



Smart Grid Standards: Specifications, Requirements, and Technologies

By Takuro Sato, Daniel M. Kammen, Bin Duan, Martin Macuha, Zhenyu Zhou, Jun Wu, Muhammad Tariq, Solomon Abebe Asfaw

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A fully comprehensive introduction to smart grid standards and their applications for developers, consumers and service providers

The critical role of standards for smart grid has already been realized by worldwide governments and industrial organizations. There are hundreds of standards for Smart Grid which have been developed in parallel by different organizations. It is therefore necessary to arrange those standards in such a way that it is easier for readers to easily understand and select a particular standard according to their requirements without going into the depth of each standard, which often spans from hundreds to thousands of pages.

The book will allow people in the smart grid areas and in the related industries to easily understand the fundamental standards of smart grid, and quickly find the building-block standards they need from hundreds of standards for implementing a smart grid system. The authors highlight the most advanced works and efforts now under way to realize an integrated and interoperable smart grid, such as the “NIST Framework and Roadmap for Smart Grid Interoperability Standards Release 2.0”, the “IEC Smart Grid Standardization Roadmap”, the ISO/IEC’s “Smart Grid Standards for Residential Customers”, the ZigBee/HomePlug’s “Smart Energy Profile Specification 2.0”, IEEE’s P2030 “Draft Guide for Smart Grid Interoperability of Energy Technology and Information Technology Operation with the Electric Power System (EPS), and End-Use Applications and Loads”, and the latest joint research project results between the world’s two largest economies, US and China. The book enables readers to fully understand the latest achievements and ongoing technical works of smart grid standards, and assist industry utilities, vendors, academia, regulators, and other smart grid stakeholders in future decision making.

The book begins with an overview of the smart grid, and introduces the opportunities in both developed and developing countries. It then examines the standards for power grid domain of the smart grid, including standards for

blackout prevention and energy management, smart transmission, advanced distribution management and automation, smart substation automation, and condition monitoring. Communication and security standards as a whole are the backbone of smart grid and their standards, including those for wired and wireless communications, are then assessed. Finally the authors consider the standards and on-going work and efforts for interoperability and integration between different standards and networks, including the latest joint research effort between the world's two largest economies, US and China.

- A fully comprehensive introduction to smart grid standards and their applications for developers, consumers and service providers
- Covers all up-to-date standards of smart grid, including the key standards from NIST, IEC, ISO ZigBee, IEEE, HomePlug, SAE, and other international and regional standardization organizations. The Appendix summarizes all of the standards mentioned in the book
- Presents standards for renewable energy and smart generation, covering wind energy, solar voltaic, fuel cells, pumped storage, distributed generation, and nuclear generation standards. Standards for other alternative sources of energy such as geothermal energy, and bioenergy are briefly introduced
- Introduces the standards for smart storage and plug-in electric vehicles, including standards for distributed energy resources (DER), electric storage, and E-mobility/plug-in vehicles

The book is written in an accessible style, ideal as an introduction to the topic, yet contains sufficient detail and research to appeal to the more advanced and specialist reader.



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Editorial Review

From the Back Cover

With numerous existing Smart Grid standards, it is clear that governments and industrial organizations world-wide have understood and acknowledged the critical role they play. This timely book is a useful guide for Smart Grid professionals in easily classifying fundamental Smart Grid standards, and to quickly find the building blocks they need to analyse and implement a Smart Grid system. The standards are organized in a systematic manner that aids identification, according to grid requirements. It also covers broader Smart Grid areas including, but not limited to, the following:

- A fully comprehensive introduction to Smart Grid standards and their applications for developers, consumers and service providers
- Presents up-to-date standards of Smart Grid, including the key standards from NIST, IEC, ISO ZigBee, IEEE, HomePlug, SAE, and other international and regional standardization organizations
- Covers short technological overviews and standards of wind energy, solar photovoltaic, fuel cells, pumped storage, and nuclear generation as well as other alternative sources of energy such as geothermal and bioenergy
- Provides short technological overviews and standards for smart storage and plug-in electric vehicles, including standards for distributed energy resources (DER), electric storage, and E-mobility/plug-in vehicles
- Explores scenarios for future low carbon power grid, describes potential for high renewable integration, and the corresponding policies and operational challenges of the Smart Grid
- Summarizes all of the standards mentioned in the book

As a comprehensive treatment of the topic, Smart Grid Standards: Specifications, Requirements, and Technologies is ideal for utilities, ICT manufacturers, telecommunication providers, engineers and researchers, postgraduates in electrical engineering, and government and industry regulators. Testing laboratories and certification organizations will also find the book useful.

About the Author

Takuro Sato

Waseda University, Japan

Daniel M. Kammen

University of California, Berkeley, USA

Bin Duan

Xiangtan University, China

Martin Macuha

France Telecom Japan Co. Ltd., Japan

Zhenyu Zhou

North China Electric Power University,
China

Jun Wu

Shanghai Jiao Tong University, China

Solomon Abebe Asfaw

University of California, Berkeley, USA

Muhammad Tariq

FAST National University of Computer and Emerging Sciences, Pakistan

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