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ENERGY INDUSTRY STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

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NB/T 31067-2015

Communications for monitoring and control of wind power plants - Information models

风力发电场监控系统通信 信息模型

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Foreword

This document was issued on 2 April 2015 by the National Energy Administration of the PRC and takes effect on 1 September 2015.

It is a NB/T standard: recommended rather than compulsory, but it is the text a Chinese reviewer applies when assessing a submission.

It is classified under ICS 27.180, Chinese classification F11.

This standard was drafted in accordance with the rules given in GB/T 1.1-2009 Directives for standardization - Part 1: Structure and drafting of standards.

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Attention is drawn to the possibility that some of the elements of this standard may be the subject of patent rights. The issuing body of this standard shall not be held responsible for identifying any or all such patent rights.

This standard is used together with NB/T 31068-2015, NB/T 31069-2015 and NB/T 31070-2015, which together form a series of standards.

IEC 61400-25 is divided into six parts: IEC 61400-25-1 Wind turbines - Part 25-1: Communications for monitoring and control of wind power plants - Overall description of principles and models; IEC 61400-25-2 Part 25-2: Information models (identically adopted as NB/T 31067-2015); IEC 61400-25-3 Part 25-3: Information exchange models (identically adopted as NB/T 31068-2015); IEC 61400-25-4 Part 25-4: Mapping to communication profile (identically adopted as NB/T 31069-2015); IEC 61400-25-5 Part 25-5: Conformance testing (identically adopted as NB/T 31070-2015); IEC 61400-25-6 Part 25-6: Logical node classes and data classes for condition monitoring.

For ease of use, the following editorial changes have been made to this standard: a) "IEC 61400-25-2:2006" has been changed to "this standard"; b) the informative summary elements of IEC 61400-25-2:2006 (including the cover, table of contents and foreword) have been deleted; c) the introduction of IEC 61400-25-2:2006 has been retained, and a national foreword has been added to this standard.

This standard was proposed by the China Electricity Council.

This standard is under the jurisdiction of the Energy Industry Wind Power Standardization Technical Committee.

Main drafting organizations of this standard: Beijing Yueneng Technology Co., Ltd., Beijing Corona Science and Technology Co., Ltd., Datang Jiaonan Wind Power Co., Ltd., Huadian Fuxin Energy Co., Ltd., China Electric Power Research Institute, Beijing Guangyao Energy Technology Co., Ltd., and Northeastern University.

Main drafters of this standard: Zhao Zigang, Zhu Zhiliang, Zhu Yongfeng, Zhang Jian, Chen Xiaoqing, E Chunliang, Feng Cheng, Li Yujun, Ji Haifeng, Huang Zhijun, Chen Jinhong, Wang Chengzhou, Qu Chunhui, Chi Yongning and Wu Jingbo.

Opinions or suggestions arising during the implementation of this standard should be fed back to the Standardization Management Center of the China Electricity Council (No. 1, Lane 2, Baiguang Road, Beijing, 100761).

Introduction

The IEC 61400-25 series defines communications for monitoring and control of wind power plants. The series has chosen a modelling approach based on abstract definitions of classes and services, so that the specifications are independent of specific protocol stacks, implementations and operating systems. The mapping of these abstract classes and

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services to specific communication profiles is not within the scope of this part, but is described in NB/T 31069-2015 of this series.

To achieve interoperability, all data in the information model need a strict definition with regard to syntax and semantics. The semantics of the data are mainly provided by the names assigned to the logical nodes and the data they contain, as defined in IEC 61400-25-2. The more that is defined, the easier interoperability becomes.

It should be noted that data with full semantics are only one element of interoperability. Since data and services are hosted by devices (such as intelligent electronic devices, IED), a suitable device model also requires compatible domain-specific services (see IEC 61400-25-3).

This standard specifies in detail the abstract definitions of logical device classes, logical node classes, data classes and abstract common data classes. These abstract definitions are mapped to concrete object definitions, that is, to a specific protocol.

This standard defines compatible logical node names and data names whose associated semantics are fixed.

NOTE: Performance of the IEC 61400-25 series is an application-specific characteristic. The IEC 61400-25 series does not require a particular performance level, which is outside its scope. However, there is no inherent limitation in the communication technology that prevents high-speed applications (millisecond-level response).

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1 Scope

NB/T 31067-2015 is the Chinese identical adoption of IEC 61400-25-2:2006, and it defines the information models used for communication in the monitoring and control of wind power plants. It is the part of the IEC 61400-25 family that fixes what the data actually is, so that a SCADA system can talk to turbines from any manufacturer without a custom driver for each. The standard builds on the IEC 61850 modelling approach. It sets out the scope, the normative references, the terms and the abbreviations - some two hundred and twenty of them, used to compose data names - and then the general principles of the information model: logical devices, logical nodes, data objects and common data classes, and how they are named and structured. The heart of the document is the definition of the wind power plant logical nodes: the common nodes for the device and its physical properties, and the wind-specific nodes for the turbine as a whole, the rotor, the transmission, the generator, the converter, the nacelle, the yaw system, the tower, the meteorological measurement, the alarm handling and the plant-level functions. For each logical node the standard tables every data object it contains, with its common data class, its meaning and whether it is mandatory or optional. The common data classes specific to wind power follow, and the annexes give the value definitions and the mapping of statuses. Note that a few terms in the Chinese text are rendered differently from the IEC original; the IEC meaning governs.

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This series of standards specifies general requirements for communication between the components of a wind power plant (such as wind turbines) and actors (such as SCADA systems). Communication internal to the individual components of the wind power plant is outside the scope.

The series applies to a communication environment supported by a client-server model and defines the following three areas, each modelled separately to ensure extensibility of the implementation: 1) the wind power plant information model; 2) the information exchange model; 3) the mapping of the information model and the information exchange model to standard communication profiles.

The wind power plant information model and the information exchange model together form an interface between client and server. As an interpretation framework for accessing wind power plant data, the information model provides the client, through the server, with uniform, component-based wind power plant data. The information exchange model reflects the complete set of functions available at the server. The series gives general applicability to access between different clients and servers from different manufacturers and suppliers.

As shown in Figure 1, the server defined by this series comprises the following aspects: information provided by wind power plant components, such as "wind turbine rotor speed" or "total power generated in a given period of time", which is modelled and can be accessed effectively; services for exchanging the modelled information values, defined in NB/T 31068-2015 of this series; and the mapping to a communication profile, providing a protocol stack for obtaining the exchanged values from the modelled information (NB/T 31069 of this series).

Figure 1 - Communication model concept: the client and the server each contain the information exchange model (get, set, report, log, control, publish, subscribe, etc.) defined in NB/T 31068-2015 and the wind power plant information model (rotor speed, stop status, total power generation, etc.) defined in NB/T 31067; the information is exchanged through the mapping to a communication profile (read, write, etc.) defined in NB/T 31069-2015. The actor (e.g. SCADA) and its application on the client side, and the wind power plant component (e.g. a wind turbine) and its application on the server side, are outside the scope.

This series only defines how information is modelled, exchanged and mapped to specific communication protocols; it does not contain recommendations on how and where to implement the communication interface, the application program interface or the implementation. However, the objective of the series is to obtain information related to a single wind power plant component (such as a wind turbine) through the corresponding logical devices.

This standard specifies in detail the information models of devices and functions related to wind power plant applications, and in particular the compatible logical node names and

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