

Winai Sungkaew 2012: Capability Analysis of Provincial Electricity Authority Low Voltage Distribution Network for Power Line Communications. Master of Engineering (Electrical Engineering), Major Field: Electrical Engineering, Department of Electrical Engineering, Thesis Advisor: Assistant Professor Wachira Chongburi, Ph.D.
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This research represents a study of characteristics of power line communication (PLC) channel in Provincial Electricity Authority (PEA)'s Automatic Meter Infrastructure (AMI) of which properties, in general, do not favor communications. The approach adopted in this study makes use of transmission theory to determine the transfer functions at various meter locations. The study focuses on the effects of branching in the power line network, where impedance matching is unlikely possible which leads to signal reflection. The parameters used in the simulation are the power cable sizes, cable lengths, number of meters at the joints and terminating impedances. The simulation is implemented on different meter configurations that are typically found in PEA's network. The simulation covers frequency range of 10 kHz to 10 MHz. The simulation results with the assumption of zero ohmic loss suggest that the distance from the transmitter and the cable configurations play the key role in deep attenuation. In the PEA's AMI frequency range of 40-95 kHz, the difference between the received powers of the closest meter and of the one located 360 meters away is as much as 70 dB. The difference reaches 100 dB when the meters are separated by 640 meters. The bit error rate approximation is also provided.

Student's signature

Thesis Advisor's signature

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