

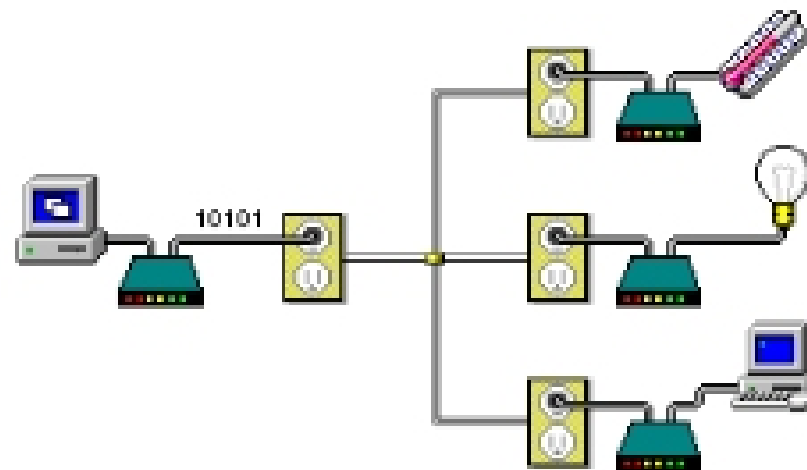
design document for

PLCCS: A Power Line Carrier Communications System

submitted to:

Professor Joseph Picone
ECE 4522: Senior Design II
Department of Electrical and Computer Engineering
Mississippi State University
Mississippi State, Mississippi 39762

December 5, 2000



submitted by:

W. Kwan, W. Parker, B. Roberts, J. Tatum
Faculty Advisor: Dr. Nicholas Younan
Department of Electrical and Computer Engineering
Mississippi State University
Box 9571
Mississippi State, Mississippi 39762
Tel: 662-338-5361

email: wyk1@ece.msstate.edu, whp1@ra.msstate.edu, brobe100@aol.com,
jat1@ece.msstate.edu

EXECUTIVE SUMMARY

Technology in today's world is advancing at a very rapid rate. Once a rare commodity, computers can now be found in hundreds of millions of homes and businesses [1]. A growing trend involving computers is industrial control and home automation, a practice in which electrical devices are controlled with little or no human interaction [2]. Although this may sound like a noble concept, many of these control systems suffer from poor performance in terms of data communications capability [3]. They also require the user to configure them locally, which makes it difficult to check the status of the systems from afar. Also, many systems carry a steep price tag that many potential buyers find unappealing [4].

To remedy the first of these issues, a new data communications system will be developed. The system will consist of one or more host units and multiple target units. The host units will initiate all data communications processes to the target units, and a target unit may reply only to the host that hails it. Only one communications process may exist at any given time per host, preventing data communication collisions. Existing electrical wiring will serve as the communications medium, preventing the expense of installing additional wiring in the building.

The access issue will be remedied by designing a software package for a personal computer. The software will allow the host device to connect to a PC, as well as the Internet using TCP/IP. The user will therefore be able to access the host device through a standard Internet connection.

A third issue is the cost of comparable control systems. Presently-available systems that are used in industry cost thousands of dollars [4]. By programming a microcontroller to emulate traditional hardware, less electronic components will be required to build a working system. As a result, overall production costs will be substantially lower than comparable systems. The production cost of each host and target unit will not exceed \$30 and \$25, respectively. The expected market price of a host unit will be \$149.95, and the expected market price for each target unit will be \$39.95.

We will approach this project by dividing it into several key components. A modem will be designed that will allow the host and target units to communicate over the power line. Microcontroller firmware will be created to control the functionality of both host and target units. Circuitry and firmware will be implemented to interface the host unit to a PC. Software will be written to allow user-control over host and target units.

Our design will be superior to presently-available device control systems in that ours will reduce the number of control errors due to corrupted data transmissions, thereby enhancing the reliability of the system. It will also provide an easy-to-use interface that will allow users to render remote control over all host and target units and all of their associated peripherals.

Considering the ongoing growth in popularity of home and industrial control systems, this project has an abundant future [5]. Potential design enhancements include improving the data transfer rate of the modems and enhancing the remote web interface.

TABLE OF CONTENTS

ABSTRACT.....	1
1. INTRODUCTION.....	1
2. PROBLEM.....	2
3. OBJECTIVES.....	2
4. APPROACH.....	5
4.1 Host Unit.....	6
4.2 Target Unit.....	22
4.3 Computer Software.....	36
4.4 Cost.....	40
5. TEST SPECIFICATION.....	41
6. TEST CERTIFICATION.....	44
7. SUMMARY.....	61
8. FUTURE WORK.....	61
9. ACKNOWLEDGEMENTS.....	61
10. REFERENCES.....	61