MICROGRID KNOWLEDGE

Virtual Conference

Engineering our Way to the Future:

Microgrids, Digitalization and Automation

Agenda

Moderator: David Smith (Burns Engineering)
Director of Energy Services

Speakers:

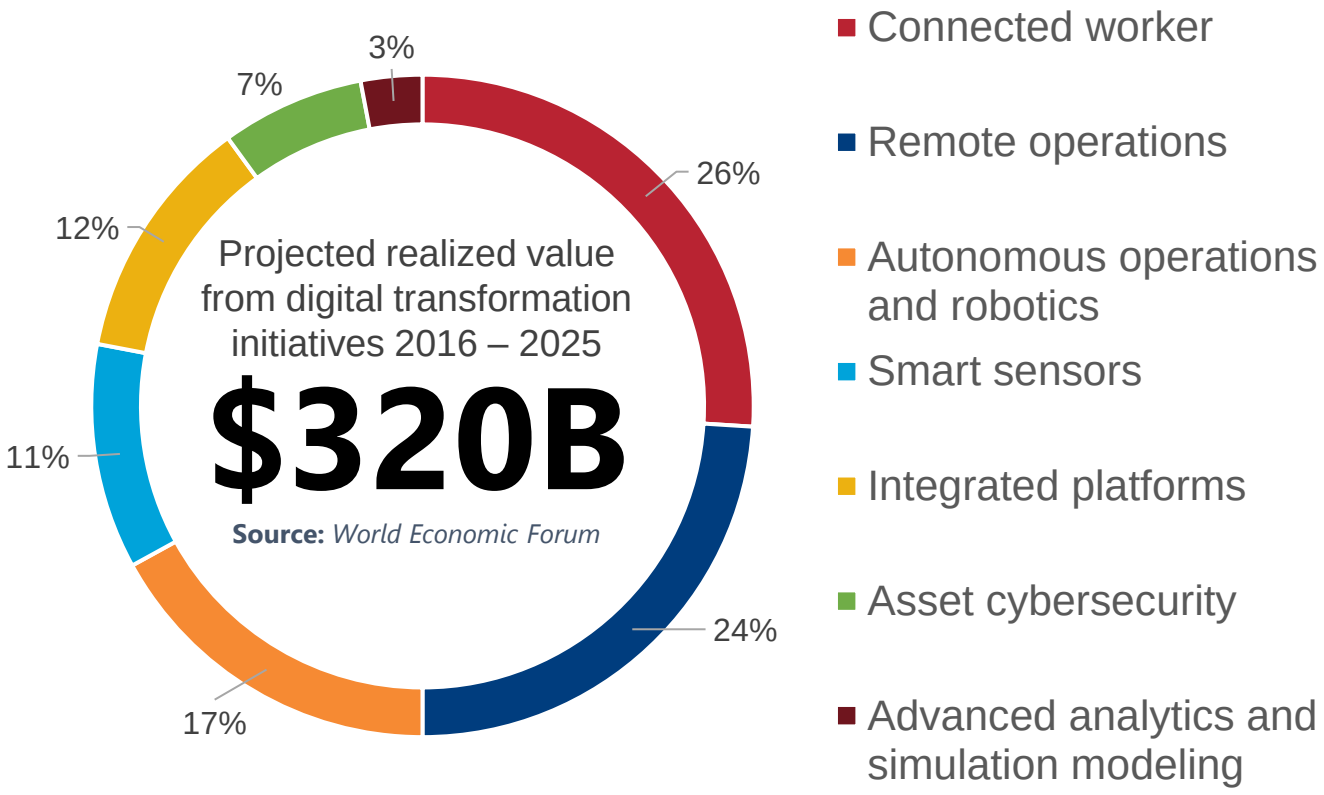
1. Alexandra Schwertner (Rockwell Automation) Advanced Energy Business Development Manager
2. Scott Manson (Schweitzer Engineering Laboratories) Technology Director
3. Kati Sidwall (RTDS Technologies Inc.) Simulation Specialist

Resources:

- Speaker Bios
- Ask the Experts: Q&A at End
- Microgrid Resources Library

Solving the data disconnect

Allie Schwertner, Rockwell Automation, Advanced Energy Business Development Manager



LESS THAN 1%

of data is currently used.

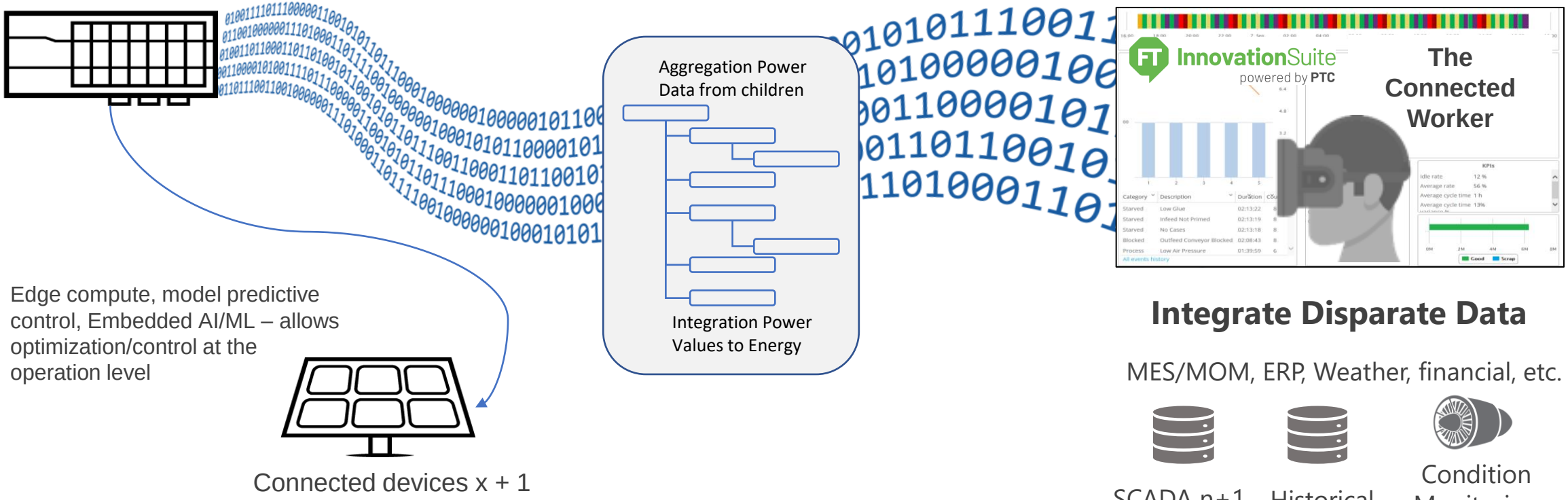
Source: *McKinsey - The Internet of Things: Mapping the Value Beyond the Hype*

Optimizing Systems of Systems through IIoT

Smart Energy Objects

Standardized Information Data Models

IIoT Platform



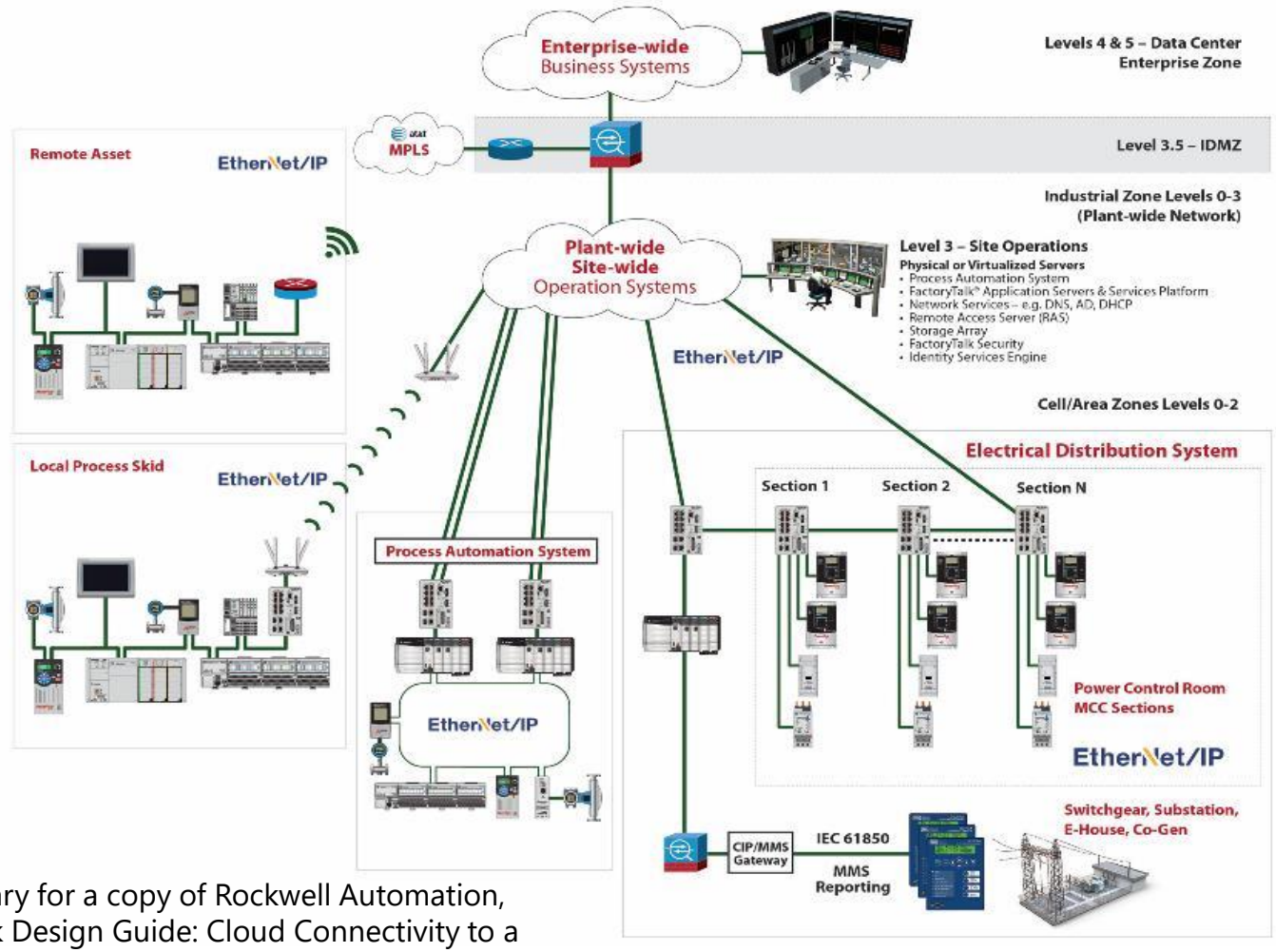
Integrate Disparate Data

MES/MOM, ERP, Weather, financial, etc.

SCADA n+1 | Historical | Condition Monitoring

Resilient IT/OT Network Architectures

- Protect the integrity and availability of data from sensor to cloud
- Authentication, authorization and accounting
- Tested and validated architectures



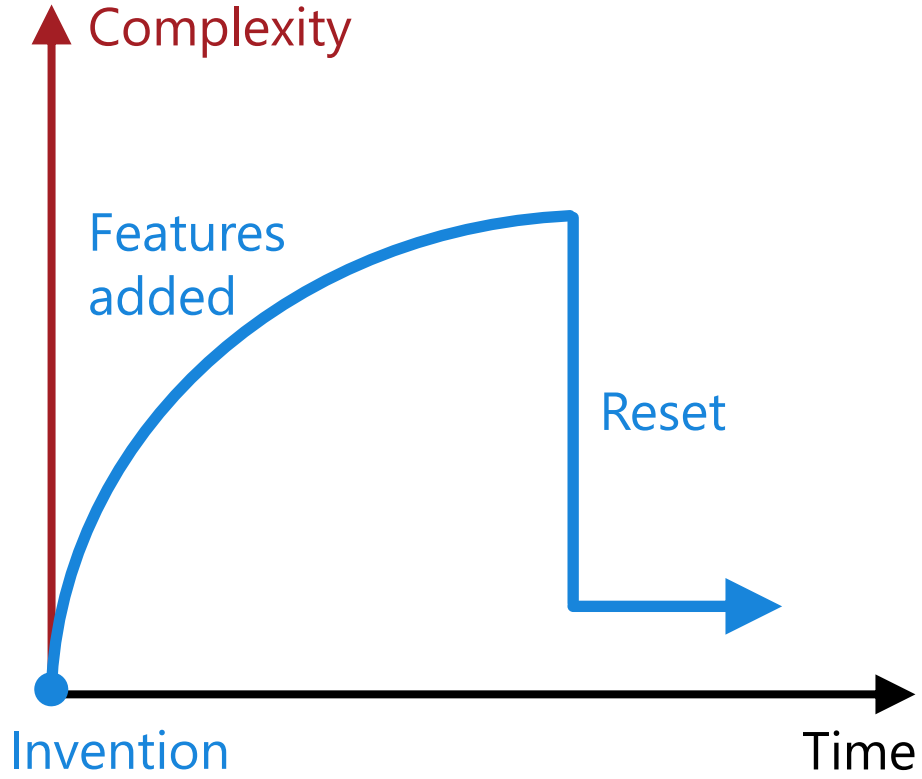
Check out the resource library for a copy of Rockwell Automation, Cisco and Panduit's network Design Guide: Cloud Connectivity to a Converged Plantwide Ethernet Architecture

Resetting Complexity in Microgrid Controls and Protection

Scott Manson, SEL, Technology Director

Challenges:

1. Complexity of microgrid controls has increased over time
2. Complexity negatively affects cost and reliability



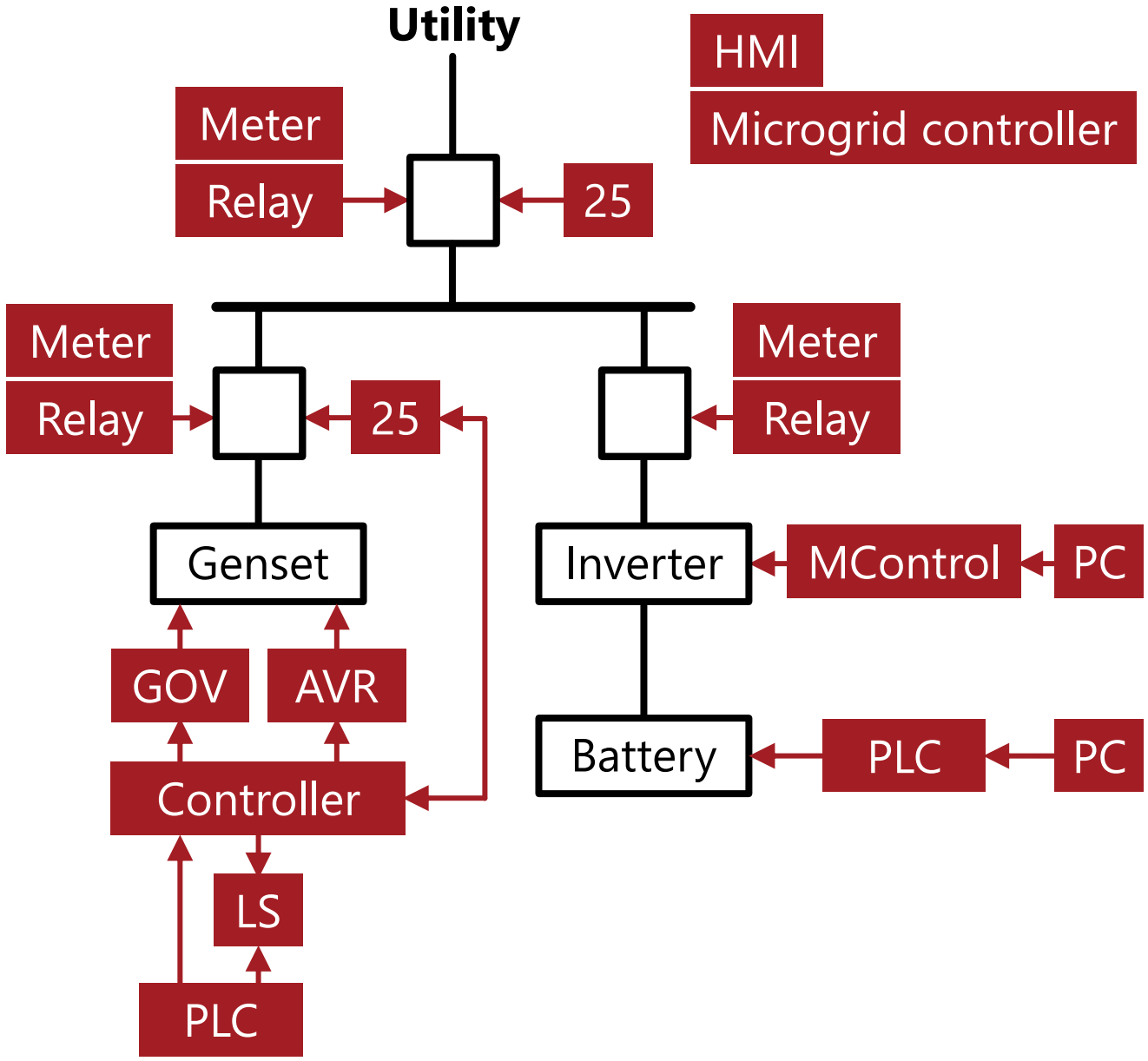
Solutions

Conventional solution

Advanced relay solution

Self-configuring communications

No tuning controls



Results / Recommendations

1. Reducing part count improves reliability

60 kW genset

Streamlined solution

De-risking microgrids of the future with hardware-in-the-loop testing

Kati Sidwall, RTDS Technologies Inc.

CONTEXT: The need for high-fidelity testing tools to anticipate vulnerabilities in protection and control (P&C) as microgrids become more complex and intelligent.

Challenges:

1. Traditional modelling / testing tools (RMS modelling / open-loop testing) can be blind to issues in modern microgrids [1]
2. Testing facilities for today's P&C require high-speed communication-based I/O in addition to traditional analogue/digital signals
3. Need for accurate modelling of DERs and their converters

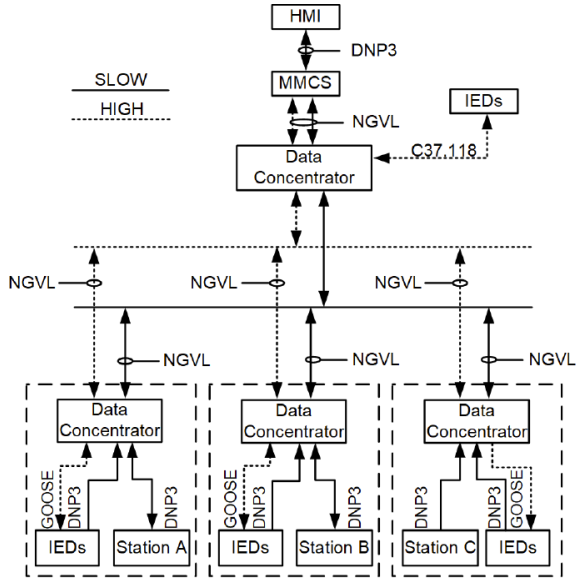
Real-time simulator

Solutions

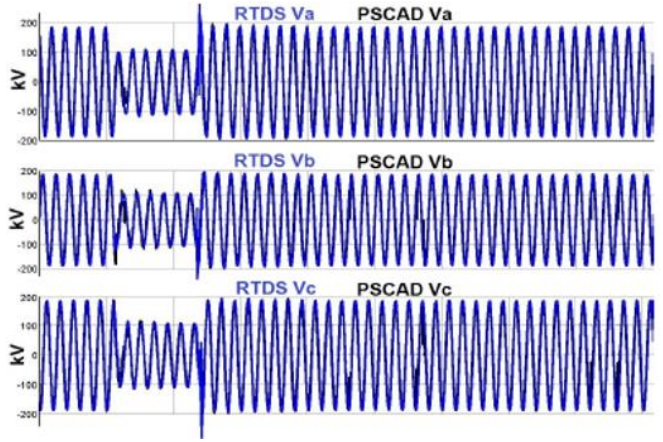
1. Electromagnetic transient (EMT) models have improved performance in converter-rich networks; real-time simulators allow for comprehensive hardware-in-the-loop testing of microgrid equipment connected to the simulation

2. MODBUS, DNP3, IEC 60870-5-104, IEC 61850, PMU data, TCP/UDP have been successfully implemented for HIL testing

3. Validated, highly detailed modelling library developed over decades (e.g. machines, loads, renewables, high frequency switching converters)



Microgrid communication network [2]



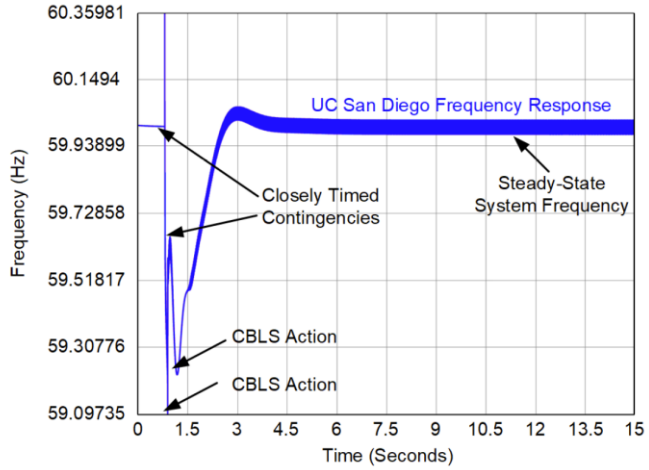
EMT model (validation of results) [3]

Results / Recommendations

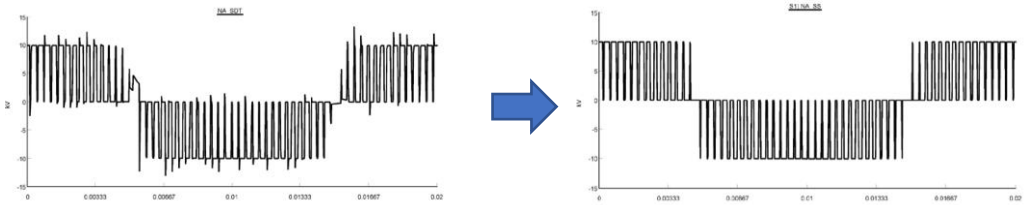
1. Include HIL testing in the validation process for microgrid projects where gaps in P&C interoperability can pose a significant reliability/stability risk

2. Slow- and fast-acting communication protocols implemented in the HIL testbed allow for primary, secondary, and tertiary control devices to be tested together

3. Continue to develop models to improve test accuracy and reflect industry trends (e.g. higher converter switching frequencies)



HIL test results for microgrid controller [2]



Improved switching algorithm for power electronics

References:

[1] B. Badrzadeh, Z. Emin, February 2020. The need for enhanced power system modelling techniques and simulation tools. CIGRE ELECTRA No. 308.
[2] Dillot, John; Upreti, Ashish; Nayak, Bharath; Ravikumar, Krishnanjan Gubba, 2018. Microgrid Control System Protects University Campus From Grid Blackouts. 45th Annual Western Protective Relay Conference.
[3] M. Davies, October 2019. Preparing for the Future Power System – Now. Presentation, RTDS Technologies Australian UGM.

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Ask the Experts: Q&A Session

Type your questions in to the Q&A box

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Microgrid Knowledge Virtual Conference Resource Library

Recommended Resources

Microgrid Resource Library

Visit ThinkMicrogrid.com

Network with the MGK Community on LinkedIn

Microgrid 2020 LIVE Conference – Nov. 18-20

Philadelphia, PA

Plenary Session - *Microgrids Have Leapt 'the Chasm.' What's on the Other Side?*

- Plus 90 Speakers in 30+ Sessions on best practices
- 35 Exhibitors
- Networking opportunities

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Thank You!

Hope to see you in Philadelphia on Nov 18-20 for Microgrid 2020

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