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Ecological Graph Visualization for Network State Estimation

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Related topics:

- EMS mutual observability in each others system
- Visualization for decision support and real-time load flow studies
- "Out of the loop syndrome"
- Ecological interface design for control center HMIs

The scope of interconnected grid operation is expanding – geographically to neighboring systems, out to the distribution edge, and functionally to weather and transportation. Increased automation will be needed, but there's unlikely to be a free lunch. More automation in complex high-reliability systems increases the peak demands on human-machine interaction to configure, supervise, resolve ambiguity, and manage out-of-design-scope situations. Existing network visualizations using geographic and schematic single-line principles may not scale up to represent larger scopes or more complex automation.

This presentation will describe the design process and outcome of an abstract graph visualization concept for supervising Network State Estimation, the foundation of today's EMS automation. To develop the design concept, we interviewed State Estimator experts, applied an existing Work Domain Analysis of transmission operations, and reviewed the literature on electric graph visualization. The design concept is intended to help back office and real-time EMS engineers localize and diagnose State Estimator model and data mismatches. If the network graph visualization proves useful for this supervisory task, it might have potential to re-purpose for other real-time applications.

A point for discussion is the value and potential of harmonizing network visualization principles across transmission and/or distribution systems. How much might most operators, engineers, and automation designers agree on?

Please send the Abstract to **dsobajic@gridengineering.com** by April 12