ELECTRICAL AUTOMATION SYSTEMS TOWARDS INTELLIGENT AND ENERGY EFFICIENCY APPLICATIONS

Musse Mohamud Ahmed

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ELECTRICAL AUTOMATION SYSTEMS

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INTELLIGENT AND ENERGY EFFICIENCY

APPLICATIONS

Musse Mohamud Ahmed

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CHAPTER 16

MODELING OF LOW VOLTAGE POWER LINE FOR DATA COMMUNICATION: SIMULATION RESULTS

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This chapter discusses the following sub titles:
Power line communication, modeling the power line Channel, pilot distribution network, conclusion and references.

16.1 Introduction

The power line communications has been applied as a data transfer method in both public electricity distribution networks and indoor distribution networks. The industrial low voltage distribution network may be utilized as a communication channel to data transfer required by the on-line condition monitoring of electric motors. The advantage of using power-line data transfer is that it does not require the installing of new cables. In this project, a pilot distribution network is formed. The transfer function of the power line channel is calculated and the signal attenuation in communication channels in the pilot environment is plotted. Then the graph was analyzed by varying the parameter that affects the signal attenuation.

16.2 Power Line Communication

A typical power line cable consists of three conductors: one connected to a phase, one connected to the neutral, and the other connected to ground. Each of the phase and neutral conductors is covered by an insulator and the set of three conductors is placed inside another insulator. Two of these three conductors suffice to create a communication channel. Since the phase and neutral conductors have equal wire gauge (usually larger than that of the ground conductor) these two conductors are used as the communication channel, although it is possible to use other combinations of conductors.

To understand the challenges of power line communication and to design suitable high-speed data transmission equipment, it is very important that one must have a good understanding of the communication channel characteristics; in particular, the range of channel frequency response, and the characteristics of the channel noise. These characteristics can be quite diverse among different buildings because of different wiring structures, different wire types, and different appliances connected to the electric circuit. For performance characterization of power line modems, it would be useful to have a number of test channels.