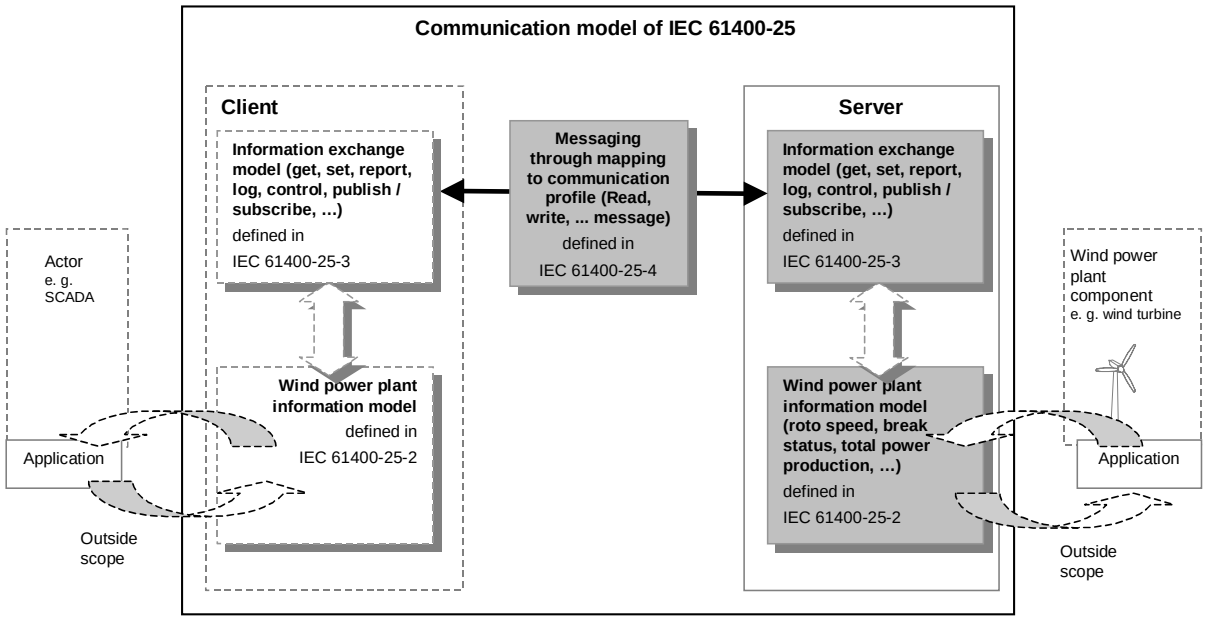

Figure 1 – Conceptual communication model of IEC 61400-25

NOTE 1 IEC 61400-25-3 excludes definition of an application program interface and implementation recommendations.

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.

IEC 61400-25-1, Communications for monitoring and control of wind power plants – Overall description of principles and models[2]

IEC 61400-25-2, Communications for monitoring and control of wind power plants – Information models[3]

IEC 61850-7-2:2003, *Communication networks and systems in substations – Part 7-2: Basic communication structure for substations and feeder equipment – Abstract communication service interface (ACSI)*

[2] Under preparation

[3] Under preparation

3 Terms and definitions

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

3.1
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.

3.2
alarm
wind power plant state information. Statement of safety intervention by the wind turbine control system (on/off/warning/acknowledged).

3.3
command
controllable data for system behaviour (enable/disable, enumeration).

3.4
communication function
used by an actor to configure, perform and monitor the information exchange with wind power plants, e.g. operational and management function.

3.5
control
operational function used for changing and modifying, intervening, switching, controlling, parameterisation and optimising of wind power plants.

3.6
data retrieval
operational function used for archiving, exporting and restoring of wind power plant data.

3.7
diagnostics
management function used to set up and provide for self-monitoring of wind power plant components.

3.8
event
wind power plant state information. State transition (status, alarm, command).

3.9
function
a function is a task that is performed in the control centre or the wind power plant. Generally, a function consists of sub functions that exchange data with each other. Depending on the function definition, functions themselves exchange data with other functions.

3.10
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 data to an external receiver.