

NERC EMT Modeling Working Group Updates

2026 EMT Simulation Workshop

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NERC-Industry Collaboration



NERC EMTWG

EMT Modeling Working Group

Best Practices

Guidelines

Outreach

NERC-ORNL-DOE- Industry

Efficiency

Scalability

Interoperability

NERC EMT Modeling Working Group (EMTWG)

Support and accelerate industry adoption of EMT modeling and simulation in the interconnection and planning studies

Best Practices Guidance

- White Papers
- Technical Reference Documents

Recommended Practices

- Reliability Guidelines

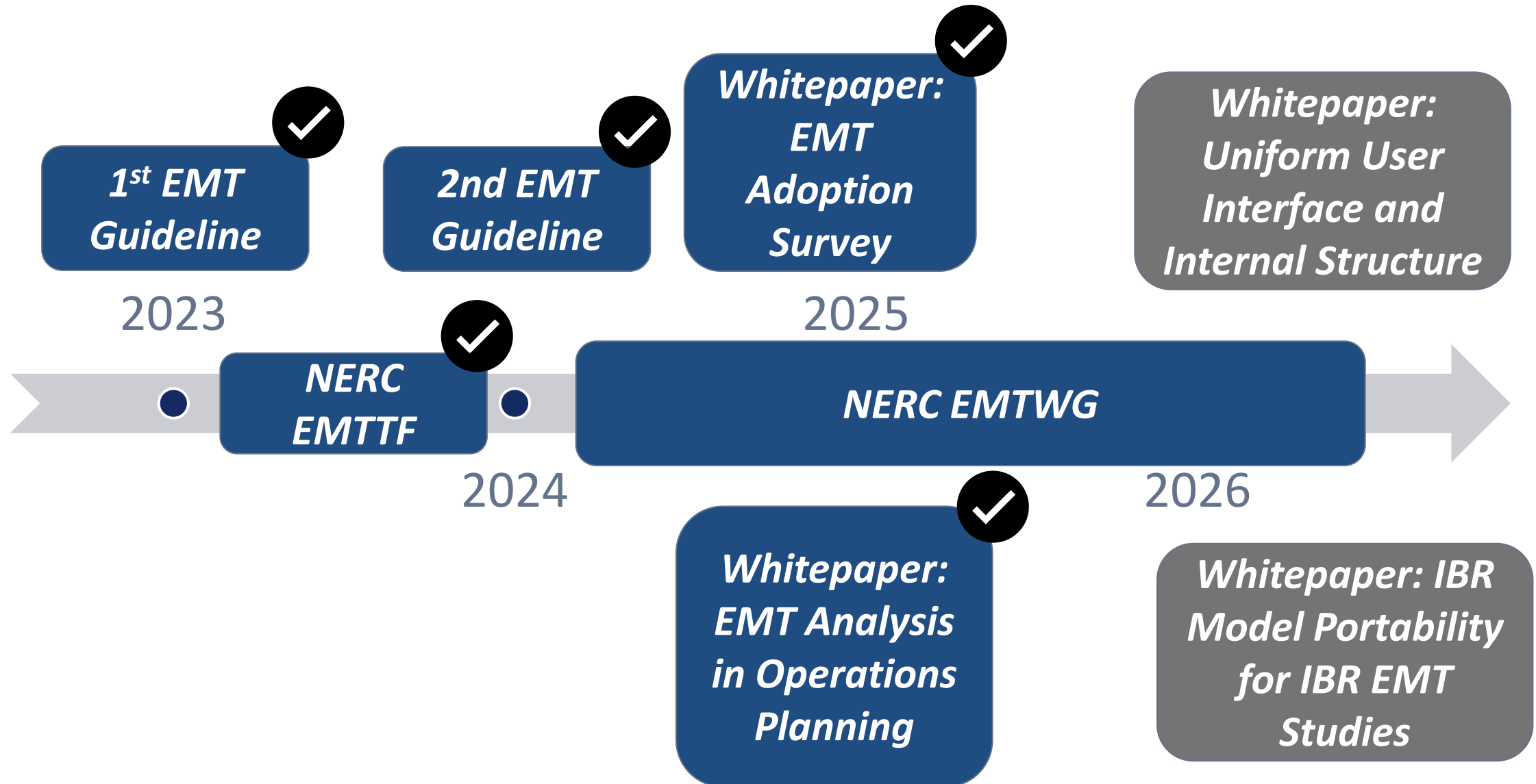
Resources

- Suggested Reading List
- Technical Presentations

Outreach and Education

- Workshops
- Webinars

Progress



EMT Adoption Survey Summary

Challenges

- Expertise and Resource Constraints
- Complexity of Models and Large System Studies
- Keeping up with Technological Changes
- Model Data Sharing

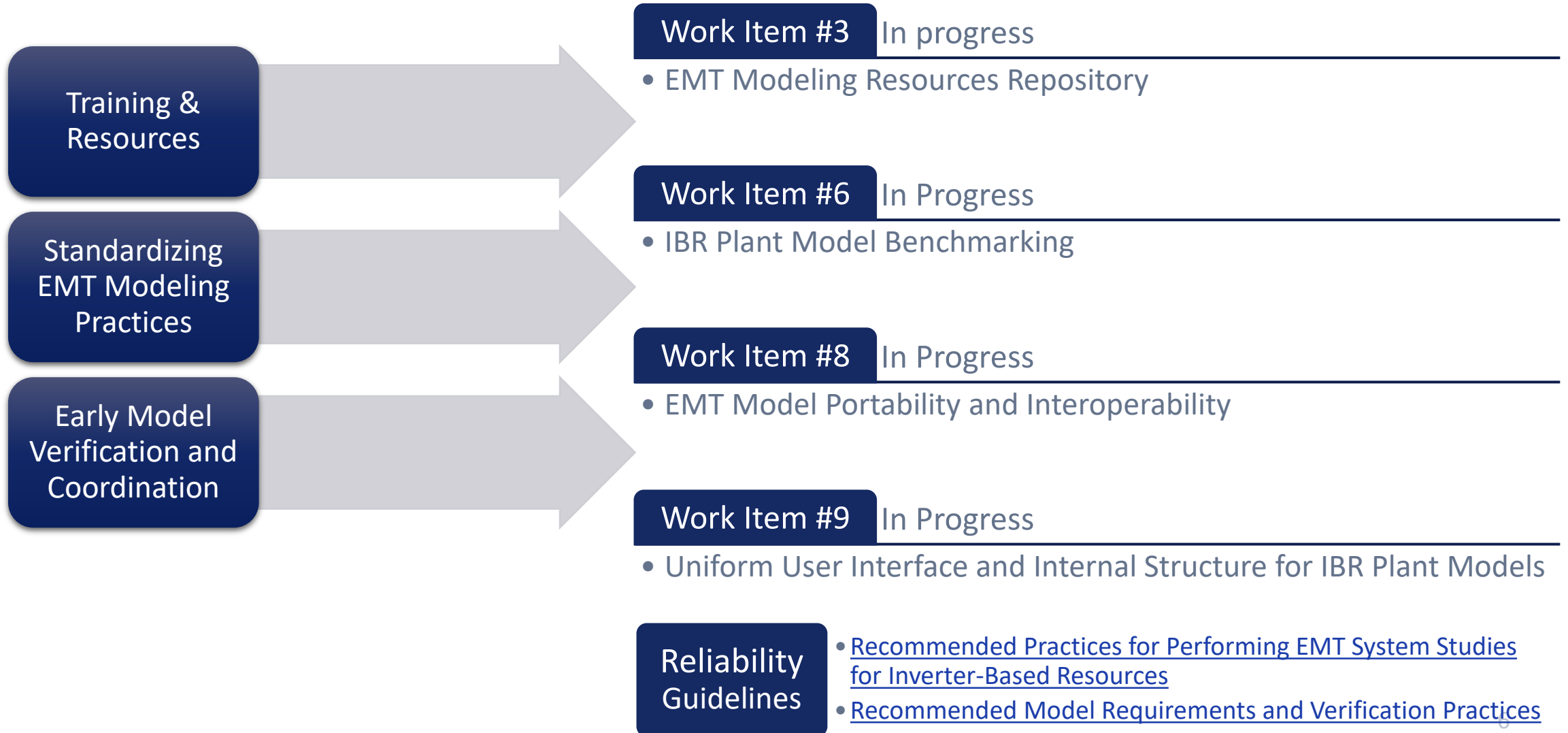
Near-term Action

- Broaden Training and Resources
- Standardization of EMT Modeling Practices
- Investment in Simulation Tools and Infrastructure
- Early Model Verification and Coordination
- Adaptability

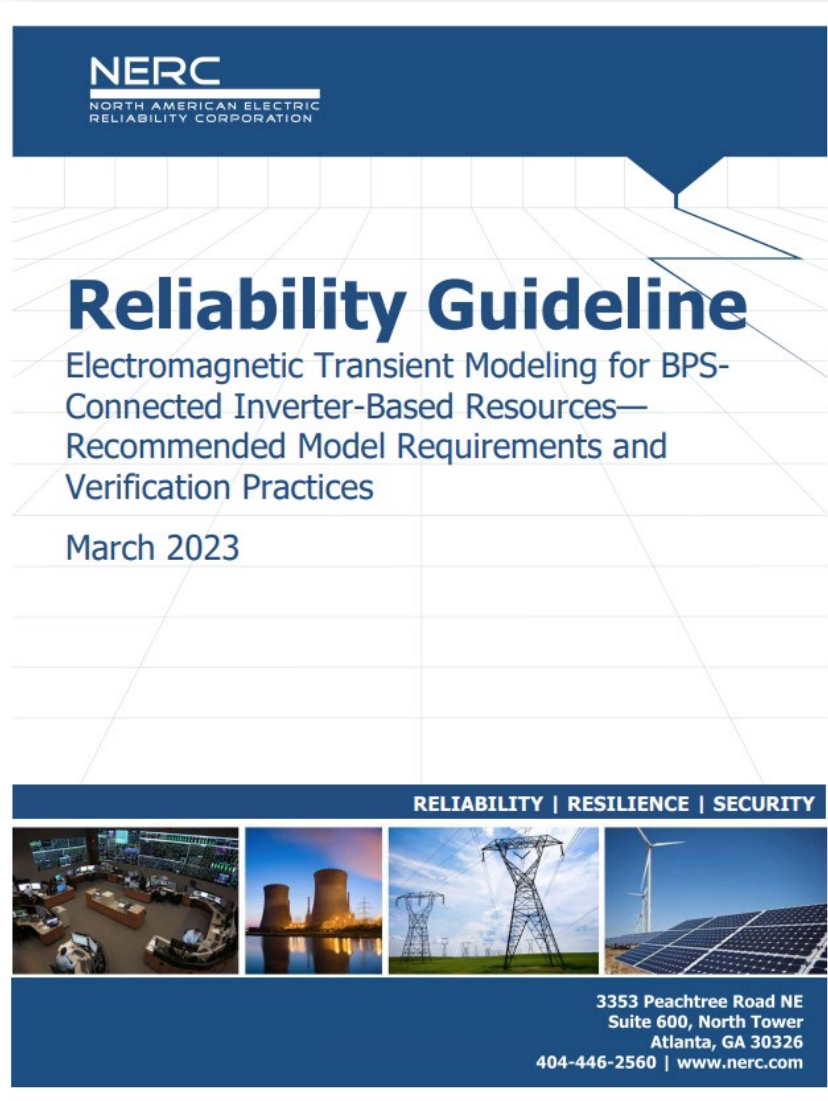
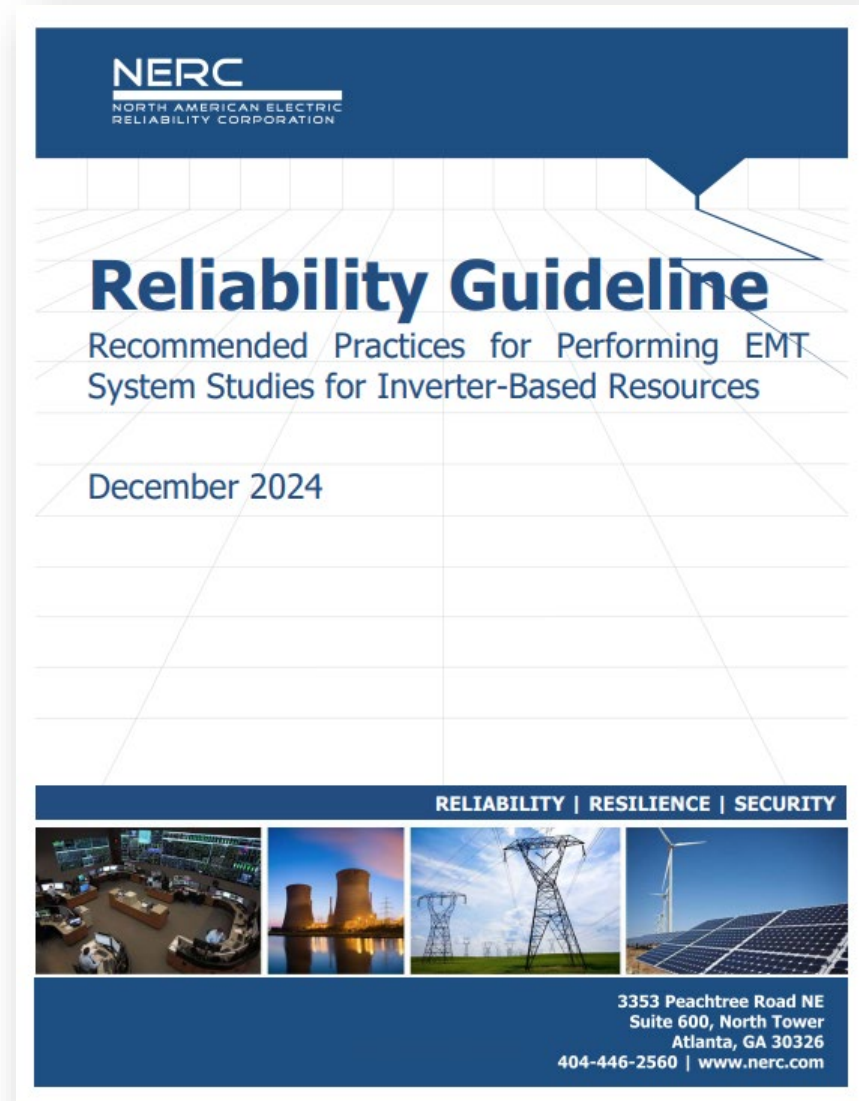
Long-term Action

- Optimize Compatibility Standards
- Leverage High-Performance Computing Solutions
- Advance Automation and Interoperability
- Improve Data Sharing

EMT Adoption Survey Summary



Reliability Guidelines on EMT Modeling



Staged Approach to EMT Modeling Adoption



Work Item 8 – White Paper:

Model Portability for IBR EMT Studies

A Lightweight Common Information Model Profile

Draft in Progress

Summary

- Introduces the need for network model management in EMT studies
- **Standard data format** to help users build, validate, update, and simulate EMT models to keep up with increasing demand for EMT studies
- Fulfill the intent of FERC Order 901 and Order 2023 by improving model data sharing among Transmission Planners and Planning Coordinators
- Discusses the essential CIM features and extensions for EMT studies of IBR integration.

Summary

Three approaches were considered:

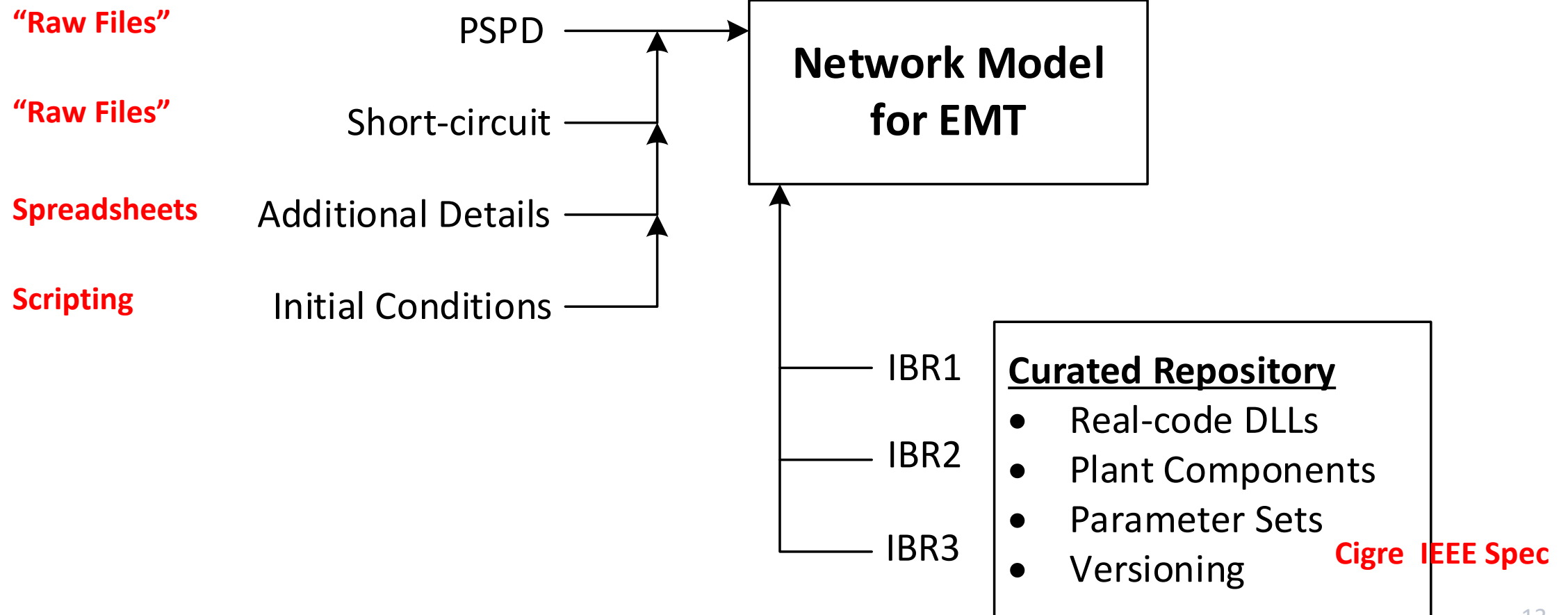
- extended and standardized “raw files”
 - Infeasible primarily for commercial reasons. Plus, some technical shortcomings
- extends the full International Electrotechnical Commission (IEC) standard Common Information Model (CIM)
 - successful in Europe with steady-state and dynamics modeling
 - slow to adopt in North America
- a simplified or lightweight CIM-inspired profile, optimized for EMT studies of IBR, without meeting all possible CIM use cases
 - proposed EMT-IBR profile would not be fully CIM compliant
 - leave the path open for upgrading to the full CIM
 - an IEEE open-source software project with schema definitions, scripts, and test cases

Summary

- Simplifications of the CIM are suggested to streamline its adoption in North America.
- One appendix presents the draft IEEE Standards Project Authorization Request for P3743.
- Another appendix documents one free-to-use and three open-source examples of the DLL interface, which can be reused by adopters of the new standard data format

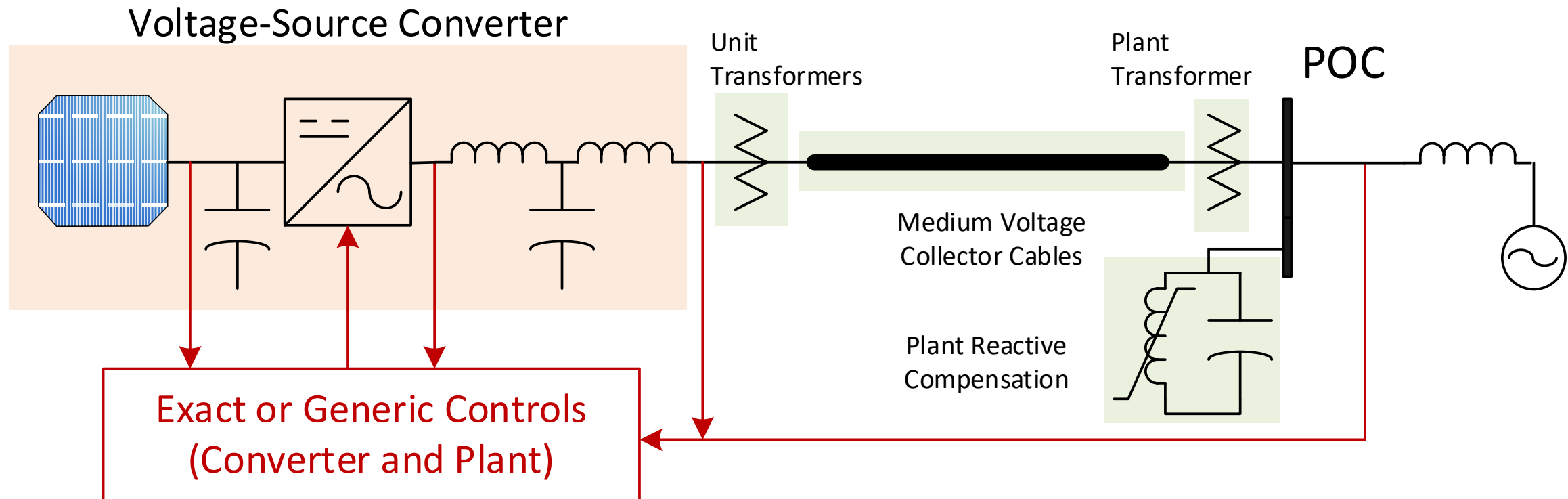
Attributes of an EMT network and IBR model Repository

- Presently an ad hoc process.



IEEE/CIGRE Task Force B4.82

- IBR Plant models include control model in DLLs along with other components behind the Point of Connection (POC)



IEEE/Cigre Task Force B4.82 developed a “real code” dynamic link library (DLL) specification that supports user-defined models

Roadmap for North American Adoption

- Complete the **IEEE P3597** Standard for Interfacing Controls and Protection to Power System Simulation Tools
 - Enables the “real-code DLLs” to become part of the “curated repository.”
- Complete the **IEEE P3743** Recommended Practice for Electromagnetic Transient Model Interoperability for Electric Power Transmission Systems
 - Facilitates inputs from existing positive-sequence dynamics data to the EMT network model
 - IBR balance-of-plant components and DLL parameter sets to the “curated repository” of IBR plant models
 - Open-source software project will be developed in parallel with the Recommended Practice
- Define a set of interoperability tests
- NERC may then encourage utilities to adopt IEEE P3597 and P3743
 - Examples: cite in implementation guidance for updates to or technical references for future MOD-026, MOD-032, and MOD-033

Work Item 10 – White Paper:

Modeling Methods to Evaluate IBR Plant Ride-Through Performance

Draft in Progress

Purpose

- To present the EMT simulation as a viable method to evaluate IBR plant, both settings and design, for their disturbance ride-through performance.
- To support industry with upcoming PRC-029-1

Scope

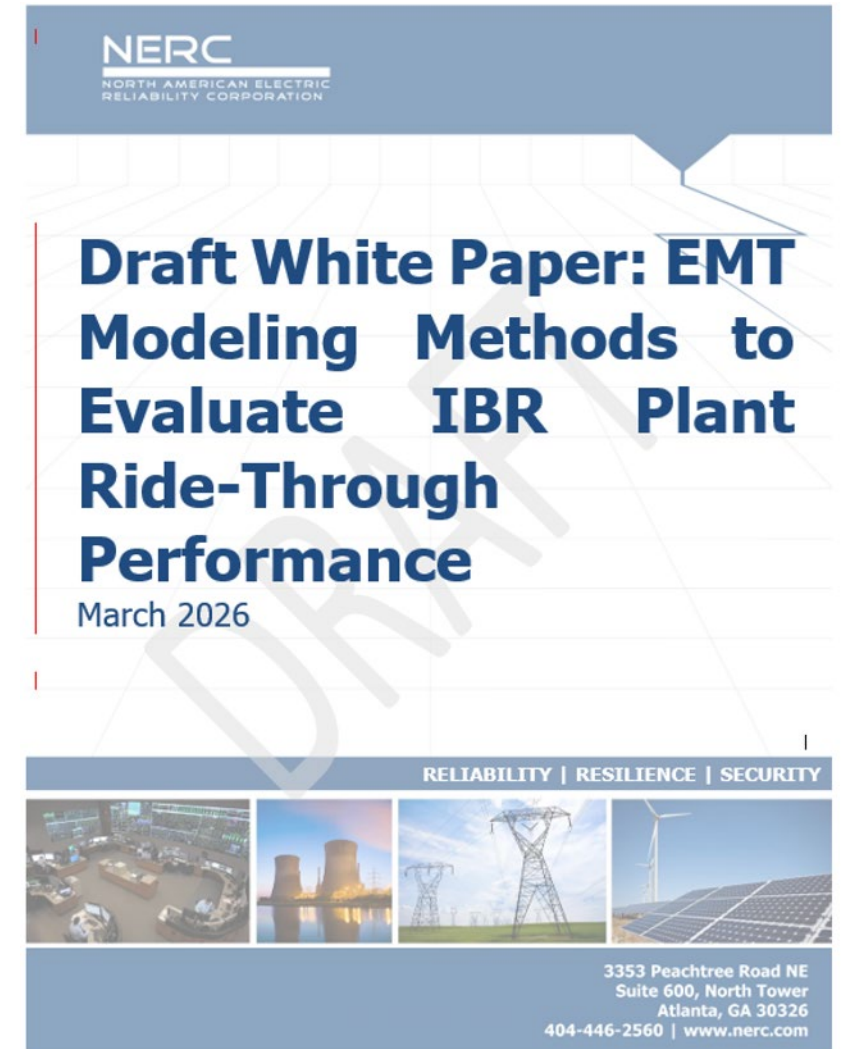
- Different EMT modeling methods to represent IBR plants and evaluate their designs for ride-through performance with respect to applicable interconnection requirements or standards such as PRC-029-1 requirements.
- Modeling IBR plant level protection relays
- Practical considerations for LVRT and HVRT
- Balancing the conservative approach with realistic expectation

Added since April 2026

- Include positive sequence phasor domain approaches

Content Outline

- Review of Current Practices
 - Ride-through requirements for IBR – PRC-029-1
 - Anatomy of a Typical IBR Plant
- Methods Ride-through Performance Evaluation
 - Comparison of PSPD and EMT methods
 - Various combinations of domains, model fidelity and aggregation methods
- EMT Analysis for Ride-through Performance Evaluation
 - IBR plant model development
 - Simulation tests and example procedures



Methods Ride-through Performance Evaluation

- PSPD Aggregate using Standard Library Model
- PSPD Aggregate using Equipment-Specific User Defined Model
- PSPD Disaggregate using either Standard Library Model or User Defined Model
- EMT Aggregate using Equipment-Specific User Defined Model
- EMT Disaggregate using Equipment-Specific User Defined Model

	Aggregate		Disaggregate	
PSPD	UDM	STANDARD	UDM	STANDARD
EMT	UDM		UDM	

EMT Analysis for Ride-through Performance Evaluation

- Simulation Tests
 - Test Conditions for IBR Plant
 - Balancing the Conservative Approach with Realistic Expectations
 - Two Ways to Simulate Disturbance and Two Ways to Model IBR Plants
 - Disaggregate IBR Plant Model
 - Inverter Model
 - Collector System Model
 - Aggregate IBR Plant Model
 - Semi-aggregated IBR Plant Model
- Importance of Protective Relay Modeling
- Appendix A: Real World Case Study as a Comparison of Various Representation Methods of IBR Plants
- Appendix B: Sample Report and Other Considerations

EMT Analysis for Ride-through Performance Evaluation

- 2 Ways to Simulate Disturbance x 2 IBR Plant Representations

GO:

SMIB + IBR
Aggregate

SMIB + IBR
Disaggregate

TP/PC:

Grid + IBR
Aggregate

Grid + IBR
Disaggregate

A light blue map of the United States is in the background. A vertical line is drawn through the center of the map, passing through the Great Lakes region and the Mississippi River valley. The text "NERC" is positioned to the left of this line, and "Discussion" is to the right.

NERC

Discussion