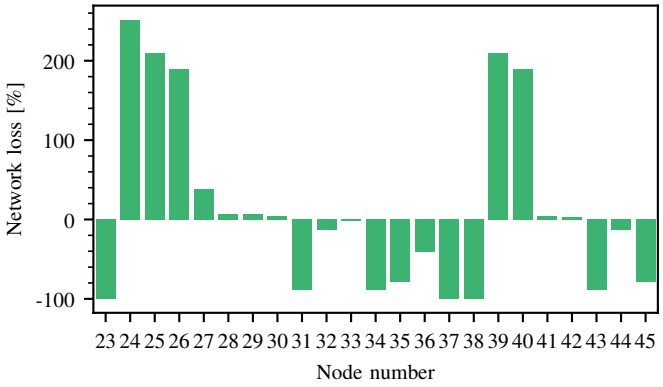

Fig. 9: The percentage of active power loss in the system when communication network nodes are removed.

advantageous method to capture the complex topology and interdependencies of a network such as a combined electrical power and communication network. In this paper, two different methods have been proposed *1) betweenness centrality* and *2) node attack method*. Both methods manage to capture the important nodes in the system, but with different criteria. The two methods obtain somewhat consistent results, especially when considering the electrical nodes. For the communication network nodes, the results differ more since the methods measure different criteria. The *node attack method* is more electric power system-oriented and does not consider the communication network to any extent.

For a system operator, it is more important to consider the security of electricity supply, and both methods are able to encounter the important nodes in the system. However, the *node attack method* is better at capturing important measures seen from a operators point of view since it considers the energy not supplied and illustrates how an outage in the communication network or the electrical power system influence the power flow. This gives a better overview of how outages might propagate in the network as well as to illustrate the consequences of a cascading failure from an outage in the communication network.

The methods proposed in this paper, will provide a basis for probabilistic analyses of the combined electrical power and communication network. This is a topic for the future work, e.g., using the methods to investigate the interdependencies in relation to the risk of short lasting blackouts.

VI. Acknowledgment

This work is funded by CINELDI - Centre for intelligent electricity distribution, an 8-year Research Centre under the FME-scheme (Centre for Environment-friendly Energy Research, 257626/E20). The authors gratefully acknowledge the financial support from the Research Council of Norway and the CINELDI partners.

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This is the accepted version of an article published in PMAPS 2020
http://dx.doi.org/10.1109/PMAPS47429.2020.9183667