

Cybersecurity in physically entangled networks

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Abstract

As we network and connect technology and infrastructure to an already complex system, we create tremendous new value but also potentially leave the system more vulnerable to cyber attacks. One such example of a complex system is the power grid, which unarguably is one of the most critical systems for a functioning modern day society. However, with many small-scale cyber attacks which remain unnoticed and the highly publicised large scale cyber attacks such as the Estonian cyber attack in 2007 and the Ukraine Blackout in 2015 indicates that such complex systems are far from fully secure.

This paper explores the various modelling techniques to model complex systems of systems such as the smart grid. Additionally, this paper builds a simulation by pipelining two relatively new concepts in computing, namely Agent Based Modelling and Blockchain technology with a user interface which allows for dynamic structuring of the network. The agent interactions interface via blockchain based smart contracts. Furthermore, the simulation introduces a simple threat model into the modelled system secured by blockchain technology to study the behaviour of the various heterogeneous stakeholders in the system and the overall global behaviour of the system through various case studies in order of increasing network complexity. Finally, remarks on efficiency and security of blockchain technology and the limitations of agent based models are concluded.