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Title : Communication networks and systems in substations – Part 7-420: Communications systems for distributed energy resources (DER) - Logical nodes

Introductory note

The project number has been changed from 62350 to 61850-7-420, and the title has been adjusted in accordance.

The French National Committee will not provide a French translation for this project.

ATTENTION VOTE PARALLÈLE CEI – CENELEC

L'attention des Comités nationaux de la CEI, membres du CENELEC, est attirée sur le fait que ce projet de comité pour vote (CDV) de Norme internationale est soumis au vote parallèle. Un bulletin de vote séparé pour le vote CENELEC leur sera envoyé par le Secrétariat Central du CENELEC.

ATTENTION IEC – CENELEC PARALLEL VOTING

The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) for an International Standard is submitted for parallel voting. A separate form for CENELEC voting will be sent to them by the CENELEC Central Secretariat.

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Draft IEC 62350 *{Tentatively to be
renumbered as IEC 61850 Part 7-420}*

**Committee Draft for Vote
(CDV1)**

April 2006

**Communications Systems
for Distributed Energy
Resources (DER)**

**Part IEC 61850 Part 7-420
DER Logical Nodes**

Notes to this first Committee Draft for Vote (CDV1)

This is the first CDV for these DER object models, and reflects the many discussions with IEC TC57 WG10 and WG18 members over the last year. This draft was reviewed in the March 2006 meeting in Mérida, Mexico. As agreed there, this document will be issued as a CDV.

Additional versions will definitely follow this first CDV in order to model additional DER devices and subsystems or to make generally agreed upon corrections. In particular, no implementations or pilot projects have actually used the objects other than in two mapping laboratory tests. Therefore, these object models are not yet field-validated. However, this document does present IEC 61850 object models for DER devices that have been reviewed by a number of IEC and vendor groups, and are therefore considered as ready for review by a larger community.

In this first CDV, DER systems as a whole, and the “energy conversion” technologies of reciprocating engines (piston engines), fuel cells, and photovoltaic systems have been addressed in full. Combined heat and power (CHP) has been tentatively addressed, but requires significant review by CHP experts.

A number of Logical Nodes for metering and physical measurements are being proposed, but these will be reviewed in a larger context since they are not DER-specific. Additional CDCs have also been proposed.

A number of DER technologies have not been addressed at all yet. The decision was made not to wait on these other DER technologies before submitting the document for review, in order to get this basic information out to reviewers. Additional sections or possibly separate documents may be sent in the future as “domain experts” become available to discuss and provide the key data items that can be used to create the object models of these other DER technologies ... Any support on these will be greeted with enthusiasm.

The working group would like to get substantive feedback on these object models: all comments and suggestions are welcome, from the editorial, to those related to modeling techniques, and to technical DER device issues.

The informative Annex A provides more information on the context of these object models.

Contents

1	SCOPE (INFORMATIVE)	12
2	NORMATIVE REFERENCES.....	15
3	TERMS AND DEFINITIONS.....	17
4	ABBREVIATED TERMS	20
5	LOGICAL NODES FOR DER SYSTEMS AND EQUIPMENT.....	22
5.1	Overview of DER Logical Nodes and Logical Devices (Informative).....	22
5.2	Logical Nodes for the DER Plant ECP Logical Device	24
5.2.1	DER Plant Electrical Connection Point (ECP) Logical Device (Informative)	24
5.2.2	LN: DER Plant Corporate Characteristics at the ECP Name: DCRP	26
5.2.3	LN: DER Operational Authority at the ECP Name: DOPA.....	26
5.2.4	LN: Operational Characteristics at ECP Name: DOPR	27
5.2.5	LN: Operating Mode at ECP Name: DOPM.....	28
5.2.6	LN: Status Information at the ECP Name: DPST	28
5.2.7	LN: DER Economic Dispatch Parameters Name: DCCT.....	29
5.3	Logical Nodes for the DER Unit Controller Logical Device.....	31
5.3.1	DER Device Controller Logical Device (Informative).....	31
5.3.2	LN: DER Controller Characteristics Name: DRCT.....	31
5.4	Logical Nodes for DER Generation Logical Device.....	33
5.4.1	DER Generator Logical Device (Informative)	33
5.4.2	LN: DER Unit Generator Name: DGEN	33
5.4.3	LN: DER Generator Ratings Name: DRAT	35
5.4.4	LN: DER Advanced Generator Ratings Name: DRAZ.....	36
5.4.5	LN: Generator Costs Name: DCST.....	37
5.5	Logical Nodes for DER Excitation Logical Device	38
5.5.1	DER Excitation Logical Device (Informative)	38
5.5.2	LN: Excitation Ratings Name: DREX.....	38
5.5.3	LN: Excitation Name: DEXC	39
5.6	Logical Nodes for DER Inverter/Converter Logical Device.....	40
5.6.1	Inverter/Converter Logical Device (Informative)	40
5.6.2	LN: Rectifier Name: YRCT	40
5.6.3	LN: Inverter Name: YINV	41

6	LOGICAL NODES FOR SPECIFIC TYPES OF DER	43
6.1	Logical Nodes for Reciprocating Engine Logical Device	43
6.1.1	Reciprocating Engine Description (Informative)	43
6.1.2	Reciprocating Engine Logical Device (Informative)	43
6.1.3	LN: Reciprocating Engine Name: DCIP	44
6.2	Logical Nodes for Fuel Cell Logical Device	46
6.2.1	Fuel Cell Description (Informative)	46
6.2.2	Fuel Cell Logical Device (Informative)	47
6.2.3	LN: Fuel Cell Controller Name: DFCL	48
6.2.4	LN: Fuel Cell Stack Name: DSTK	49
6.2.5	LN: Fuel Processing Module Name: DFPM	50
6.3	Logical Nodes for Photovoltaic System (PV) Logical Device	51
6.3.1	Photovoltaic System Description (Informative)	51
6.3.2	Photovoltaics System Logical Device (Informative)	53
6.3.3	LN: Photovoltaics Array Characteristics Name: DPVE	55
6.3.4	LN: Photovoltaics Array Controller Name: DPVC	56
6.3.5	LN: Tracking Controller Name: DTRC	57
6.4	Logical Nodes for Combined Heat and Power (CHP) Logical Device	58
6.4.1	Combined Heat and Power Description (Informative)	58
6.4.2	Combined Heat and Power Logical Device (Informative)	61
6.4.3	LN: CHP System Controller Name: DCHC	62
6.4.4	LN: Chimney and Exhaust Name: DCHI	63
6.4.5	LN: Heat Exchanger Name: DCHX	63
6.4.6	LN: Heat Storage Name: DCHS	64
6.4.7	LN: Coolant System Name: DCHC	64
7	LOGICAL NODES FOR AUXILIARY SYSTEMS	65
7.1	Logical Nodes for Interval Metering Logical Device	65
7.1.1	Interval Metering Logical Device (Informative)	65
7.1.2	LN: Interval Revenue Metering Name: MITV	65
7.2	Logical Nodes for Fuel System Logical Device	65
7.2.1	Fuel System Logical Device (Informative)	65
7.2.2	LN: Fuel Systems Name: FUEL	67
7.2.3	LN: Fuel Delivery System Name: FULP	68
7.3	Logical Nodes for Battery System Logical Device	69
7.3.1	Battery System Logical Device (Informative)	69
7.3.2	LN: Battery Systems Name: BATT	69
7.3.3	LN: Battery Charger Name: BATC	70

7.4	Logical Nodes for Physical Measurements.....	71
7.4.1	Physical Measurements (Informative).....	71
7.4.2	LN: Temperature Measurements Name: MTMP.....	72
7.4.3	LN: Pressure Measurements Name: MPRS.....	72
7.4.4	LN: Heat Measured Values Name: MHET.....	73
7.4.5	LN: Flow Measurements Name: MFLW.....	73
7.4.6	LN: Vibration Conditions Name: MVIB.....	74
7.4.7	LN: Emissions Measurements Name: MEMS.....	75
7.4.8	LN: Meteorological Conditions Name: METR.....	76
8	ADDITIONAL COMMON DATA ATTRIBUTE TYPES AND COMMON DATA CLASSES (CDC).....	77
8.1	Proposed New Common Data Attribute Types.....	77
8.1.1	Master Resource Identity (MRID).....	77
8.1.2	Array of Points (Arrp).....	77
8.2	Proposed New CDCs.....	77
8.2.1	Array (ARY).....	77
8.2.2	List of Identifiers (LIST).....	78
8.2.3	Metering Configuration (MTG).....	78
8.2.4	Metering Electric Measured values (MTV).....	79
8.2.5	Device Ownership and Operator (DOO).....	80
8.2.6	Proportional-Integral-Derivative Configuration (PID).....	80
A1.	INTRODUCTION TO DISTRIBUTED ENERGY RESOURCES (DER) OBJECT MODELLING (INFORMATIVE).....	82
A1.1	Challenge of Integrating DER into the Power System Information Infrastructure.....	82
A1.2	Background on the Development of the DER Object Models.....	83
A1.3	Purpose of this Annex on DER Object Models (DER-OM).....	84
A1.4	Purpose of DER-OM.....	84
A2.	FUNCTIONAL REQUIREMENTS FOR DER INFORMATION (INFORMATIVE).....	86
A2.1	Overview of the DER Environment.....	86
A2.1.1	Challenges and Opportunities of Integrating DER with Utility Operations.....	86
A2.1.2	DER Monitoring and Control Requirements.....	87
A2.1.3	DER Stakeholders.....	88
A2.2	Functions Requiring Monitoring and Control of DER Systems.....	90
A2.2.1	“Use Cases” as Method for Determining Information Exchange Requirements.....	90
A2.2.2	DER Owner/Operator Functions.....	91
A2.2.3	Third-Party Remote Operation Functions.....	92
A2.2.4	Utility Automated Distribution Operations (ADO) Functions.....	93

A2.2.5	Utility Emergency Operations Functions.....	94
A2.2.6	Planning, Installation, Commissioning, and Maintenance Functions.....	95
A2.3	Information Exchanges: What Data Should, Might, or Should Not Be Included in DER Object Models	95
A2.3.1	Different Configurations Determine Scope of Information Exchanges	95
A2.3.2	Configuration #1 – Single DER Unit with Manual Controls.....	96
A2.3.3	Configuration #2 – Standalone DER Unit Connected to a Local Controller	96
A2.3.4	Configuration #3 – Local DER Management System	97
A2.3.5	Configuration #4 – Remote DER Master Station for Multiple DER Systems.....	98
A2.3.6	Configuration #5 – Utility Operations Managing DER Systems.....	99
A3.	EXAMPLES OF USING DER LOGICAL NODES IN DER IMPLEMENTATIONS (INFORMATIVE).....	101
A3.1	Generic DER Installation Configuration	101
A3.1.1	DER Plant Electrical Connection Point (ECP) Logical Device.....	103
A3.1.2	DER Device Controller Logical Device	104
A3.1.3	DER Generator Logical Device.....	105
A3.1.4	DER Excitation Logical Device	105
A3.1.5	Inverter/Converter Logical Device.....	105
A3.2	Reciprocating Engine (Diesel GenSet) Logical Device.....	105
A3.2.1	Reciprocating Engine Description.....	105
A3.2.2	Reciprocating Engine Logical Device	106
A3.3	Fuel Cell Logical Device.....	107
A3.3.1	Fuel Cell Description.....	107
A3.3.2	Fuel Cell Logical Device	109
A3.4	Photovoltaic Systems Logical Device	111
A3.4.1	Photovoltaic System Description	111
A3.5	Combined Heat and Power Logical Device	113
A3.5.1	Combined Heat and Power Description.....	113
A3.5.2	Combined Heat and Power Logical Device	116
A3.6	Auxiliary Logical Devices	117
A3.6.1	Interval Metering Logical Device.....	117
A3.6.2	Fuel System Logical Device.....	117
A3.6.3	Battery System Logical Device	118
A3.6.4	Physical Measurements.....	119

Figures

Figure 1-1: Example of a Communications Configuration for a DER Plant	13
Figure 1-2: IEC 61850 Modeling and Connections with Other IEC TC57 Models.....	14
Figure 5-1: Conceptual Organization of DER Logical Devices and Logical Nodes.....	23
Figure 5-2: Illustration of Electrical Connection Points (ECP) in a DER Plant	24
Figure 6-1: Reciprocating engine (<i>Wikipedia</i>)	43
Figure 6-2: LNs in a Reciprocating Engine System (e.g. Diesel Gen-Set).....	44
Figure 6-3: Fuel cell – Hydrogen/oxygen proton-exchange membrane fuel cell (PEMFC) (<i>Wikipedia</i>)	46
Figure 6-4: Fuel Cell Stack	47
Figure 6-5: LNs Used in a Fuel Cell System	47
Figure 6-6: One line diagram of an interconnected PV system	52
Figure 6-7: PV array diagram - large array divided in sub arrays.....	53
Figure 6-8: LNs Associated with a Photovoltaics System	54
Figure 6-9: Two Examples of CHP Configurations	59
Figure 6-10: CHP unit includes both domestic hot water and heating loops.....	60
Figure 6-11: CHP unit includes domestic hot water with hybrid storage.....	60
Figure 6-12: CHP unit includes domestic hot water without hybrid storage	60
Figure 6-13: LNs Associated with a Combined Heat and Power (CHP) System.....	61
Annex Figure 1: Interactions involving Distributed Energy Resources (DER) in Electric Power System Operations.....	83
Annex Figure 2: Overview of IEC Object Modeling Constructs	85
Annex Figure 3: DER Stakeholders.....	90
Annex Figure 4: Configuration #1 – Manual DER System	96
Annex Figure 5: Configuration #2 – Standalone DER with Local Controller/HMI	97
Annex Figure 6: Configuration #3 – Local DER Management System.....	98
Annex Figure 7: Configuration #4 – Remote DER Master Station	99
Annex Figure 8: Configuration #5 – Distribution Operations Managing DER Systems	100
Annex Figure 9: Block Diagram of a Generic Distributed Energy Resources (DER) System	102
Annex Figure 10: Illustration of Electrical Connection Points (ECP) in a DER Plant.....	103
Annex Figure 11: Reciprocating engine (<i>Wikipedia</i>).....	106
Annex Figure 12: LNs in a Reciprocating Engine System (e.g. Diesel Gen-Set).....	107
Annex Figure 13: Fuel cell – Hydrogen/oxygen proton-exchange membrane fuel cell (PEMFC) (<i>Wikipedia</i>)	108
Annex Figure 14: Fuel Cell Stack.....	109
Annex Figure 15: LNs Used in a Fuel Cell System.....	110
Annex Figure 16: One line diagram of an interconnected PV system.....	112
Annex Figure 17: PV array diagram - large array divided in sub arrays	113
Annex Figure 18: Two Examples of CHP Configurations.....	114
Annex Figure 19: CHP unit includes both domestic hot water and heating loops.....	115
Annex Figure 20: CHP unit includes domestic hot water with hybrid storage	115
Annex Figure 21: CHP unit includes domestic hot water without hybrid storage.....	115
Annex Figure 22: LNs Associated with a Combined Heat and Power (CHP) System	116

Tables

Table 5-1: DER Plant Corporate Characteristics at the ECP, LN (DCRP)	26
Table 5-2: DER Operational Authority at the ECP, LN (DOPA).....	27
Table 5-3: Operational Characteristics at the ECP, LN (DOPR)	27
Table 5-4: Operating Mode at the ECP, LN (DOPM)	28
Table 5-5: Status at the PCC, LN (DPST).....	29
Table 5-6: DER Economic Dispatch Parameters, LN (DCCT)	29
Table 5-7: DER Unit Controller, LN DRCT	31
Table 5-8: DER Unit Generator, LN (DGEN).....	33
Table 5-9: DER Basic Generator Ratings, LN (DRAT).....	35
Table 5-10: DER Advanced Generator Ratings, LN (DRAZ)	36
Table 5-11: Generator Costs, LN DCST	38
Table 5-12: Excitation Ratings, LN (DREX)	38
Table 5-13: Excitation, LN (DEXC).....	39
Table 5-14: Rectifier, LN (YRCT)	41
Table 5-15: Inverter, LN (YINV)	41
Table 6-1: Reciprocating Engine, LN (DCIP)	45
Table 6-2: Fuel Cell Controller, LN (DFCL).....	48
Table 6-3: Fuel Cell Stack, LN (DSTK).....	50
Table 6-4: Fuel Cell Processing Module, LN (DFPM)	51
Table 6-5: Photovoltaic Array Characteristics, LN (DPVE)	55
Table 6-6: Photovoltaic Array Controller, LN (DPVC).....	57
Table 6-7: Tracking Controller, LN (DTRC).....	57
Table 6-8: CHP System Controller, LN (DCHC)	62
Table 6-9: CHP Chimney, LN (DCHI)	63
Table 6-10: CHP Heat Exchanger, LN (DCHX)	63
Table 6-11: CHP Heat Storage, LN (DCHS).....	64
Table 6-12: CHP Coolant System, LN (DCHC)	64
Table 7-1: Interval Revenue Metering, LN (MITV).....	65
Table 7-2: Fuel types.....	66
Table 7-3: Fuel Systems, LN (FUEL).....	67
Table 7-4: Fuel Systems, LN (FULP).....	68
Table 7-5: Battery Systems, LN (BATT).....	69
Table 7-6: Battery Charger, LN (BATC).....	71
Table 7-7: Temperature measurements, LN (MTMP)	72
Table 7-8: Pressure measurements, LN (MPRS)	72
Table 7-9: Heat Measurement, LN (MHET).....	73
Table 7-10: Flow Measurement, LN (MFLW)	74
Table 7-11: Vibration Conditions, LN (MVIB)	75
Table 7-12: Emissions Measurements, LN (MEMS)	75
Table 7-13: Meteorological Conditions, LN (METR)	76
Table 8-1: Array of Points (Arrp)	77
Table 8-2: Array (ARY)	77

Table 8-3: List of Identities (LIST)78
Table 8-4: Metering Configuration (MTG)78
Table 8-5: Metering Electric Measurements (MTV)79
Table 8-6: Device Ownership and Operator (DOO)80
Table 8-7: Proportional-Integral-Derivative Configuration (PID).....80

Annex Table 1: Fuel types117

INTERNATIONAL ELECTROTECHNICAL COMMISSION

Distributed Energy Resources (DER) Logical Nodes –**FOREWORD**

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This working draft of the International Standard IEC 61850 Part 7-xxx has been prepared by IEC technical committee 57: Working Group 17 on Distributed Energy Resources Object Modeling.

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

INTRODUCTION

1 Scope (Informative)

The scope of this document is the specification of the object models of DER information that can be exchanged between DER devices and any systems which monitor, control, maintain, audit, and generally operate the DER devices. An informative Annex A titled “*Communications Systems for Distributed Energy Resources (DER) – Informative Annex on DER Modeling*” provides the background, identification of DER functions that will use these normative DER object model standards, and discussions as to how these object model standards will be used by different types of DER devices.

Simply put, “object models” are standardized formats or templates for exchanging data between different equipment or systems. Standard object models, combined with standard service models (methods for sending the data, e.g. report-by-exception, periodic, control commands) and standard protocols (the bits and bytes actually send over the communication channel), permit different systems to interact with minimal customization and greater interoperability. The combination of object model, service model, and protocol profiles can be termed the “information model”.

These DER information models are based on open-system language, semantics, services, protocols, and architecture, which have been standardized by IEC 61850, but they include some extensions to IEC 61850. The DER object models will eventually be provided to the IEC as a draft set of object models for international standardization. In order to ensure the standardization process is simplified, these DER information models are compatible with IEC 61850, IEC61970 (CIM), IEC60870-5 (telecontrol protocol, which also formed the base for DNP), and IEC60870-6 (ICCP/TASE.2) standards.

The object models in this draft document are ready for trial use by vendors in order to provide feedback and updates. However, it must be understood that these are still draft object models and are subject to change.

Communications for DER plants involve not only local communications between DER units and the plant management system, but also between the DER plant and the operators who manage both the plant and the individual DER units. This is illustrated in Figure 1-1.

Although this document addresses only the IEC 61850 object models, additional modeling efforts will be needed for DER (and other domain areas) in the CIM/CFL areas.

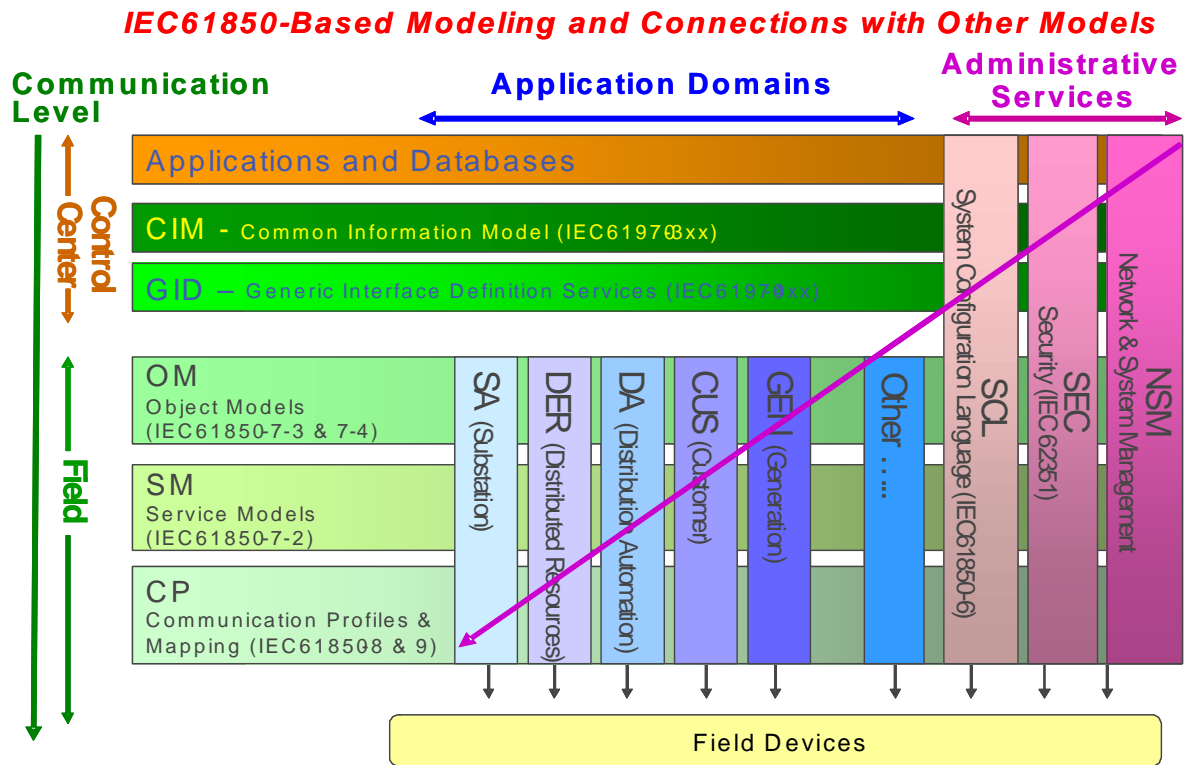


Figure 1-2: IEC 61850 Modeling and Connections with Other IEC TC57 Models

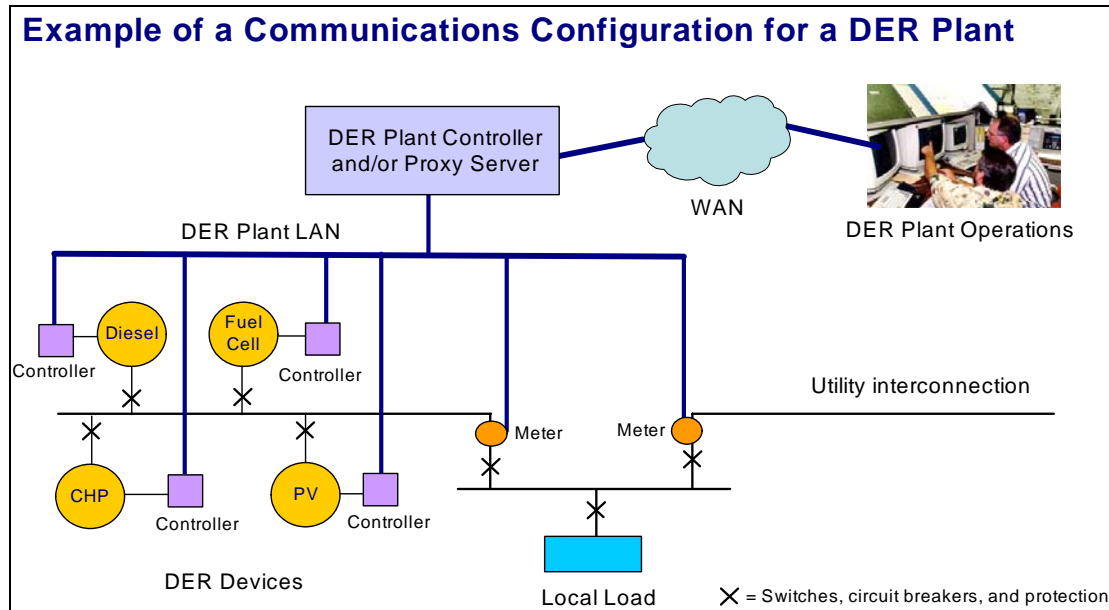


Figure 1-1: Example of a Communications Configuration for a DER Plant

There is a growing interest in implementing DER devices throughout the world. As the DER technology evolves, nations recognize the economic, social, and environmental benefits of integrating DER technology within their electric infrastructure. The manufacturers of DER devices are facing the age-old issues of what communication standards and protocols to provide to their customers for monitoring and controlling DER devices, in particular when they are interconnected with the electric utility system. In the past, DER manufacturers developed their own proprietary communication technology. However, as utilities and other energy service providers start to manage DER devices which are interconnected with the utility power system, they are finding that coping with these different communication technologies present major technical difficulties, implementation costs, and maintenance costs. Therefore, utilities, DER manufacturers, and the customers they serve are increasingly interested in having one international standard that would define the communication and control interfaces for all DER devices. Such standards, along with associated guidelines and uniform procedures would simplify implementation, reduce installation costs, reduce maintenance costs, and improve reliability of power system operations.

At the same time, the object modeling technology has developed within the last few years to become well-established as the most effective method for managing information exchanges. In particular, the IEC 61850 object models for the exchange of information within substations have moved through the standardization process, and are now formally designated as the IEC 61850 International Standard. Many of the components of this standard can be reused for object models of other types of devices. Some new components are also needed, but these can follow the rules for creating these new components, thus making them compatible with the existing IEC 61850 standards.

The interrelationship between IEC TC57 modeling standards is illustrated in Figure 1-2. This illustration shows as horizontal layers the three components to an information exchange model for retrieving data from the field, namely, the communication protocol profiles, the service models, and the object models. Above these layers is the information model of utility-specific data, termed the Common Information Model (CIM), as well as all the applications and databases needed in utility operations. Vertically, different areas are shown: substation automation, DER, distribution automation, customer services, generation (including large hydro plants), etc.