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Distribution Automation Terms, Definitions, and Standards

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Distribution Automation Terms and Definitions

ADMS: An **Advanced Distribution Management System** is a software platform that monitors and controls other subsystems used by electric utilities to boost the resilience and reliability of the distribution grid.

DER: A **Distributed Energy Resource** is any device connected to the distribution grid that functions to increase resiliency, reliability, or efficiency.

DERMS: A **Distributed Energy Resource Management System** is a software platform that monitors and controls the operations of the distributed energy resources on a distribution system.

Distribution Automation: A family of technologies, including sensors, processors, information and communication networks, and switches, through which a utility can collect, automate, analyze, and optimize data to improve the operational efficiency of its distribution power system.

DNP3: Distributed Network Protocol is a communication protocol outlined in IEEE 1815 *Standard for Electric Power Systems Communications-Distributed Network Protocol*. The Standard provides interoperability between substations, control stations, and intelligent electronic devices. DNP3 contains Application and Data Link Layers and utilizes bits to send data to reduce bandwidth usage.

FLISR: Fault Location, Isolation, and System Restoration is the use of system intelligence, remote control devices, and communications networks to quickly identify the location of a fault and then isolate the faulted area as tightly as possible to minimize the impact of the power outage associated with the fault. FLISR is synonymous with Fault Detection, Isolation, and Restoration (FDIR).

FAN: A **Field Area Network** is a group of interconnected devices on the distribution grid, allowing distribution substations and control centers to send and receive signals to/from each device while enabling a control function.

GOOSE: Generic Object Oriented Substation Events refers to a device communication protocol as outlined in IEC 61850 Communication Networks and Systems in Substations. The protocol entails a messaging format and timing interval to communicate information between intelligent electronic devices about certain events.

ICT: Information and Communications Technology refers to the integration of telecommunications infrastructure and computing power to transmit, process, and store information.

IED: An **Intelligent Electronic Device** is a microprocessor-based device that gathers data about and controls power grid equipment. It performs these functions using sensors and by interfacing with remote terminal units.

Modbus: A communication protocol used by intelligent electronic devices. Modbus is used due to its simplicity for small gear and the number of different devices that support the protocol. Modbus is an application layer protocol and uses text descriptions to send data.

RTU: A **Remote Terminal Unit** is a microprocessor-controlled electronic device that interfaces physical equipment with a software-based control system.

SCADA: Supervision Control and Data Acquisition refers to an automated system that monitors the health of an electric circuit or group of circuits and uses programmable logic to remotely control electrical equipment on the circuit(s).

Substation Automation: A family of technologies, including sensors, processors, information and communication networks, and switches, through which a utility can collect, automate, analyze, and optimize data to improve the operational efficiency of its substations.

VVO: **Volt/VAR Optimization** refers to the use of power grid equipment such as load tap changing transformer, voltage regulators, switched capacitors, smart inverters, and other power electronics-based equipment to optimally managing voltage levels and reactive power [in real-time] and maximize grid efficiency by reducing system losses, peak demand or energy consumption or a combination of the three.

Distribution Automation Standards

NEMA Standards	
Document	Title
NEMA VT P1-2018	Volt/VAR Technologies
NEMA RR 1-2019	Best in Class Roadmap for Resilient Distribution Systems

ANSI/NEMA Standards	
Document	Title
SG-IPRM 1-2016	Smart Grid Interoperability Process Reference Manual
ANSI/NEMA SG-IC 1-2013	Smart Grid Interoperable & Conformant (SG-IC) Testing & Certification Scheme Operator Guidelines

IEEE Standards	
Document	Title
ANSI/IEEE Std C37.90.1	IEEE Standard Surge Withstand Capability (SWC) Tests for Protective Relays and Relay Systems
ANSI/IEEE Std C37.90.2	IEEE Standard for Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers
ANSI/IEEE Std C37.230	IEEE Guide for Protective Relay Applications to Distribution Lines for the standards.
ANSI/IEEE Standard C63.14-2014	American National Standard Dictionary of Electromagnetic Compatibility (EMC) including Electromagnetic Environmental Effects (E3)
IEEE 1547-2018	IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces
IEEE 1815 (DNP3)	This Standard is used for substation and feeder device automation, as well as for communications between control centers and substations
IEEE C37.238	Ethernet communications for power systems
IEEE C37.239	Interchange of power system event data
IEEE 1588	Standard for time management and clock synchronization across the Smart Grid for equipment needing consistent time management
IEEE 2030.5	Standard for Smart Energy Profile Application Protocol
IEEE 1613-2009	IEEE Standard Environmental and Testing Requirements for Communications Networking Devices Installed in Electric Power Substations

IEEE-1613.1-2013	IEEE Standard Environmental and Testing Requirements for Communications Networking Devices Installed in Transmission and Distribution Facilities
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IEC Standards	
Document	Title
IEC 60870-6-702	Telecontrol Equipment and Systems Part 6: Telecontrol protocols compatible with ISO standards and ITU-T recommendations
IEC 61850 Suite	Standard defines communications within transmission and distribution substations for automation and protection
IEC 61968/61970 Suites	Family of Standards define information exchanged among control center systems using common information models. They define application-level energy management system interfaces and messaging for distribution grid management in the utility space

ISO/IEC Standards	
Document	Title
ISO/IEC Guide 28:2004	Conformity Assessment—Guidance on a Third-Party Certification System for Products
ISO/IEC 17065:2012	General Requirements for Bodies Operating Product Certification Systems
ISO/IEC/EN 17025:2005	General Requirements for the Competence of Testing and Calibration Laboratories
ISO/IEC 17011:2004	Conformity Assessment—General Requirements for Accreditation Bodies accrediting Conformity Assessment Bodies
ISO/IEC 17000:2004	Conformity Assessment—Vocabulary and General Principles
ISO/IEC Guide 68:2002	Arrangements for the Recognition and Acceptance of Conformity Assessment Results
ISO/IEC Guide 67:2004	Conformity Assessment—Fundamentals of Product Certification
ISO/IEC 15408	Information technology—Security techniques—Evaluation criteria for IT security

Other Standards	
Document	Title
IAF Guidance on the Application of ISO/IEC Guide 65:1996	General Requirements for Bodies Operating Product Certification Systems

ISO 9001:2008	Quality Management Systems—Requirements (available at www.iso.org)
NIST Special Publication 1108R2: 2012	NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 4.0
RFC 2119:1997	Key Words for Use in RFCs to Indicate Requirement Levels
SGIP 946	Testing and Conformance Framework Development Guide, Version 1: 2010
SEPA IPRM	Interoperability Process Reference Manual (IPRM), November 2017
ASAP-SG security profiles	A list of the publicly available information on this topic located here
IEC/TR 61000-2-5:2011	Electromagnetic Compatibility (EMC)—Part 2-5: Environment—Description and Classification of Electromagnetic Environments
NISTIR 7628 Revision 1: 2014	Guidelines for Smart Grid Cybersecurity
NIST Special Publication 800-53 Revision 4: 2013	Security and Privacy Controls for Federal Information Systems and Organizations
NIST Special Publication 800-53A Revision 4: 2014	Assessing Security and Privacy Controls in Federal Information Systems and Organizations: Building Effective Assessment Plans
NIST Special Publication 800-115: 2008	Technical Guide to Information Security Testing and Assessment
NIST Special Publication 800-142: 2010	Practical Combinatorial Testing
NERC CIP Standards	Available information on this topic is located here
OSSTMM 3	Open Source Security Testing Methodology Manual located here
PTES Technical Guidelines	Penetration Testing Execution Standard located here
SGIP: 2012-005, Version 1.0	SGIP EMIIWG Electromagnetic Compatibility and Smart Grid Interoperability Issues located here
Interoperability Test and Certification Management	UCA International OpenADE Task Group Interoperability Test and Certification Management Assistance Analysis, December 2011

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