

**City of Manassas  
Broadband over Power Lines  
Experimental License WD2XCZ  
File No. 0069-EX-PL-2003**

**Six Month Report  
Filed December 2003**

The City of Manassas, Virginia respectfully submits the first report pursuant to experimental license WD2XCZ, File No. 0069-EX-PL-2003 for Broadband over Power Lines (BPL) granted on April 10, 2003.

**I. Description of Test Installation and Procedures**

**Equipment Selected for Testing**

During the first six-month period the City of Manassas has conducted testing of BPL equipment manufactured by one manufacturer, Main.net Communications. During this time, Main.net has provided the BPL equipment for in-home use and the BPL equipment for external use on the city's electric distribution system.

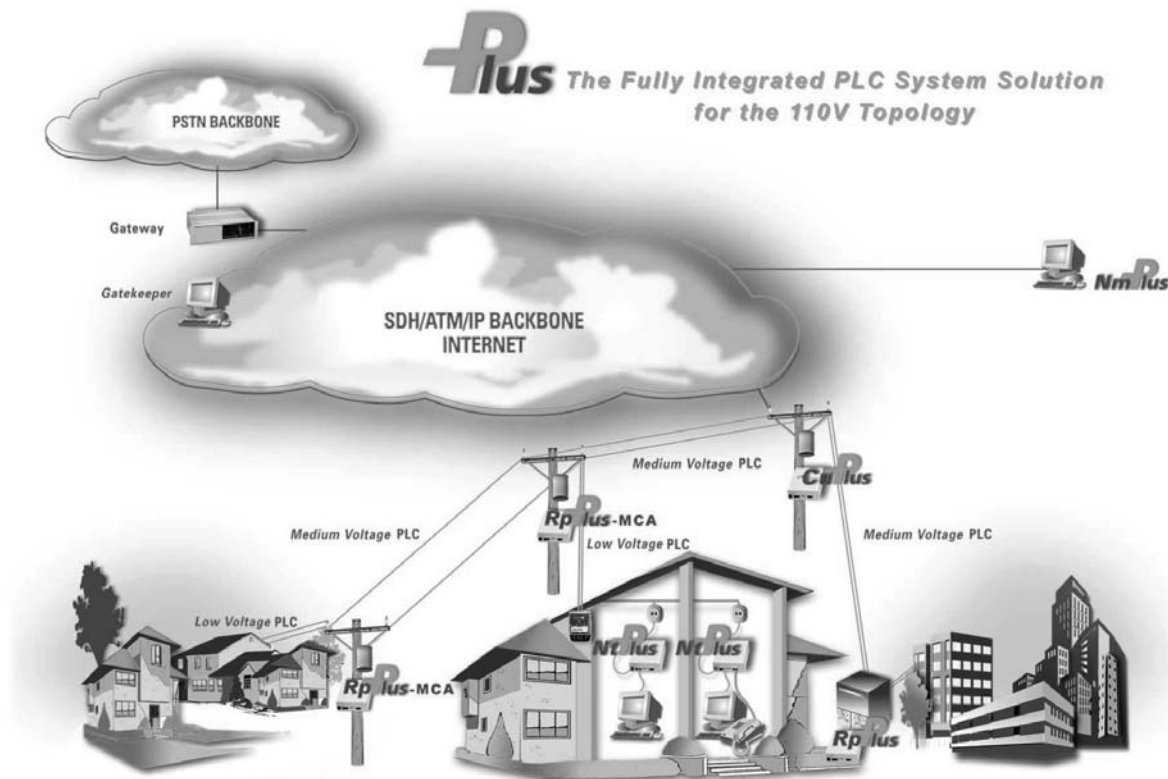
**Description of test installation**

The City of Manassas and Main.net have installed a BPL system in Manassas, Virginia that passes by approximately 45 homes. The BPL network is a "cell" type architecture, where a "cell" is a group of homes served by a back-haul connection point. In this case, the back-haul connection point is a wire line fiber optic type connection. Thus, to the extent that the term "installation" refers to a network configuration, combining or merging the City's fiber optic network and the City's electric distribution network. All of the BPL facilities are deployed on the City's underground medium and low voltage electric distribution network.

Each BPL cell consists of a BPL modem at the back-haul connection point. BPL modems on both the medium and low voltage distribution networks act as repeaters at points between the back haul connection point and the end user. A BPL modem within the premises of the end user is plugged into a standard 120-volt outlet and is connected to their personal computer with an ethernet cable through a standard RJ45 interface. Network management is done via software provided and operated by Main.net.

The test network has been installed and is being operated in basically the same manner, from a technical and operational standpoint, as a commercial BPL network.

As the test network was being installed, the City of Manassas invited each household in the service area to participate in the test via a mailer. Each participant signed an agreement that acknowledged that the service is experimental in nature and can be cancelled at any time. Participants do not pay for the service; however, they agree to cooperate with the City of Manassas in gathering data for the testing.



## II. Description of Tests

### City of Manassas Acceptability Testing

The City of Manassas has evaluated the Main.net equipment for electrical safety, installation, performance and economic deployability. The system first installed in May 2002 has operated without incident of breakdown or report of interference. Reliability of the network has been very good. Two units failed due to flooding in low voltage junction boxes. These units were replaced and installed in NEMA 4x closures and have operated without further incident. The City of Manassas determined every end user in the "cell" was able to receive service. No end user participant was outside the reach of the BPL network. Main.net has maintained management of the network elements and is currently compiling data on the overall system operation regarding factors such as link status, bandwidth and network traffic. The City of Manassas is able to report to the commission, the network has experienced few technical or operational problems. After a minimal amount of initial technical support to end users, ongoing or repetitive technical support to end-users has not been required. The City of Manassas estimates that less than 20 minutes is required to install a Main.net BPL network element on the medium and low voltage underground electrical system. With the extensive fiber backbone maintained by the City, a neighborhood of 1,000 homes could be deployed in less than 10 crew days. Self-installation at the end users level can significantly reduce start up time and directly assist in a commercial deployment having

most average customers connected to a broadband service in less than 20 days from start of deployment.

Additionally, the City of Manassas has determined the Main.net architecture, which has a BPL network element installed at each distribution transformer, provides an additional benefit of transformer outage notification through the network management system. The City of Manassas has concluded the Main.net system, with built in redundancy, self provisioning of medium voltage network elements and a self healing capability provides a very reliable communication network.

### **End User Customer Acceptability Testing**

The City of Manassas has conducted several surveys with the test participants to determine the amount and kind of use of the service desired. Positive comments supported by changes in “user” behavior after switching to the BPL service, such as use of more or different Internet resources, and economic and marketing issues support the city’s belief that BPL is a viable communications system. The participants have continued to express an interest in a full-scale city deployment.

### **FCC Part 15 Verification**

Main.net has become FCC Part 15 compliant with Product Safety Engineering in Tampa, FL, demonstrating compliance on both overhead and underground lines, as well as testing and compliance verification of the in-home BPL modems.

### **Interference complaints**

The City of Manassas has not received any complaint of interference from test participants or any third parties.

### **Vendor FCC compliance testing**

The City of Manassas communicates frequently with Main.net regarding FCC compliance testing. This includes reporting to the City of Manassas any other testing that Main.net has conducted on their equipment. Currently, the City of Manassas understands the following to be the status of Main.Net compliance testing.

### **Low Voltage Units**

A low voltage consists of a BPL unit that connect directly to a low voltage power line. Main.net has advised the City of Manassas that it (Main.net) has been granted certification by a TCB of the low voltage units and that its certification report is on file with the commission under grantee code QM3. The test report on file with the commission is dated May 2002. The low voltage units delivered and installed May 2002 are in compliance with FCC Part 15 – Carrier Current Class B – Peripheral.

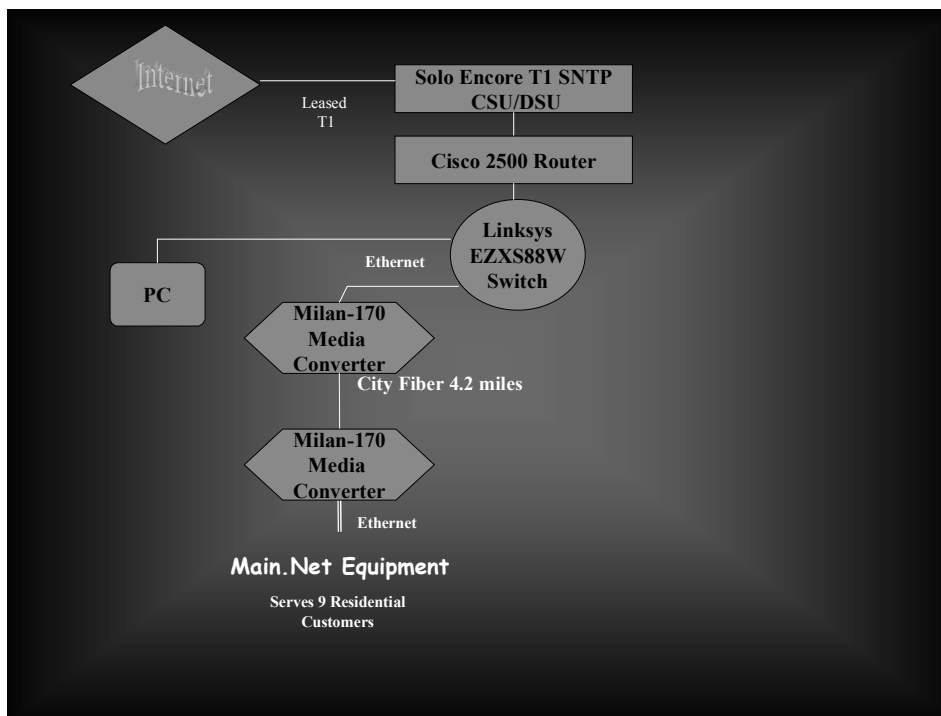
## Medium Voltage Units

A medium voltage unit makes contact with medium voltage power line via an inductive coupler. Main.net has advised the City of Manassas that Main.Net has verified compliance with FCC Part 15 – Carrier Current.

## Conclusion

The City of Manassas concludes that BPL is a viable form of communications with satisfactory performance and minimal downtime. The City believes that BPL is a credible last mile/quarter mile solution for a municipal with a fiber optic network and an electric distribution system. To date, no interference has been reported or detected.

## Experimental Project Network Diagram



## Project Photographs:



**BPL Modem**

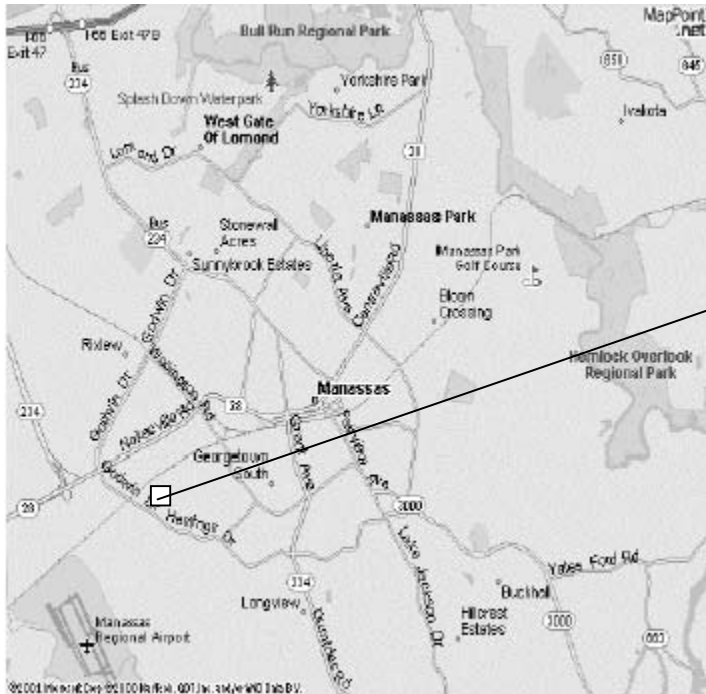


**Meter Socket Adapter with Repeater**



**Typical Transformer Installation**

## Experimental Test Area



**Experimental Test Area**

## Experimental Test Area

\*All homes connected also include an RP at the electric meter socket or internally in addition to the user BPL modem

