Microgrid Controllers
Standards for Specifications and Testing

James T. Reilly

Consultant

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IEEE P2030.7: Standard for the Specification of Microgrid Controllers

On June 11, 2014 the IEEE SA Board approved the PAR (IEEE P2030.7), *Standard for the Specification of Microgrid Controllers*.

Dr. Geza Joos, McGill, Chair

Shay Bahramirad, ComEd, Vice-Chair

Mark Buckner, ORNL, Secretary

Scope: A key element of microgrid operation is the Microgrid Energy Management System (MEMS). It includes the control functions that define the microgrid as system that can manage itself, and operate autonomously or grid connected, and seamlessly connect to and disconnect from the main distribution grid for the exchange of power and the supply of ancillary services. The scope of this standard is to address the technical issues and challenges associated with the proper operation of the MEMS that are common to all microgrids, regardless of topology, configuration or jurisdiction, and to present the control approaches required from the distribution system operator and the microgrid operator. Testing procedures are addressed.

Hierarchical Levels of Control

Hierarchical levels of control for microgrids may be categorized as primary, secondary, and tertiary.

- *Primary control* is the level in the control hierarchy that is based exclusively on local measurements, which includes islanding detection, output control, and power sharing (and balance control).
- *Secondary control*, the μEMS, is responsible for microgrid operation in either the grid-connected or islanded mode.
- *Tertiary control* is the highest level of control and sets long-term and "optimal" set points depending on the host grid's requirements.

Microgrid Control System Standardization

Function Assignments to Blocks

Block 4

Grid Interactive Control Functions

Area EPS Control, Spot Market, DMS, Transmission SCADA, Connection to Adjacent Microgrid

Block 3

Supervisory Control Functions

Forecasting, Data management and Visualization, Optimization (e.g. Volt/VAR, Economic dispatch), Dispatch, State Estimation, Emergency Handling, Generation Smoothing, Spinning Reserve, Topology Change Management, Black Start, Protection Coordination

Block 2

Local Area Control Functions

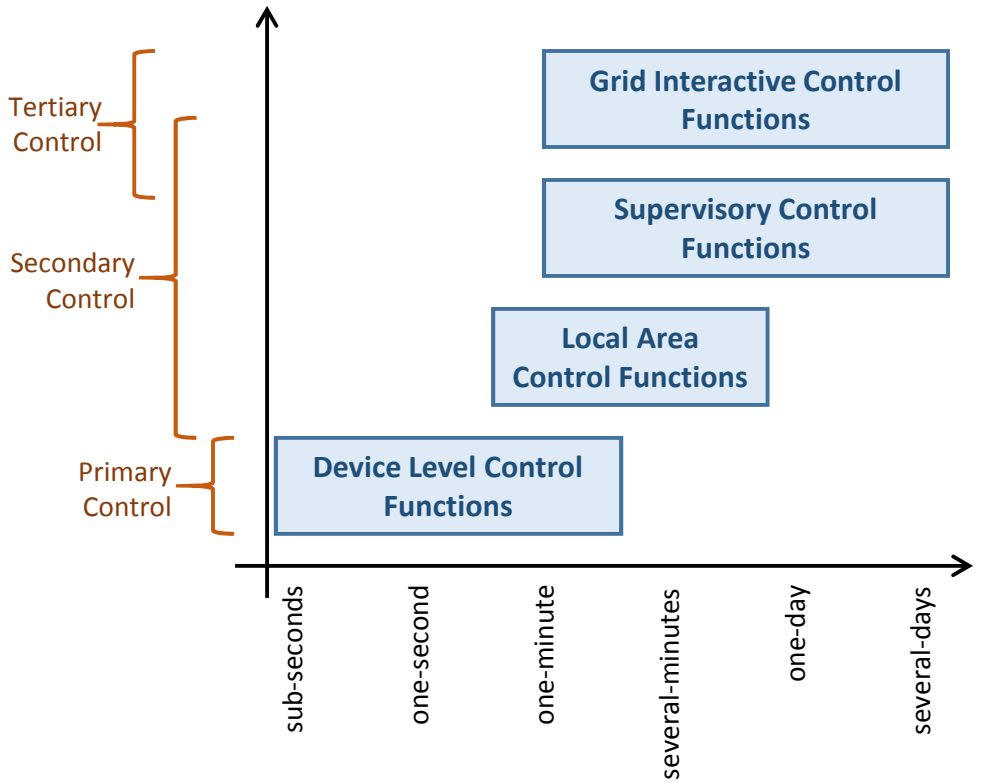
Sequence Logic/Status control, Load Management, Building Energy Management, Plant Controller, AGC, Fast Load Shedding, Resynchronization, Disturbance Recording

Block 1

Device Level Control Functions

Voltage/Frequency Control, Reactive power Control, Electric Vehicle Control, Energy Storage Control, Load Control, Generation Control, Islanding Detection, Fault Protection

Block Action Timescale



BERKELEY LAB
Lawrence Berkeley National Laboratory

IEEE P2030.8: Standard for the Testing of Microgrid Controllers

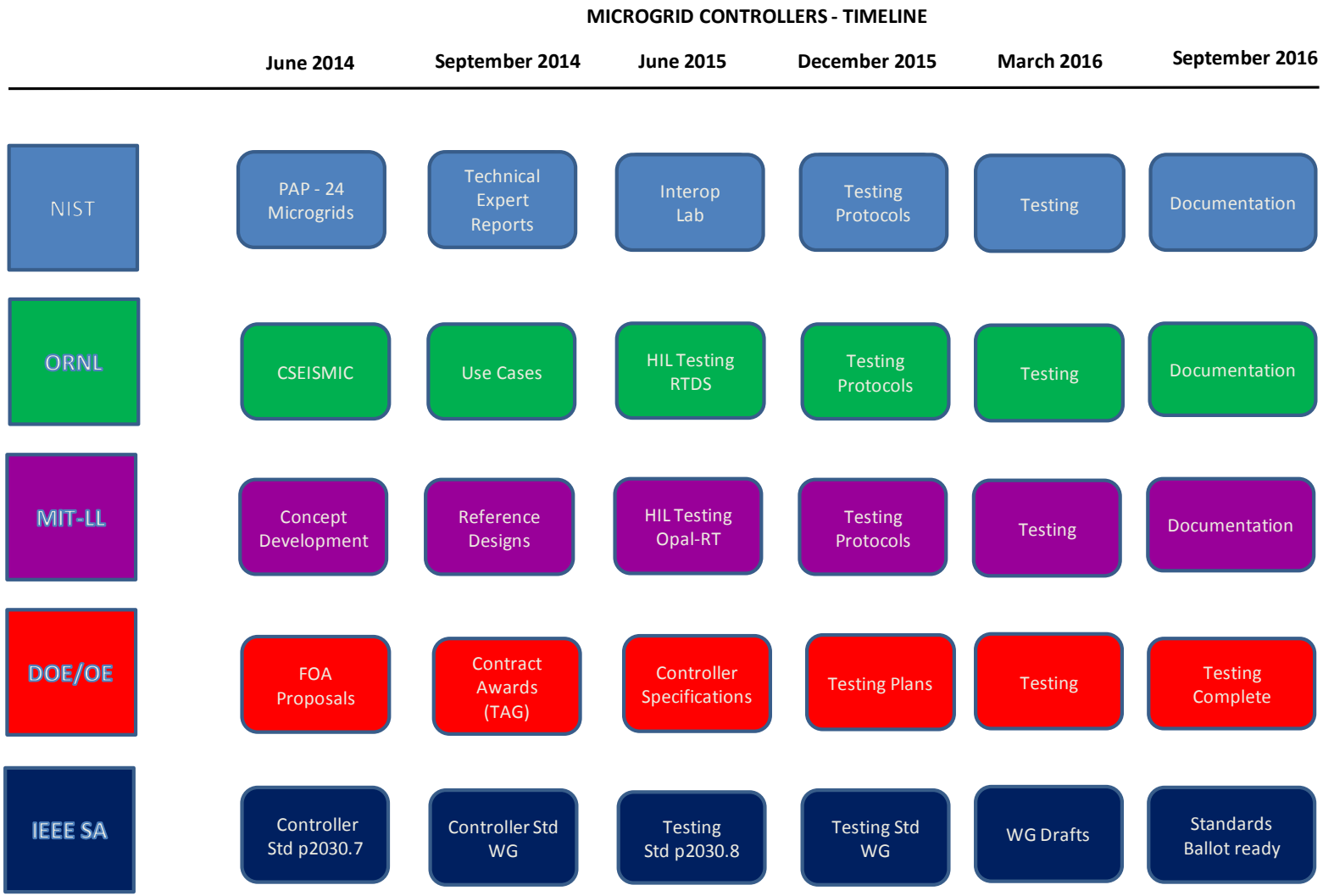
On June 11, 2015 the IEEE SA Board approved the PAR (IEEE P2030.8), *Standard for the Testing of Microgrid Controllers*.

Ward Bower, Ward Bower Innovations, Chair

Dr. Geza Joos, McGill, Secretary

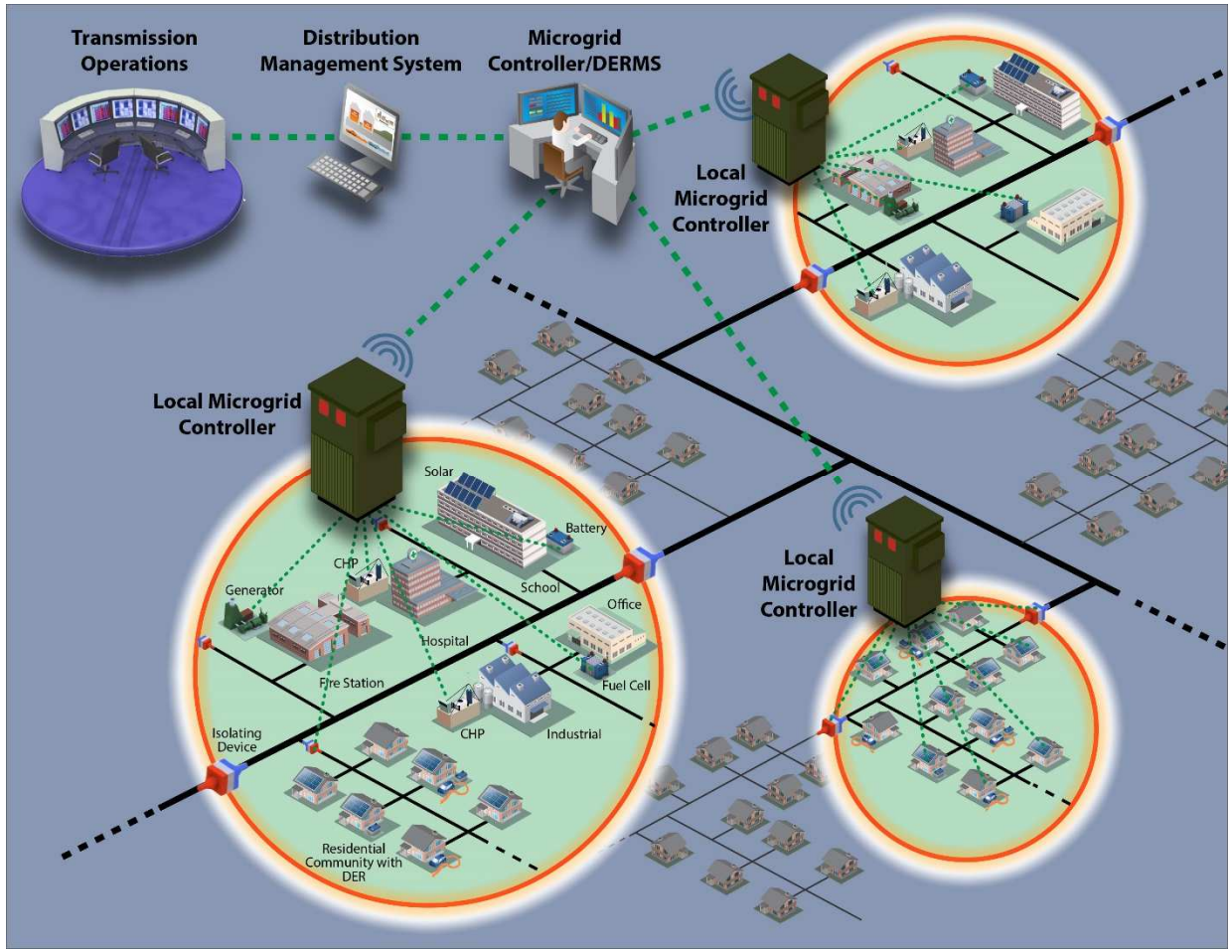
Scope: A key element of microgrid operation is the microgrid controller and more specifically the energy management system. It includes the control functions that define the microgrid as a system that can manage itself, and operate autonomously or grid connected, and seamlessly connect to and disconnect from the main distribution grid for the exchange of power and the supply of ancillary services, including the distribution system to which it is connected. It is recognized that microgrid components and operational solutions exist in different configurations with different implementations. The scope of this standard is to develop a set of testing procedures allowing the verification, the quantification of the performance and a comparison of the performance with expected minimum requirements of the different functions of the microgrid controller that are common to the control of all microgrids, regardless of topology, configuration or jurisdiction. It aims to present metrics for a comparison of the control functions required from both the microgrid operator and the distribution system operator. A set of testing and performance metrics will be developed.

Microgrid Controller Standards and Testing



Note: IEEE P2030.7 Ballot ready draft due date, December 2016 (latest). FOA awards, 24 month period of performance ends September 2016.

Microgrids
Integrated Energy Management Systems



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