IBR Performance Response and Analytics Monitoring (IPRAM) Task Force

Priya Mana (PNNL) – Task Force Lead

NASPI Task Team Meeting - EATT

January 29, 2025

IBR Plant Performance Monitoring and Analysis White Paper

Outline

1. **Introduction – Need for IBR monitoring**
   - reported IBR behavior that has impacted the system.
   - new paradigm of grid operation: how to define what is normal/abnormal, secure/unsecure.
   - A discussion of grid codes, standards and overview from NERC reports.
   - reasoning, intrinsic behavior of IBR operation.
2. **Overview on monitoring methods**
   - What phenomena are currently monitored. Need based perspective.
   - Industry practices on monitoring the system in a synchronous-machine rich grid.
   - synchrophasor, point-on-wave based industrial solutions. Mechanism of monitoring. Nyquist frequency based limitations.
   - Different measurement tools/methods and their corresponding applications.
3. **IBR operational behavior**
   - An overview on how IBRs operate under normal operating conditions vs. transient grid-conditions.
   - Response under fault conditions. Protection implications.
   - Operational behavior – transient response – local vs range of interactions globally.
4. **IBR performance monitoring**
   - After discussing IBR behavior, tie back to what monitoring methods have worked well for what behavior from field.
   - Close to point of common coupling (PCC) and system-wide monitoring.
5. **Analytics (Demonstrated and Theorized)**
   - Academic and laboratory tested solutions
6. **Data-related aspects**
   - Discussion of data types, storage, compression, retention, interoperability
7. **Conclusion**
   - Topics of discussion for future – distribution systems

Questionnaire

What are some of the current **applications that need IBR-monitoring** in your organization?

Examples:

- Oscillation detection.
- Monitor grid strength/ shirt circuit ratio.
- Others

What **IBR-performance related** challenges are you currently facing?

Examples:

- Baselining normal operations. Differentiating between normal and abnormal operations.
- Baselining performance standards for different types of inverters (GFM, GFL).
- IBR response to topological changes.

How are you tackling the challenge?

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Questionnaire

Can you share a successful **IBR-monitoring case study**?

Examples:

- Oscillation detection.
- Monitor grid strength/ shirt circuit ratio.
- Others

Seeking contributions on IBR-monitoring related case study

What **IBR-data related** challenges are you currently facing?

Examples:

- Visibility into DER behavior. General visibility of IBR behavior.
- Proprietary information
- Time-synchronization

How are you tackling the challenge?

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Questionnaire

What **methods and tools** are you using to process and analyze monitoring data?

- Potential use of AI for IBR monitoring? Anomaly detection?
- Other advanced methods in research or deployment?

Seeking contributions on state-of-the-art monitoring solutions

Other thoughts and suggestions?

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Thank you

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