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Introduction to IEC 61400-25

"Communications for monitoring and control of wind power plants"

IEC 61400-25 User group - USE61400-25



Why a standard for wind power?

Objectives for the IEC 61400-25:

- Provide a uniform communication platform for monitoring and control of wind power plants
- Perform a way to minimize the communication barriers arising from the wide variety of proprietary protocols, data labels, data semantics etc.
- Offering the possibility to manage different wind power plants independently of the vendor specific SCADA systems
- Enable components from various vendors to easily communicate with other subsystems, at any location, at any time
- Applying modern software object-oriented software technology, data structures, enabling more efficient handling and presentation of information from wind power plants
- Maximize scalability, connectivity, and interoperability in order to **reduce total cost of ownership or cost of energy**



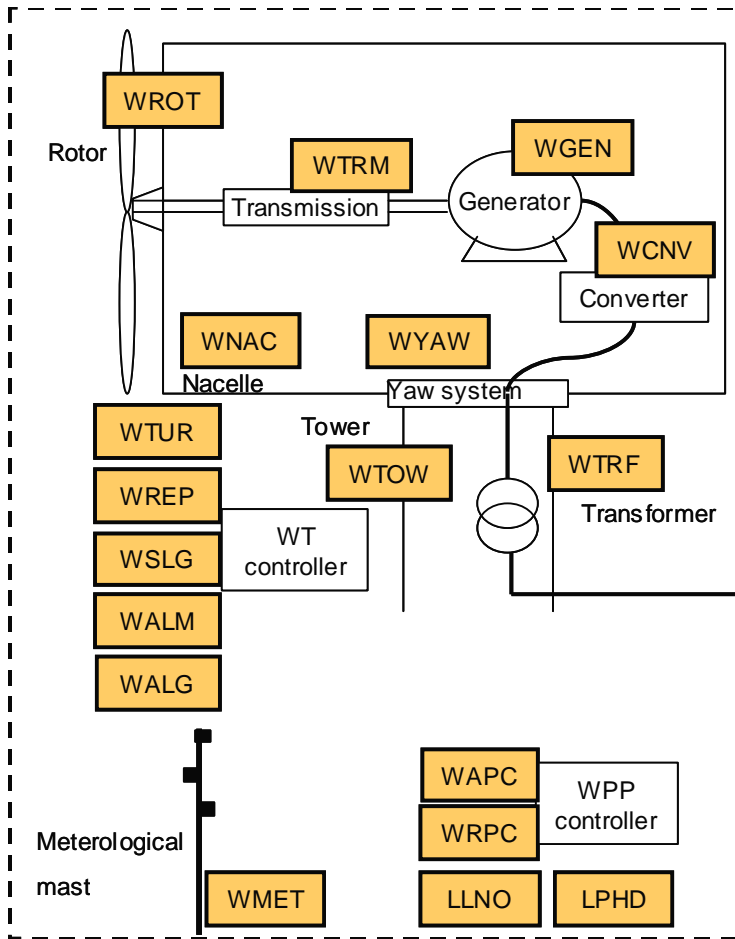
IEC 61400-25 Scope

The scope of the IEC 61400-25 standard is as follows:

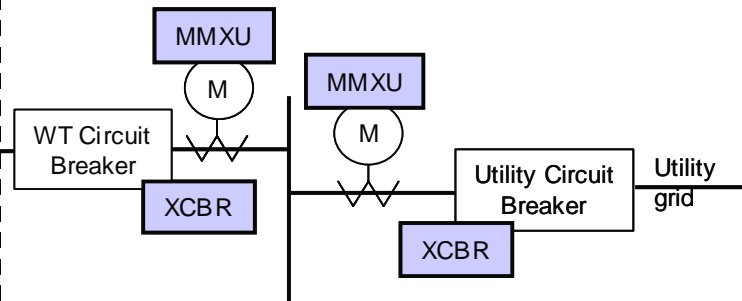
- Addressing all communication means between **wind power plant components** such as wind turbines and **actors** such as SCADA systems and dispatch centres
- Applies to any wind power plant operational concept, i.e., both in individual and integrated operations
- The application area of IEC 61400-25 covers all components required for the operation of wind power plants including the meteorological subsystem, the electrical subsystem and the wind power plant management system
- IEC 61400-25 defines how to
 - model the information
 - perform information exchange
 - map specific communication protocols stacks
 - perform conformance testing
- The wind power plant specific information given in IEC 61400-25 is build on the common data classes specified in thee IEC 61850 series of standards
- The standard excludes a definition of how and where to implement the communication interface and thereby enable any topology to be applied



IEC 61400-25-2 Wind Power Plant information



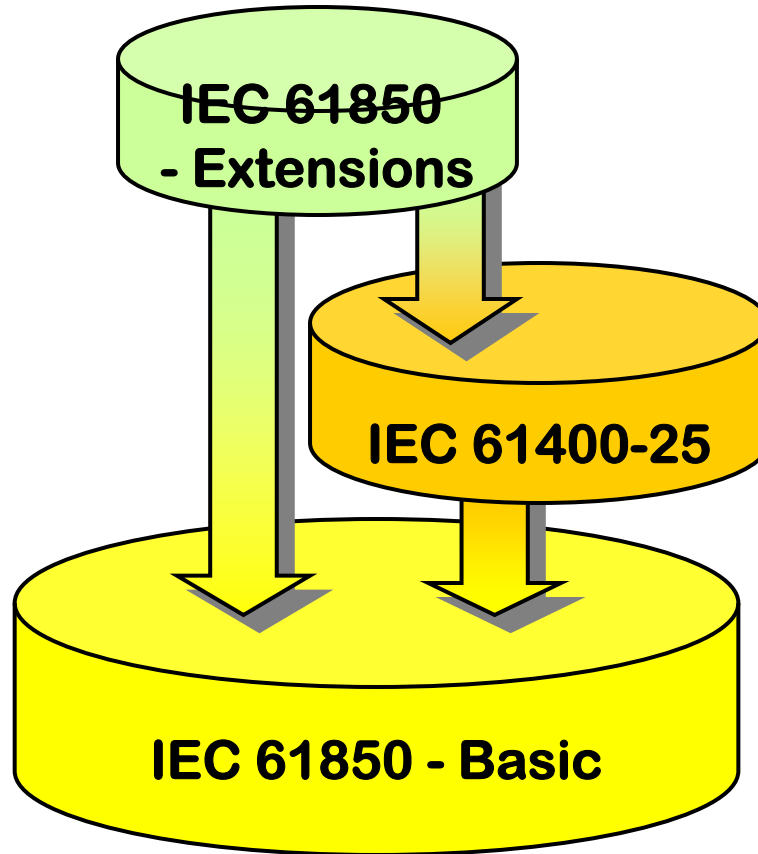
- One method to model different wind turbines
- Additional components: met.stations, alarm/event logs, active/reactive power control, CMS.
- Raw source data from WPP components processed into specified information.



- Additional process information available: 10 min-avg, alarms, logs, counters, timers,...



IEC 61400-25 Introduction – platform



Hydro, Solar,
Fuel Cell, ...

Wind Power
2006 - ...

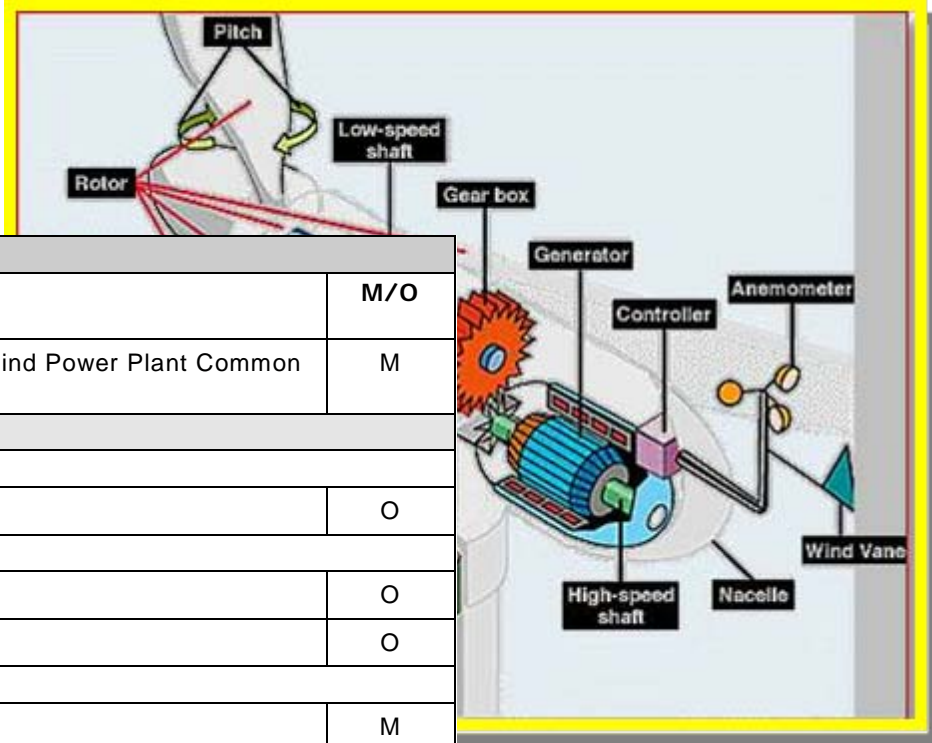
Substations (HV, MV),
SCADA, 1995 - 2003
Power Quality, 2006



IEC 61400-25-2 Information model

Drawing developed by the U.S. Department of Energy - Wind Energy Program

Hierarchical structure of information with standardized names, semantics and data types

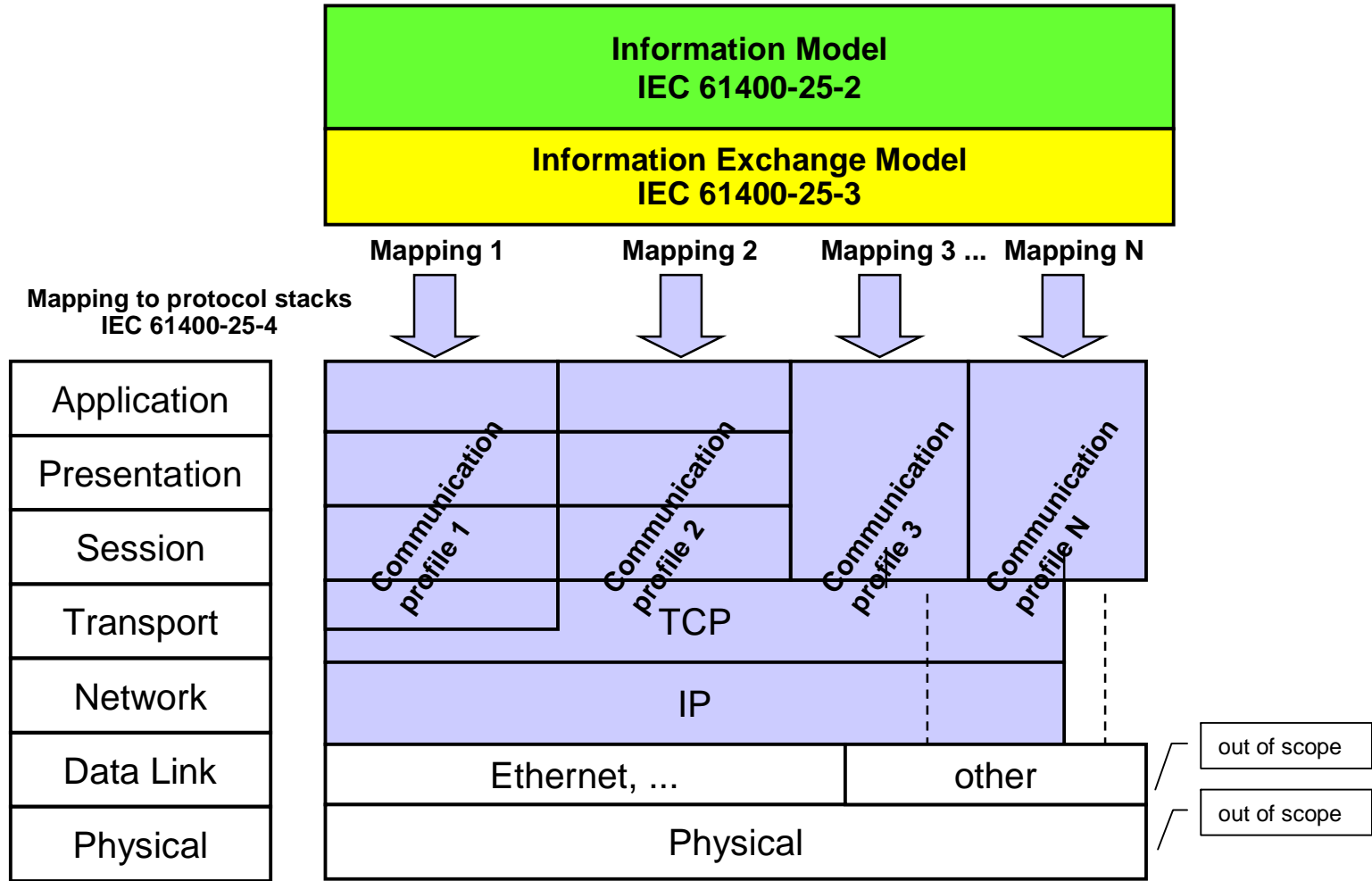


WGEN class			
Attribute name	Attribute type	Explanation	M/O
		LN shall inherit all Mandatory Data from Wind Power Plant Common Logical Node Class	M
Data			
<i>Common information</i>			
OpTmRs	TMS	Generator operation time	O
<i>Status information</i>			
GnOpMod	STV	Operation mode of generator	O
CISst	STV	Status of generator cooling system	O
<i>Analogue information</i>			
Spd	MV	Generator speed	M
W	WYE	Generator active power	O
VAr	WYE	Generator reactive power	O
GnTmpSta	MV	Temperature measurements for generator stator	

Logical node = Component
 "WGEN" = Generator



IEC 61400-25 Overview





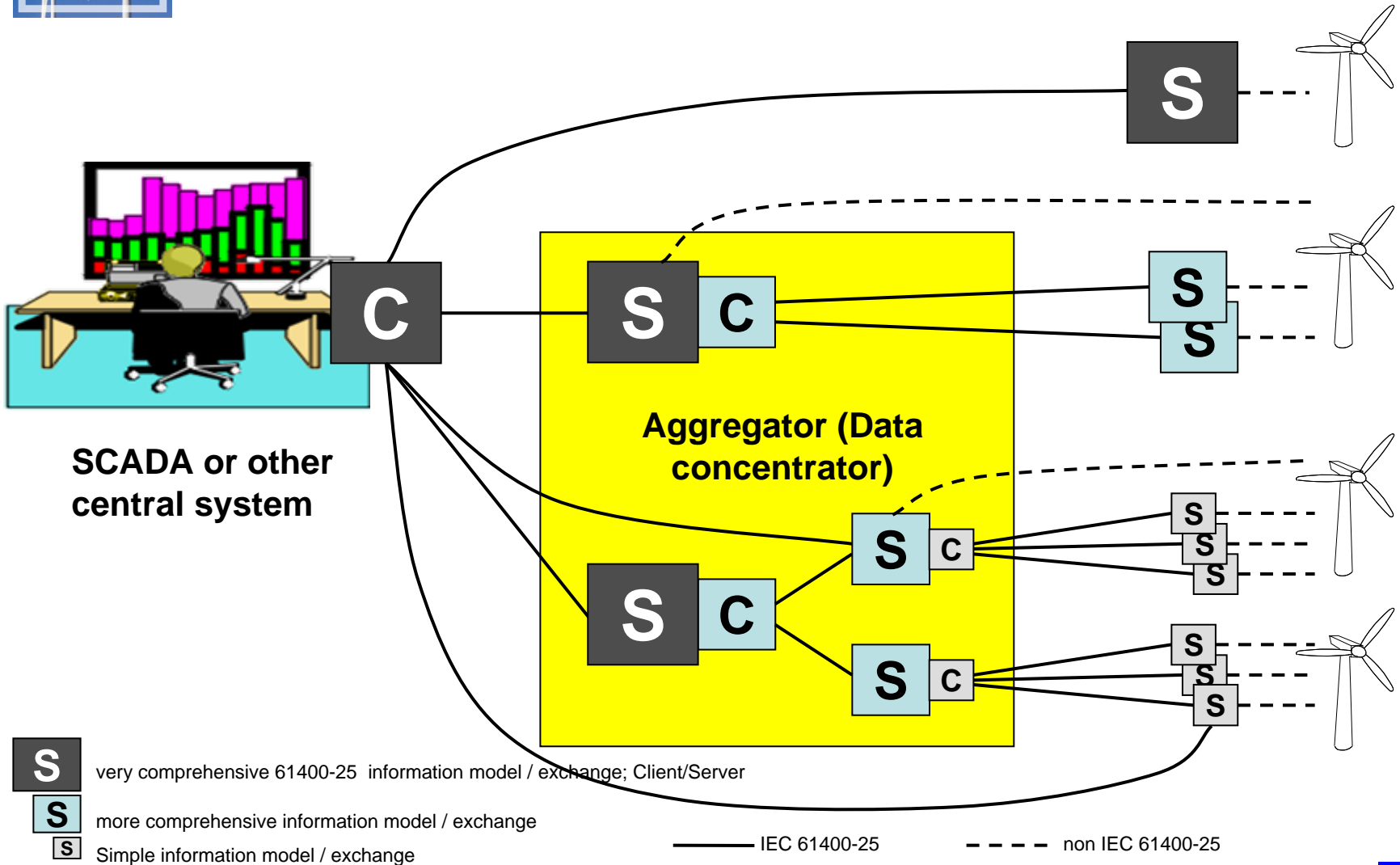
IEC 61400-25-4 Mapping to communication profile

Five optional mappings for different applications and interfaces:

- SOAP-based web services
- OPC/XML-DA
- IEC 61850-8-1 MMS
- IEC 60870-5-104
- DNP 3



IEC 61400-25 - Topology





The IEC 61400-25 series of standards

Title: **WIND TURBINES – Communications for Monitoring and Control of Wind Power Plants**

- IEC 61400-25-1 Overall description of principles and models
- IEC 61400-25-2 Information Models
- IEC 61400-25-3 Information Exchange Models
- IEC 61400-25-4 Mapping to communication profiles
- IEC 61400-25-5 Conformance testing
- IEC 61400-25-6 Logical node classes and data classes for condition monitoring



Background and history

- Work initiated in 2000 by Swedish and Danish companies.
- IEC project set up within IEC TC88 – Wind Turbines
- ✓ First step - Investigate if IEC 61850 could be the basis for wind power communication.
- ✓ Second step – Focus on wind power specific information models and service models
- ✓ Third step – Focus on communication profiles
- Fourth step – Implementation
- Fifth step – Maintenance and coordination with other IEC 61850 based standards.



Project Team – PT25

PT25 members are as follows:

- **Energi E2 A/S, Denmark**
- **EnerNex Corporation, USA**
- **General Electric Energy, USA**
- **Hydro Tasmania, Australia**
- **KC Associates, Inc.**
- **n@tcon 7 – ENERCON, NORDEX, REpower Systems AG, Germany**
- **Schwarz Consulting Company, Germany**
- **Siemens Wind Power A/S, Denmark**
- **Statkraft, Norway**
- **Vattenfall, Sweden**
- **Vestas Wind Systems A/S, Denmark**
- **Q-Technology, Denmark**



IEC 61400-25 Scope

