INTERNATIONAL STANDARD

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Wind turbines –

Part 25-2:
Communications for monitoring and control of wind power plants – Information models

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

WIND TURBINES –

Part 25-2: Communications for monitoring and control of wind power plants – Information models

FOREWORD

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International Standard IEC 61400-25-2 has been prepared by IEC technical committee 88: Wind turbines.

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

The text of this standard is based on the following documents:

FDIS	Report on voting
88/275/FDIS	88/281/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

A list of all parts of the IEC 61400 series, under the general title *Wind turbines* can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

INTRODUCTION

The IEC 61400-25 series defines communication for monitoring and control of wind power plants. The modeling approach of the IEC 61400-25 series has been selected 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 a specific communication profile is not within the scope of this part of the IEC 61400-25 series but within the scope of future IEC 61400-25-4[1].

To reach interoperability, all data in the information model need a strong definition with regard to syntax and semantics. The semantics of the data is mainly provided by names assigned to logical nodes and data they contain, as defined in this part of the IEC 61400-25 series. Interoperability is easiest if as much as possible of the data are defined as mandatory.

It should be noted that data with full semantics is only one of the elements required to achieve interoperability. Since data and services are hosted by devices (IED), a proper device model is needed along with compatible domain specific services (see IEC 61400-25-3).

This part is used to specify the abstract definitions of a logical device class, logical node classes, data classes, and abstract common data classes. These abstract definitions are mapped into concrete object definitions that are to be used for a particular protocol.

The compatible logical node name and data name definitions found in this part and the associated semantics are fixed.

NOTE Performance of the IEC 61400-25 series implementations are application specific. The IEC 61400-25 series does not guarantee a certain level of performance. This is beyond the scope of the IEC 61400-25 series. However, there is no underlying limitation in the communications technology to prevent high speed application (millisecond level responses).

[1] To be published.

WIND TURBINES –

Part 25-2: Communications for monitoring and control of wind power plants – Information models

1 Scope

The focus of the IEC 61400-25 series 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 the IEC 61400-25 series.

The IEC 61400-25 series 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 accessible 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. The IEC 61400-25 series enables connectivity between a heterogeneous combination of client and servers from different manufacturers and suppliers.

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

– information provided by a wind power plant component, for example “wind turbine rotor speed” or “total power production of a certain time interval”, is modelled and made available for access.
– services to exchange values of the modelled information defined in IEC 61400-25-3.
– mapping to a communication profile, providing a protocol stack, to carry the exchanged values from the modelled information (IEC 61400-25-4).

The IEC 61400-25 series 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, the application program interface and implementation recommendations. However, the objective of the standard is that the information associated with a single wind power plant component (such as a wind turbine) is accessible through a corresponding logical device.

IEC 61400-25-2 specifies the information model of devices and functions related to wind power plant applications. In particular, it specifies the compatible logical node names, and data names for communication between wind power plant components. This includes the relationship between logical devices, logical nodes and data. The names defined in the IEC 61400-25 series are used to build the hierarchical object references applied for communicating with components in wind power plants.

This part of IEC 61400-25 specifies common attribute types and common data classes related to wind turbine applications. In particular it specifies common data classes for:

- setpoint value,
- status value,
- alarm,
- command,
- event counting,
- state timing,
- alarm set status.

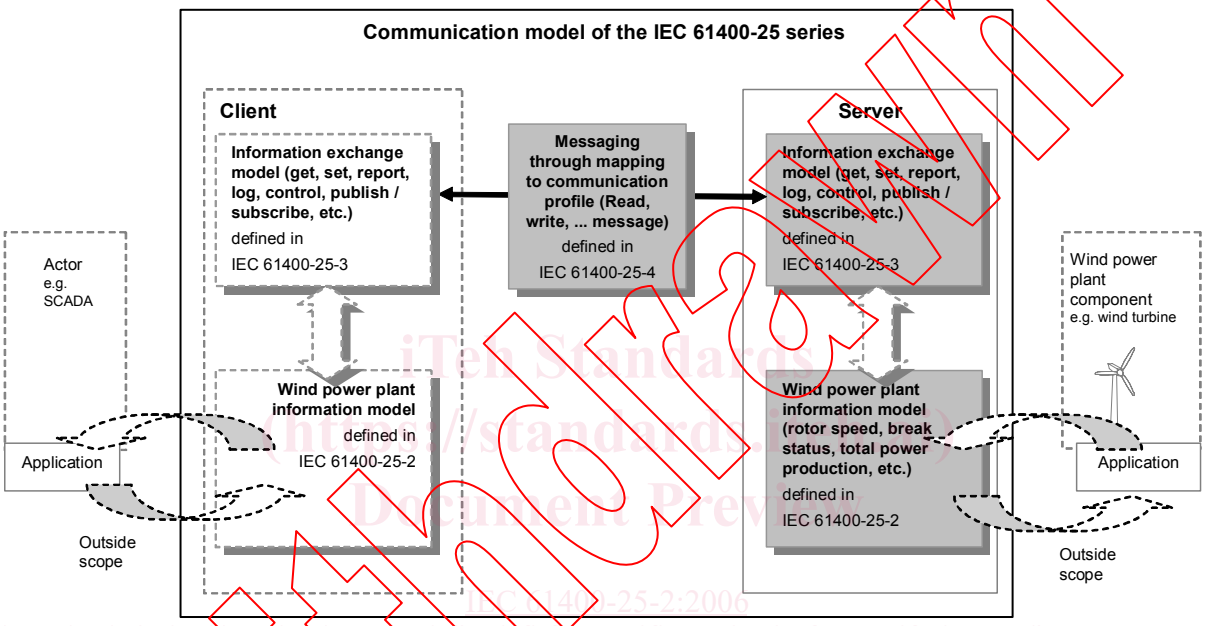

Figure 1 – Conceptual communication model of the IEC 61400-25 series

Devices implementing the information model of this part shall choose one or more logical nodes as required by the application.

NOTE 1 The IEC 61400-25 series focuses on the common, non-vendor-specific information. Those information items that tend to vary greatly between vendor-specific implementations can for example be specified in bilateral agreements or by user groups.

NOTE 2 This part does not provide tutorial material.

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 (all parts), *Wind turbines - Part 25: Communications for monitoring and control of wind power plants*

IEC 61850-5, *Communication networks and systems in substations – Part 5: Communication requirements for functions and device models*

IEC 61850-7-1:2003, *Communication networks and systems in substations – Part 7-1: Basic communication structure for substations and feeder equipment – Principles and models*

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)*

IEC 61850-7-3, *Communication networks and systems in substations – Part 7-3: Basic communication structure for substations and feeder equipment – Common data classes*

IEC 61850-7-4, *Communication networks and systems in substations – Part 7-4: Basic communication structure for substations and feeder equipment – Compatible logical node classes and data classes*

ISO 639 (all parts), *Codes for the representation of names of languages*

ISO 1000, *SI units and recommendations for the use of their multiples and of certain other units*

ISO 3166 (all parts), *Codes for the representation of names of countries and their subdivisions*

RFC 2445, *Internet Calendaring and Scheduling Core Object Specification (iCalendar)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61400-25-1 as well as the following apply.

3.1
conditional
attribute of a common data class provided by an implementation of the IEC 61400-25 series if a certain condition corresponding with the attribute is true

3.2
mandatory
defined content shall be provided in compliance with the IEC 61400-25 series

3.3
optional
defined content can be optionally provided in compliance with the IEC 61400-25 series

4 Abbreviated terms

CDC	Common Data Class
DC	Data Class
IED	Intelligent Electronic Device
LCB	Log Control Block
LD	Logical Device
LN	Logical Node
LPHD	Logical node Physical Device Information
RCB	Report Control Block
SBO	Select Before Operate
WPP	Wind Power Plant
WT	Wind Turbine
XML	Extensible Markup Language

Abbreviated terms used to build names of data classes found in LNs shall be as listed below.

EXAMPLE RotPos is constructed by using two names "Rot" which stands for Rotor and "Pos" which stands for "Position". Thus the concatenated name represents a "Rotor Position".

Term	Description
A	Current
AC	AC
Ack	Acknowledge
Acs	Access
Act	Actual
Alm	Alarm
An	Analogue
Ane	Anemometer
Ang	Angle
Alt	Altitude
At	Active (real)
Atv	Activate
Av	Average
Avl	Availability
Az	Azimuth
Bec	Beacon
Bl	Blade
Blk	Blocked
Brg	Bearing
Brk	Brake
Cab	Cable
Calc	Calculation
Ccw	Counter clockwise
Ch	Characteristic
Chg	Change
Chk	Check
Chrg	Charge
Cl	Cooling
Cm	Command
Cnv	Converter
Ct	Counting
Ctl	Control
Cw	Clockwise
d	Description
Dat	Data
Db	Deadband
DC	DC (Direct Current)
Dcl	DC-link
Dec	Decrease
Dehum	De-humidifier
Del	Delta
Det	Detection
Dir	Direction
Disp	Displacement
Dly	Daily
Dmd	Demand
Drv	Drive
Dn	Down
Egy	Energy

Term	Description
Elev	Elevator
Emg	Emergency
En	Enable
Ent	Entrance
Ety	Empty
Evt	Event
Ex	External
Exp	Expired
Ext	Excitation
Flsh	Flash
Flt	Fault
Ftr	Filter
Gbx	Gearbox
Gra	Gradient
Gri	Grid
Gn	Generator
Gs	Grease
Hi	High
Hly	Hourly
Hor	Horizontal
Ht	Heating
Htex	Heat-exchanger
Hum	Humidity
Hy	Hydraulic
Hz	Frequency
Ice	Ice
Id	Identifier
Idl	Idling
Inc	Increase
Inj	Injection
Inl	Inline
Inlet	Inlet
Inst	Instantaneous
Intl	Internal
Lev	Level
Log	Log
Lift	Lift
Lim	Limit
Lo	Low
Lu	Lubrication
Lum	Luminosity
Man	Manual
Max	Maximum
Met	Meteorological
Min	Minimum
Mly	Monthly
Mod	Mode
Mthd	Method
Mul	Multiplier

Term	Description
Mx	Measurement
Nac	Nacelle
Num	Number (size)
Of	Off line
Oil	Oil
Op	Operate, Operating
Oper	Operator
Ov	Over
Per	Period, Periodic
PF	Power factor
Ph	Phase
Pmp	Pump
Pl	Plant
Plu	Pollution
Pos	Position
Pres	Pressure
Prod	Production
Pt	Pitch
Ptr	Pointer
Pwr	Power
q	Quality
Rdy	Ready
Rep	Report
Rms	Root-mean-square
Rng	Range
Roof	Roof
Rot	Rotor (windturbine)
Rs	Reset
React	Reactive
Rtr	Rotor (generator)
Sdv	Standard deviation
Sev	Severity
Seq	Sequence
Shf	Shaft
Smk	Smoke
Smp	Sampled
Sp	Setpoint
Spd	Speed
Src	Source
St	Status
Sta	Stator
Stdby	Standby
Stop	Stop
Str	Start
Sw	Switch
Sys	System
t	Timestamp
Tm	Timer
Tmp	Temperature
Tot	Total
Tow	Tower

Term	Description
Tra	Transient
Trf	Transformer
Trg	Trigger
Torq	Torque
Tur	Turbine
Un	Under
Urg	Urgent
V	Voltage
VA	Apparent power
Val	Value
Vals	Values
Ver	Vertical
Vib	Vibration
Vis	Visibility
Wd	Wind (power)
Wly	Weekly
Wup	Windup
Xdir	X-direction
Ydir	Y-direction
Yly	Yearly
Yw	Yaw