



28. Windernergietage Wenn der Wind sich dreht...

Profi(t) am Wind

Potsdam 05. - 07. November 2019

IEC 61400-25

**Wind Power Plant Communication under the aspects
of cyber risks and compliance to security standards**

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IEC 61400-25 User group Chairman

Agenda

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- 1 Introduction of the standard IEC 61400-25

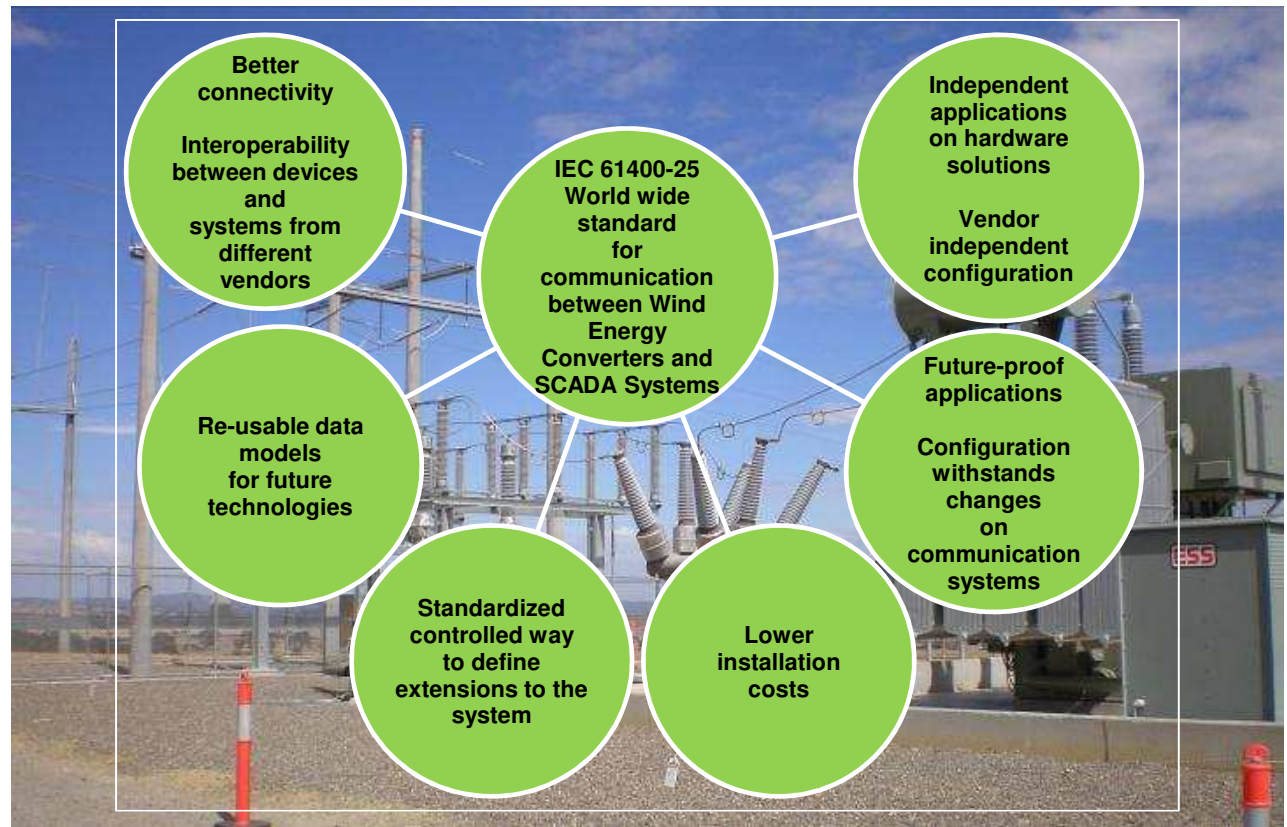
- 2 Cyber Risk Assessment and compliance to security standards

- 3 Introduction of the IEC 61400-25 user group

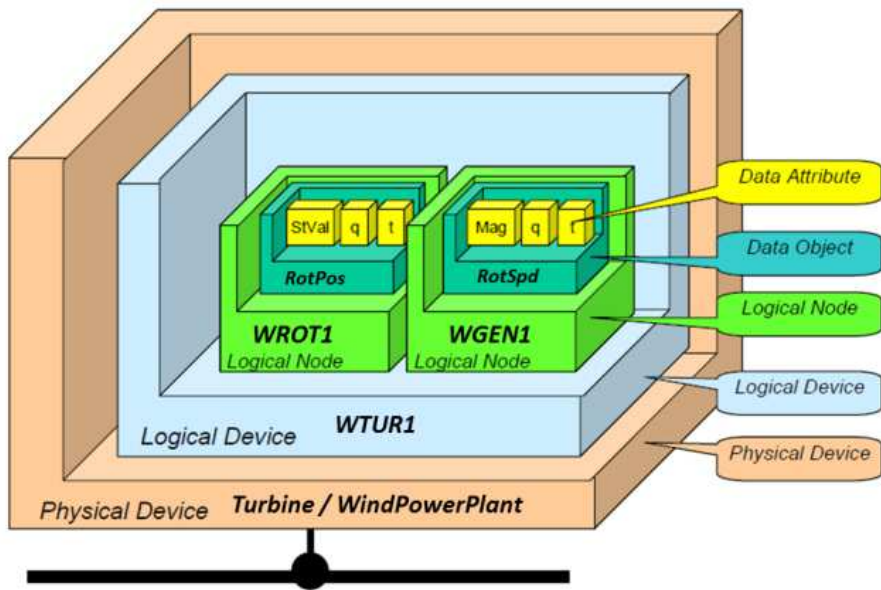
IEC 61400-25 is the wind information model for interoperable plant to supervision/operation/network control centers

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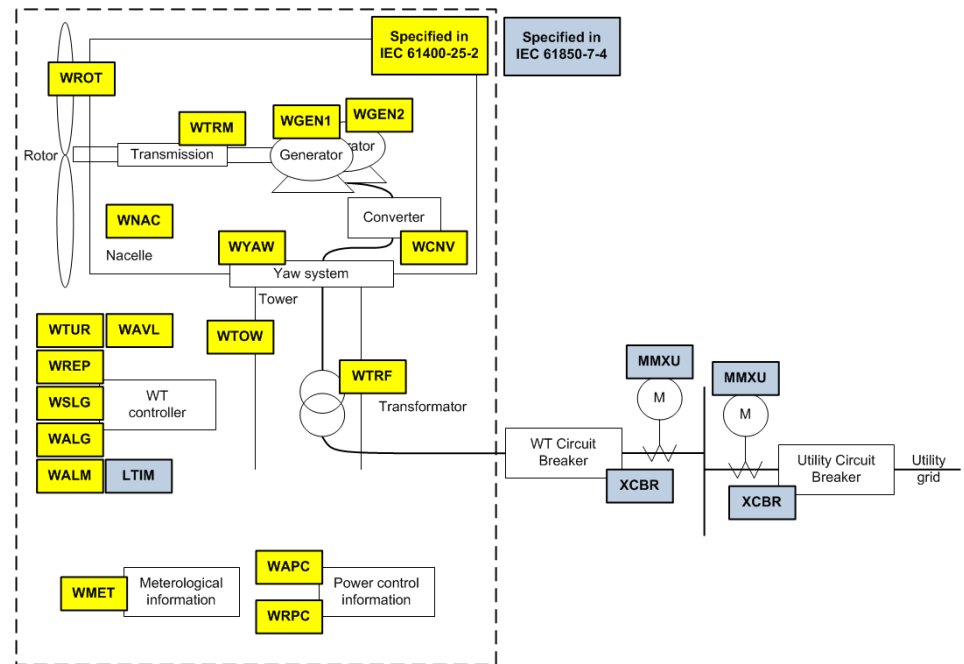
- IEC 61400-25 builds on IEC 61850 the worlds most used substation automation architecture.
- enables connectivity between a heterogeneous combination of client and servers from different manufacturers and suppliers.
- only defines how to model the information, information exchange and mapping to specific communication protocols.
- excludes a definition of how and where to implement the communication interface, the application program interface and implementation recommendations.



Structure of wind power plant information model



Use of instances of logical nodes



IEC 61400-25: Communications for monitoring and control of wind power plants



Standard series based on IEC 61850 (Communication networks and systems for power utility automation)

Standard	Description	State
61400-25-1	Overall description of principles and models	Edition 2, published 2017
61400-25-2	Information models	Edition 2, published 2015
61400-25-3	Information exchange models	Edition 2, published 2015
61400-25-4	Mapping to communication profile [web services, OPC XML-DA, MMS, IEC 60870-5-101/104, DNP3]	Edition 2, published 2016
61400-25-41	Mapping to communication profile based on IEC 62541 (OPC UA)	Edition 1, approved for CD 2019
61400-25-5	Compliance testing	Edition 2, published 2017
61400-25-6	Logical node classes and data classes for condition monitoring	Edition 2, published 2016
61400-25-71	Configuration Description Language	Edition 1, approved for publication 2019

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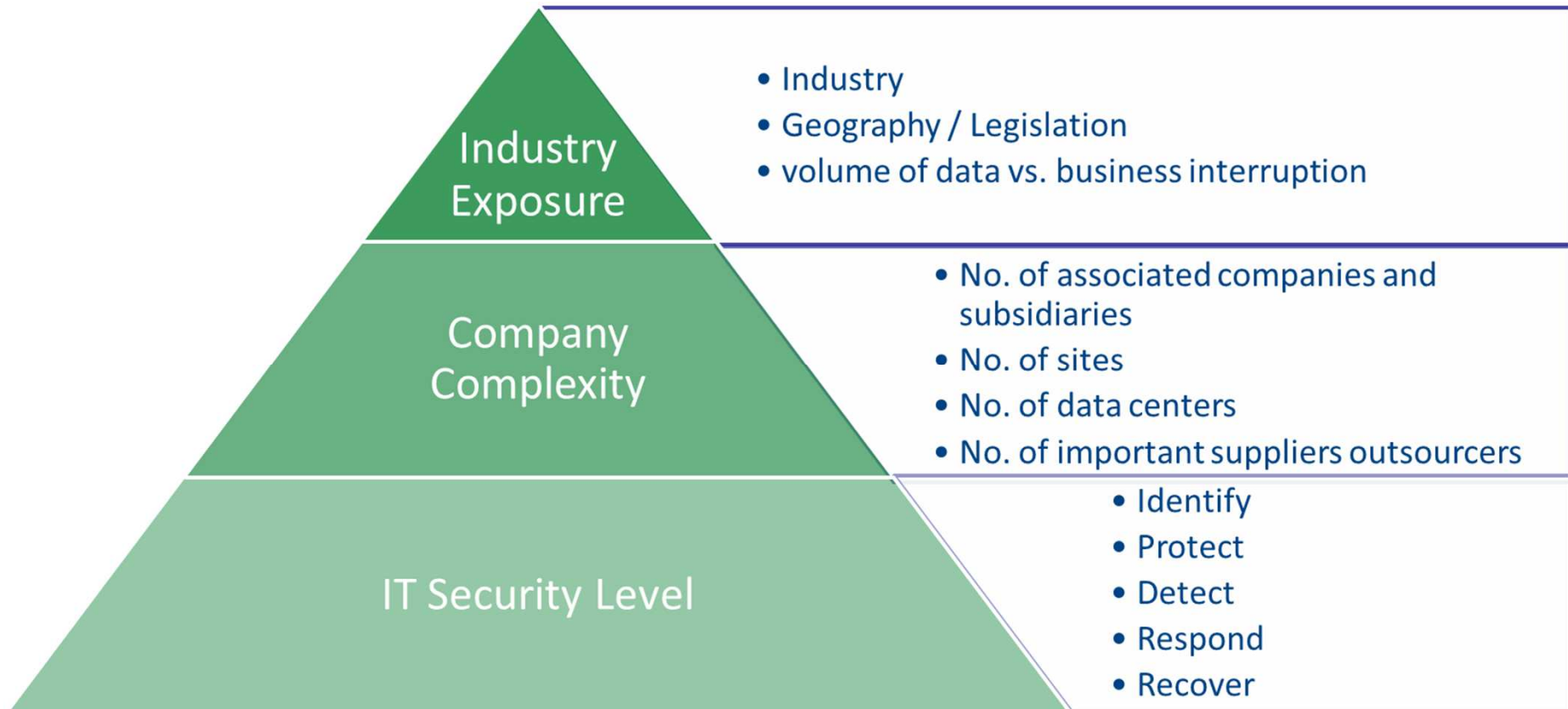
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Identify

- Governance & Compliance
- Responsibilities
- Risk Management
- Procurement
- Working with external partners
- Recruitment



Protect

- User access control
- Awareness & Training
- Data Security
- Processes and Procedures
- Encryption
- Patch & change management



Detect

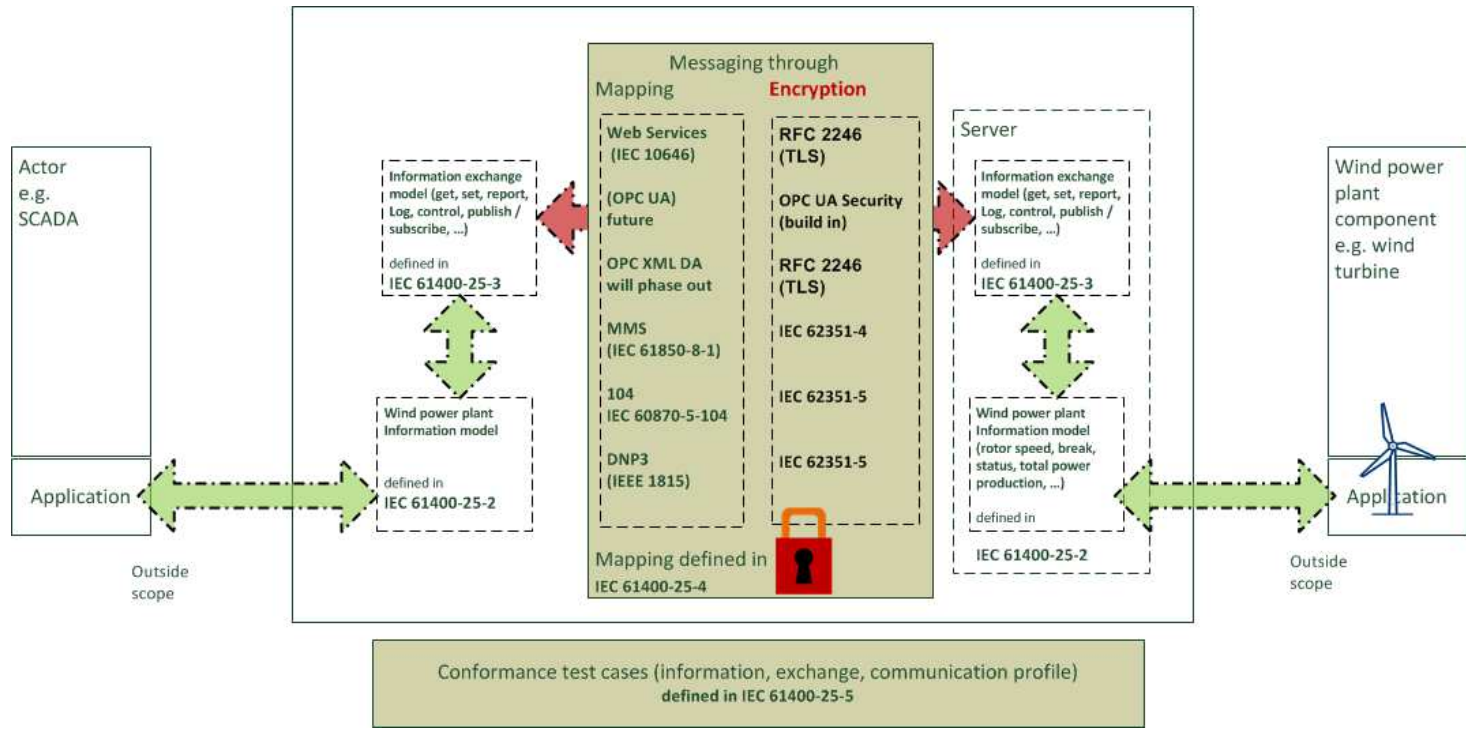
- Security Incident Event Monitoring (SIEM)
- Malware protection



Respond & Recover

- Incident Management
- Emergency Management
- Backup
- Disaster Recovery
- Business Continuity Management

Build In Security By Using Security Standards



Security means defined for

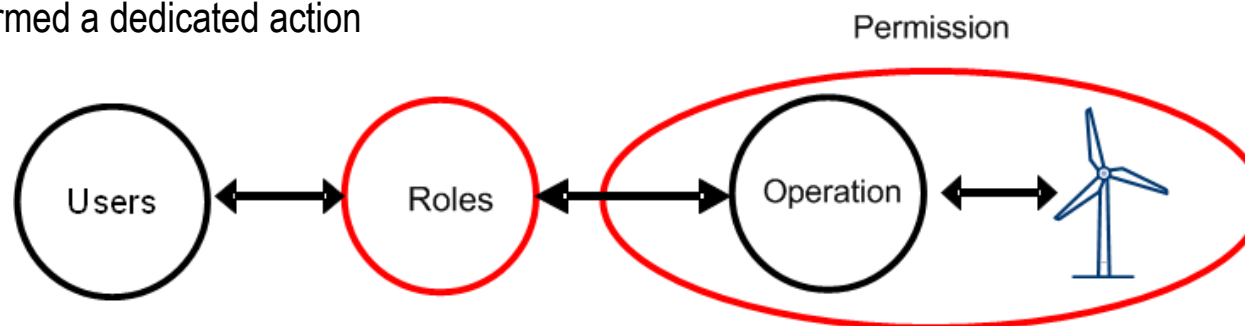
- Authentication and authorization using Role Based Access Control (RBAC)
- Secure IP- based and serial communication
- Secure application level exchanges
- Security monitoring and event logging
- Test case definition
- Guidelines for applying specific security measures

by utilizing or profiling

- existing IEC standards and recommendations

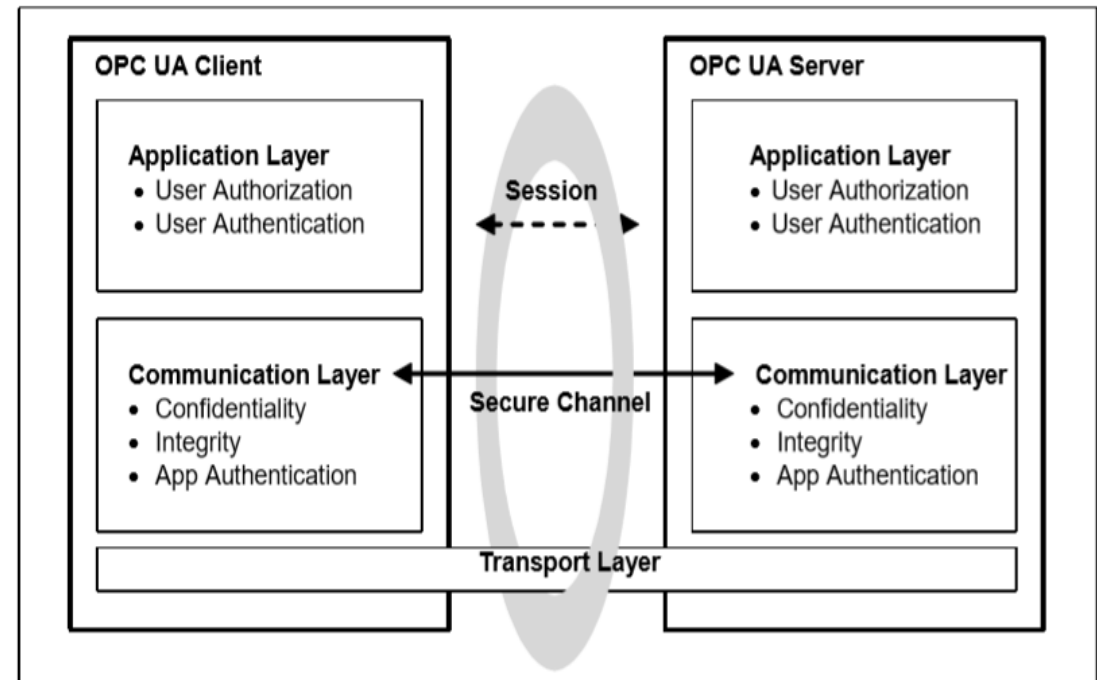
For example utilize IEC 62351-8:

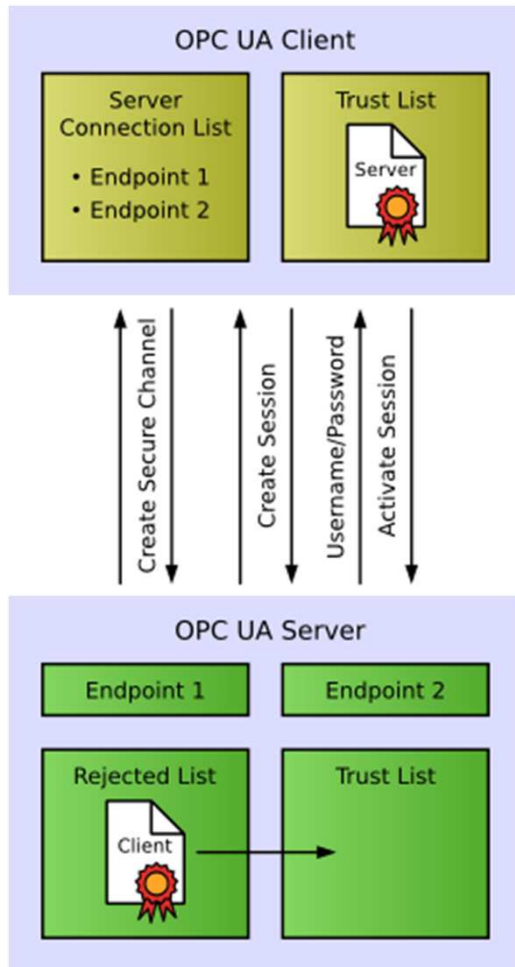
RBAC supports verification of who has authorized and performed a dedicated action



Security features:

- User Authentication based on different user tokens
- User Authorization based on roles
- Secure communication channel with message signing and encryption based on Security Policies
- Application Authentication based on Application Instance Certificates
- Access control down to nodes and attributes
- Audit mechanisms for connection establishment, Write and Call services





Anonymous Identity Token

No user information is available.

Username Identity Token

A user identified by user name and password.

X.509 Identity Token

A user identified by an X509v3 Certificate.

Three types of X.509v3 certificates are used

OPC UA Application Instance Certificates

OPC UA Software Certificates

OPC UA User Certificates

Issued Identity Token

A user identified by a JSON Web Token (JWT).

Certificates are managed by PKI

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IEC 61400-25 user group members



*1) OPC-UA foundation members

The main goal is to assist users with implementing the IEC 61400-25 standard.

The implementation guideline covers the following topics:

- Overview of the IEC 61400-25 standard series and the related standards
- Descriptions and examples how to read the standard
- Customization of the IEC 61400-25 models
- IEC 61400-25 as part of the wind power plant engineering process
- SCL guideline with examples

Open Source Client (MMS)

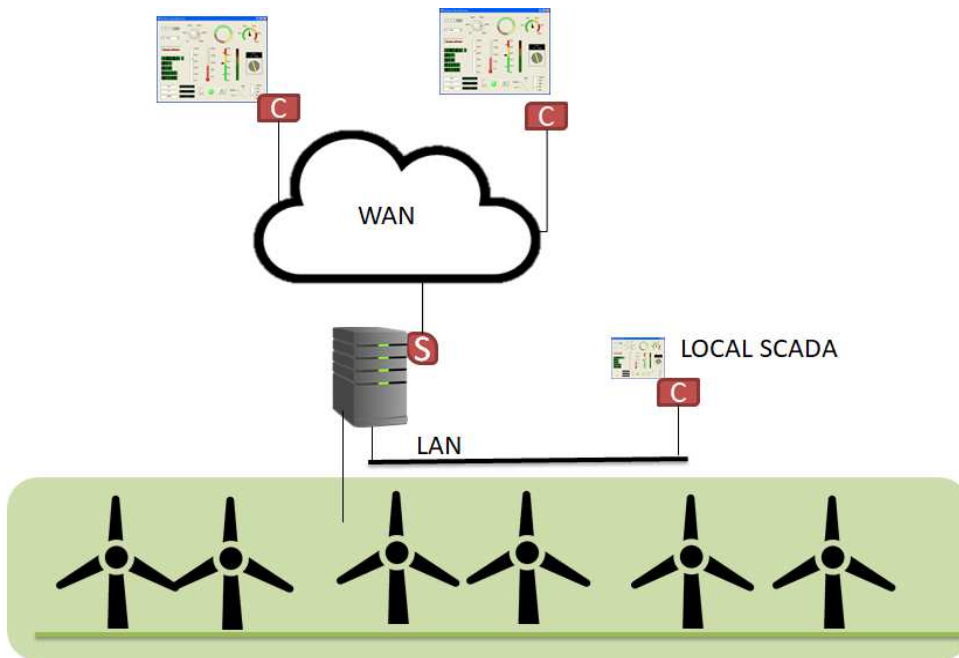
- Source code examples available

The image shows two screenshots from a software application. The left screenshot is a 'Server Explorer' window showing a tree view of servers and datasets. The right screenshot is a data table for node 41199, showing various data points and their types.

Node	Value	Type
LD BEWECSIMWTG		
LN LLN0		
LN LPHD1		
LN MMXU1		
LN WALM1		
LN WGEN1		
FC ST		
DO Health	{1,0000000000000000,Fri Apr 26 13:52:10 CEST 2019}	
DA stVal	1	INT32
DA q	0000000000000000	QUALITY
DA t	Fri Apr 26 13:52:10 CEST 2019	TIMESTAMP
DO Loc	{false,0000000000000000,Fri Apr 26 13:52:10 CEST 2019}	
FC MX		
DO Spd	{{1569,1569.3623},0000000000000000,Fri Apr 26 13:52:10 CEST 2019}	
DO W	{{{(984,983.836),(60,60.0)},0000000000000000,Fri Apr 26 13:52:10 CEST 2019}}	
DA phsA	{{(984,983.836),(60,60.0)},0000000000000000,Fri Apr 26 13:52:10 CEST 2019}	
DA cVal	{984,983.836},{60,60.0}	
DA mag	{984,983.836}	
DA i	984	INT32
DA f	983.836	FLOAT32
DA ang	{60,60.0}	
DA q	0000000000000000	QUALITY
DA t	Fri Apr 26 13:52:10 CEST 2019	TIMESTAMP
DA phsB	{{(984,983.836),(60,59.99)},0000000000000000,Fri Apr 26 13:52:10 CEST 2019}	
DA phsC	{{(984,983.836),(60,60.0)},0000000000000000,Fri Apr 26 13:52:10 CEST 2019}	
DO VAr	{{{(0,0.0),(60,60.0)},0000000000000000,Fri Apr 26 13:52:10 CEST 2019}}	
DO GnTmpSta	{{(71,71.1),0000000000000000,Fri Apr 26 13:52:10 CEST 2019}}	
DO GnTmpRtr	{{(74,73.5),0000000000000000,Fri Apr 26 13:52:10 CEST 2019}}	
DO GnTmpInlet	{{(38,38.3),0000000000000000,Fri Apr 26 13:52:10 CEST 2019}}	
FC DC		
LN WNAC1		
LN WROT1		
LN WTUR1		
LN WYAW1		

Reference server for edition 2 of IEC 61400-25 standard

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It is a Wind Power Plant Server acting as a gateway that provides access to a simulated wind farm using different communication mappings:

- mappings to IEC 61850 MMS, webservice, IEC 60870-5-104, DNP3 and OPC XML-DA (soon OPC UA)
- Connected to the information of existing Wind Turbine controllers.
- Simulate several wind turbines to provide a full wind power plant view.
- Accessed with any standard based client or with the specific software developed for the association members

Thank you for your attention !

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Management Team

Bertram Lange (Chairman)
Hennig Harden (Technical Team Chairman)
Knud Johansen (Treasurer)
Erik San Telmo (Validation, Interoperability, Cyber Security)
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