ICT Degradation Modelling

Pranav Deo[1]
Matriculation number 104145

Universitat Passau

Abstract. With the advent of Cyber-Physical Energy Systems (CPES) and their application on Smart Grids (SG), the integration of Communication Technologies (ICT) and Power Systems (PS) have been rooted deeply. ICTs and PS in such environments have heavy mutual interdependencies on one another. Failures in ICT can disrupt PS, while failures in PS could disrupt ICTs due to lack of energy, thus leading into cascading system failures. While the ENTSO-ESSC provides classification systems for classifying PS operation states to determine PS degradation, such comparable systems are not available for ICTs. In this paper, we attempt to understand various components of an ICT system, and understand the various operation states of the ICT components. We attempt to survey the distribution network technologies as a part of the SG paradigm, and isolate components of interest. The essential properties such as availability and reliability are determined and used to map the states of components. Since distribution networks can be treated as Markov models, we attempt to design degradation models of the distribution networks using Markov chain analysis.

Keywords: Cyber-Physical Energy Systems · Information and Communication Technology · [More to follow later]