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Cybersecurity Certification Standard for Distributed Energy Resources

Ryan Cryar, Cybersecurity Researcher
National Renewable Energy Laboratory
NERC DER Workshop
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RELIABILITY | RESILIENCE | SECURITY




Cybersecurity Certification – Why Now?

- Why should we care about developing DER cybersecurity certification now?
- Solar is 3% of todays electricity generation
- Rooftop and small solar in the Western Interconnection is approximately 30,000 MW
- This represents about 65% of all solar in the west, none of which is required to follow NERC CIP

A national or international cybersecurity certification standard can aid industry stakeholders to evaluate and validate the cybersecurity posture of the DER devices before they are connected to the electric grid.

Photo by Dennis Schroeder, NREL 22168

CNN

Biden administration says solar energy has the potential to power 40% of US electricity by 2035

Nilsen, Ella. CNN.com, September 8, 2021. url

Reuters

Solar energy can account for 40% of U.S. electricity by 2035, according to DOE

Volcovici, Valeri. Reuters.com, September 8, 2021. url

NBC

Nearly half of U.S. electricity could come from solar by 2050, Biden administration

Lederman, Josh. NBC.com, September 8, 2021. url

NERC

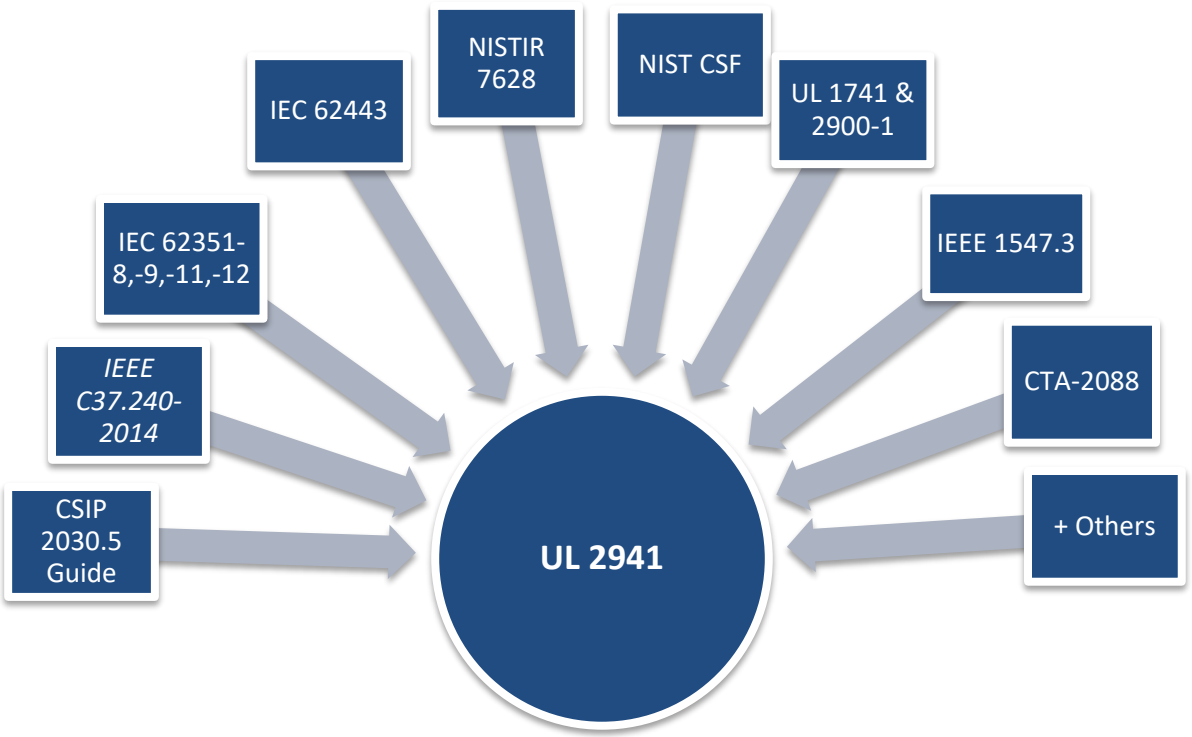
Variable-energy resources ….continue to be a significant component of new capacity

NREC Planning Committee Meeting, June 6, 2017. url

UL 2941: An Introduction

The UL cybersecurity certification standard will:

- Build on past work
- Map and leverage security requirements from industry best practices for hardware and software
- Provide an information hub for DER Industry stakeholders
- Establish “Security by Design”
- UL will lead development of the cybersecurity certification standard.



Note: All these standards serve a different purpose.
The UL cybersecurity certification standard will not replace them by any means.

Outline of Investigation (OOI)

PRESS RELEASE

UL and NREL Announce Cybersecurity Testing Recommendations for Distributed Energy Resources and Inverter Based Resources

UL and the National Renewable Energy Laboratory will complete an Outline of Investigation as a precursor to the first cybersecurity certification standard for distributed energy resources.

Home > News > UL and NREL Announce Cybersecurity Testing Recommendations for Distributed Energy Resources and Inverter Based Resources

March 7, 2022

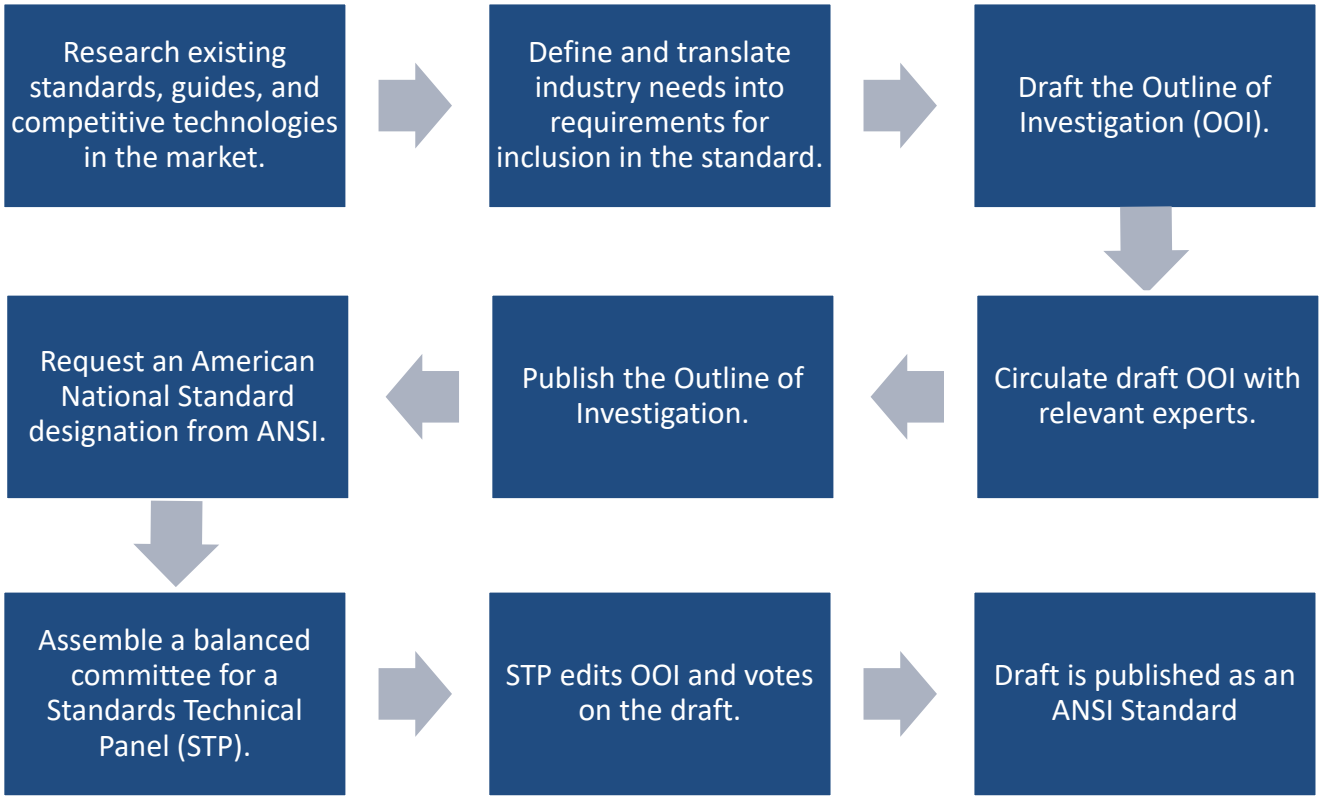
NORTHBROOK, Illinois – March 7, 2022 – UL, a global safety science leader, has released a report, co-authored with the U.S. Department of Energy's (DOE's) National Renewable Energy Laboratory (NREL), titled "Cybersecurity Certification Recommendations for Interconnected Grid Edge Devices and Inverter Based Resources." The report includes recommendations that enable distributed energy resources (DER) and inverter based resources (IBRs) to maintain a strong cybersecurity posture.

With support from DOE's Solar Energy Technologies Office, UL will continue working with NREL on developing requirements to support cybersecurity certification standards for DERs and IBRs. NREL and UL are currently working on an Outline of Investigation for a standard that will apply to energy storage and generation technologies on the distribution grid, including photovoltaic inverters, electric vehicle chargers, wind turbines, fuel cells and other resources essential to advancing grid operations. These new requirements will prioritize cybersecurity enhancements for power systems dealing with high penetration inverter-based resources, including those interfacing with bulk power systems for periods of instantaneous high wind, solar and hybrid/storage generation. It will also help ensure cybersecurity is designed into new IBR and DER systems.

"Currently, there are no cybersecurity certification requirements to which manufacturers and vendors can certify their DER and IBR devices against an established and widely adopted cybersecurity certification program. The development of these new cybersecurity certification requirements will provide a single unified approach that can be taken as a reference for performing the testing and certification of DERs before being deployed and while in the field," said Kenneth Boyce, senior director for Principal Engineering, Industrial, group at UL. "Drafting comprehensive certification requirements with peer review requires effective leadership and stakeholder participation. We are pleased to be working with NREL in this effort to bring additional performance-based security to electrical grid infrastructure."

- The requirements will provide a single unified approach for testing and certification of DERs in *advance* of deployment.
- The certification will be applicable to generation and energy storage technologies.
- UL and NREL are actively developing the OOI.
- Feedback was received from 10 manufacturers, a few utilities, and three national labs
- Publishing version 1 of OOI by end of year
- In calendar year 2023, will have one more round of formal feedback sonication
- To receive news and information, please visit UL news.

Process from OOI to Certification Standard



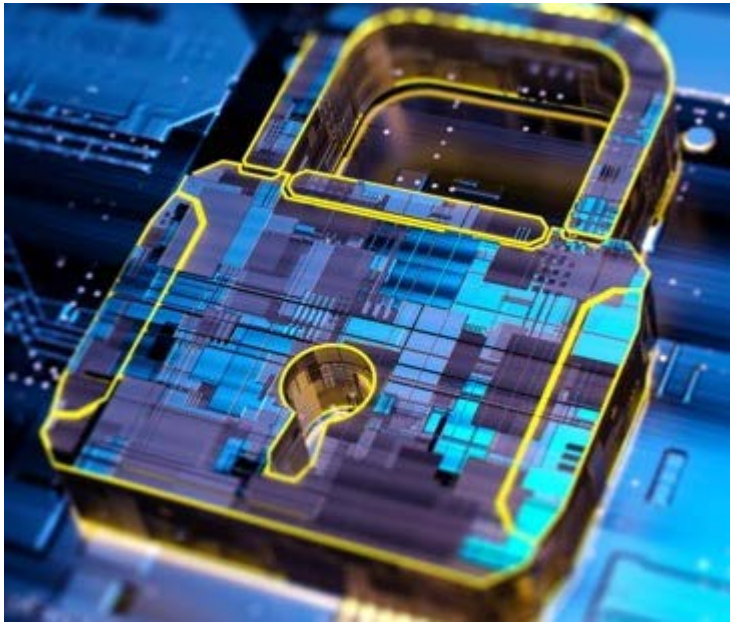
Organization and Engagement

CONTENTS

* Draft, subject to change

- Draft v6
- Testable requirements categorized into 11 domains
- Addressed comments from industry, in final reviews for v1
- v1 publication end of December
- Feedback from manufacturers, installers/aggregators, utilities, and national labs
- Controls on public key infrastructure, access control, and remote management
- **UL will serve on the advisory board** and help drive select committees and working groups to advance key cybersecurity objectives.
- **UL's goal** is to structure cybersecurity and promote adoption of the cybersecurity certification standard.

Benefits of a Cybersecurity Certification Standard



- Ensures DER devices have all five pillars of cybersecurity: confidentiality, integrity, availability, authentication, and non-repudiation
- Supports federal and state mandates
- Establishes security by design in new DER systems
- Creates an environment where the baseline security posture of the DER industry will be elevated

What Needs To Be Done

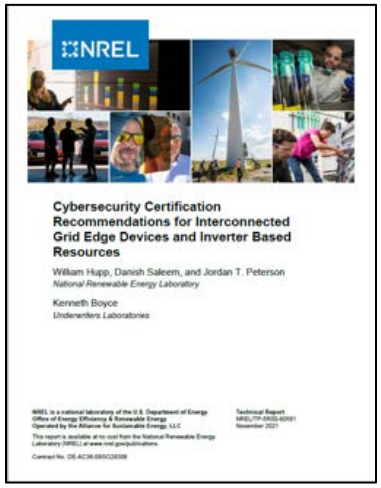
Outcomes of Cybersecurity Standards Initiatives

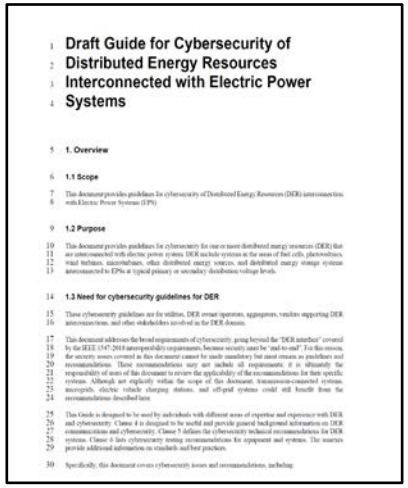
Provides a baseline for device-level security and informs the development of a cybersecurity certification standard for DER stakeholders

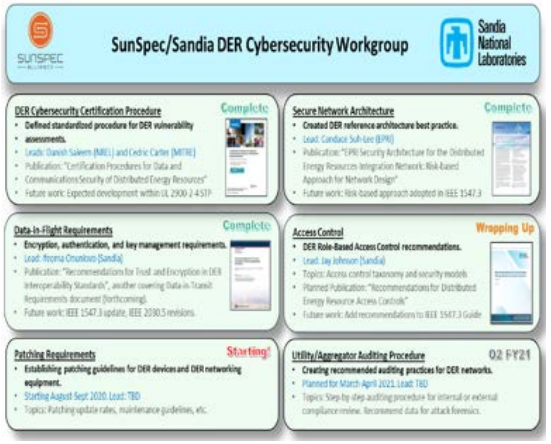
Provides cybersecurity guidelines for one or more distributed energy resources that are interconnected with electric power system

Provides cybersecurity certification requirements that IBR equipment shall support in a way that the choice of implemented technology is at the manufacturer's decision.

Provides engagement activities to bring together individuals across industry, academia, and government to exchange ideas and learn.

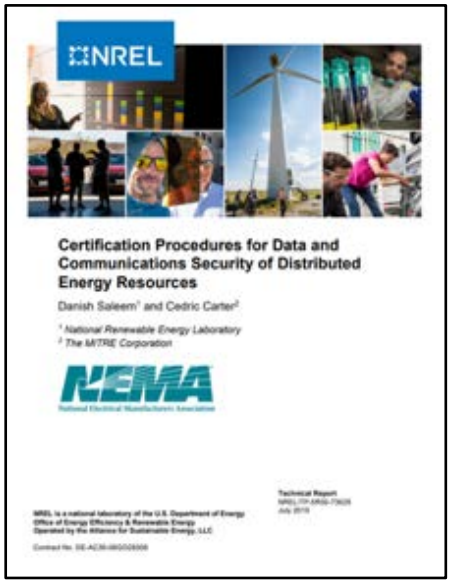






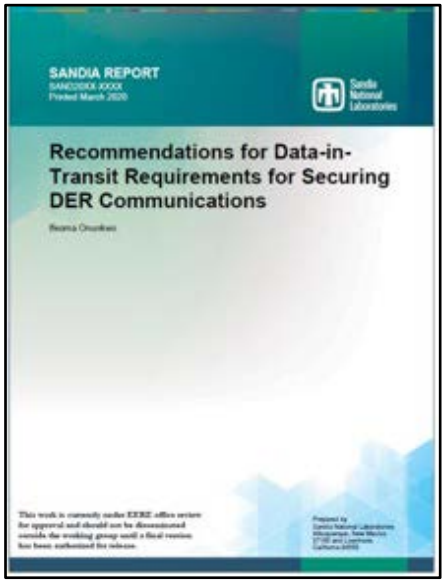
Outcomes of Cybersecurity Standards Initiatives Cont.

Provides test cases that can be used to check, verify and validate cybersecurity posture of DERs



Provides practical cybersecurity requirements pertaining to the network components supporting DERs.

Examines the cybersecurity requirements for DER comms protocols, per IEEE 1547-2018 revision



Provides near and long-term recommendations to improve trust and encryption mechanisms for DER comms

Roadmap of Next Steps

- Publish the Outline of Investigation.
- Develop appropriate third-party conformity assessment programs for DER cybersecurity testing and certification.
- Develop white papers, a press release, industry webinars, and related activities to increase awareness.
- Organize and host a DER cybersecurity summit for thought leaders and key stakeholders from national laboratories, utilities, and the energy and renewables industries to establish practical and actionable plans to move forward.

Questions and Answers

NREL/PR-5R00-84709

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