CURRENT Technologies, LLC
Report of Measurements
CT Bridge® OH 5000ml and CT Backhaul-Point® OH 5000g

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1. General Information

Applicant:	CURRENT Technologies, LLC
Applicant Address:	20420 Century Boulevard Germantown, MD 20874 301-944-2700
Equipment:	CT Bridge OH 5000ml CT Backhaul-Point OH 5000g
Equipment Description:	The CT Bridge OH 5000ml and CT Backhaul-Point OH 5000g are parts of an Access BPL system. They operate on overhead public utility power lines over low-voltage and medium-voltage wires. The CT Backhaul-Point OH 5000g is the primary data router that connects the BPL system to the local point of presence; aggregating and managing the data traffic from its downstream CT Bridges. Each CT Backhaul-Point has two interfaces: a backhaul Ethernet interface to a fiber-optic or wireless connection; and a medium voltage interface through the CT Coupler® to the MV primary cable. The CT Bridge OH 5000ml is the device that routes and controls data traffic between the low- and medium-voltage lines. The CT Bridge serves as a gateway to all customers powered from the same distribution transformer as itself. It communicates over the medium-voltage lines via the CT Coupler and over the low-voltage system by a standard 240V two-wire connection.
Test Operators:	Steve Seymour and Bob McKay
Dates of Testing:	May 19, 2006 to August 19. 2006
Test Locations:	▪ CURRENT Technologies Rockville Test Area – PLB-01 (Rockville, Maryland), ▪ CURRENT Technologies Rockville Test Area – PLB-02 (Rockville, Maryland), ▪ CURRENT Technologies Rockville Test Area – PLB-04 (Rockville, Maryland), ▪ CURRENT Technologies Rockville Test Area – BP-02 (Rockville, Maryland) ▪ CURRENT Technologies Potomac Test Area – PLB-K2 (Potomac, Maryland), ▪ CURRENT Technologies Potomac Test Area – PLB-K4 (Potomac, Maryland), ▪ CURRENT Technologies Field Research and Test Area - Location P3 (Urbana, MD) ▪ Washington Laboratories Open Area Test Site (Gaithersburg, Maryland)
Modes of Operation:	▪ LV Active: transmitting high-density OFDM signal on Low-Voltage power line (4.4 MHz to 20.8 MHz), ▪ MV Active: transmitting high-density OFDM signal on Medium-Voltage power line (31.4 MHz to 47.9 MHz)
Applicable EMC Specification:	▪ FCC Part 15, Subpart G
Class of Service:	▪ Class A

2. Applicable Documents

Testing of emissions was performed in accordance with FCC requirements.

2.1. Federal Communication Commission (FCC), code of Federal Regulations 47, FCC docket 89-103, Part 15: Radio Frequency Devices, Subpart G, October 2005.

2.2. Federal Communication Commission (FCC), code of Federal Regulations 47, FCC docket 89-103, Part 15: Radio Frequency Devices, Section 15.109(b) and 15.209, October 2001.

2.3. FCC/OET, “FCC Procedure for Measuring Electromagnetic Emissions for Digital Devices”, TP-5, March 1989.

2.4. Federal Communication Commission (FCC), Report and Order, FCC-04-245, Appendix C, Measurement Guidelines for Broadband Over Power Line (BPL) Devices or Carrier Current Systems (CCS) and Certification Requirements for Access BPL Devices, October 2004.

2.5. International Special committee on Radio Interference (CISPR) Publication 16, First Edition 1977, “CISPR Specification for Radio Interference Measuring, Apparatus and Measurement Methods”.

2.6. American National Standard, “Interim Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz”, ANSI C63.4, 2000.

3. Detailed Applicable EMC Requirements and Limits

The equipment was evaluated to Federal Communications Commission (FCC) requirements.

3.1. Conducted Limits

Conducted emissions limits do not apply to this Access BPL equipment

3.2. Radiated Limits

The following radiated emissions limits apply:

Applicable Specification Reference	Frequency Range (MHz)	Class	Limit of Radiated Emissions		Measurement Distance (m)
			(μV/m)	(dBμV/m)	
FCC 15.107(c)(3), 15.109(c), 15.209	1.705 to 30	-	30	29.5	30
FCC 15.109	30 to 88	A	90	39.1	10
	88 to 216	A	150	43.5	10
	216 to 960	A	210	46.4	10
	960 and Above	A	300	49.5	10

Notes:

1. *The tighter limit shall apply at the edge between two frequency bands*
2. *Distance refers to the distance in meters from measuring instrument antenna to the closest point of any part of the equipment under test.*

4. Procedures for Measuring RF Emissions

The following test procedures were used to measure RF emissions from the CT Bridge OH 5000ml and CT Backhaul-Point OH 5000g.

4.1. AC Power Line Conducted Emissions Measurements

Conducted emissions limits do not apply to this Access BPL equipment.

4.2. Radiated Emissions Measurements

Measurements of radiated emissions were made using a spectrum analyzer and calibrated broadband antennas. Tests were performed in the following frequency ranges: 1.705 MHz to 30 MHZ, 30 MHz to 50 MHz, and 50 MHz to 1000 MHz. The CT Bridge OH 5000ml and CT Backhaul-Point OH 5000g were set and operated in a manner representative of actual use.

4.2.1. Radiated Emissions Measurement – 1.705 MHz to 30 MHz

In the frequency band 1.705 MHz to 30 MHz, the CT Bridge OH 5000ml and CT Backhaul-Point OH 5000g function as Access BPL devices as described in FCC Rules, Sections 15.3(ff). Since the CT Bridge OH 5000ml and CT Backhaul-Point OH 5000g use the same transmit circuitry in this band, the CT Bridge OH 5000ml was tested as being representative of both products. The radiated emissions were measured at three separate installation sites, as required under the rules. Measurements were made with the transmit power set to its maximum output power level.

The CT Bridge OH 5000ml was installed in a residential neighborhood on a utility pole, approximately 7-9 meters above the ground. The CT Bridge OH 5000ml low-voltage wires were connected to the power utility's low-voltage power lines. The CT Bridge OH 5000ml medium-voltage connector was connected to a CURRENT Technologies OH medium-voltage coupler, model number CT Coupler OH 5000, which was installed on the power utility's medium-voltage power line.

The CT Bridge OH 5000ml was operated remotely using Access BPL services. The Access BPL control equipment is described in Section 5. Control equipment was connected to the CT Bridge through public utility wiring. For measurements of radiated emissions associated with the LV-signal (4.4 MHz to 20.8 MHz), the CT Bridge OH 5000ml was configured to transmit as described in Section 5.1.

The test antenna was placed on the ground at a distance of approximately 10 meters, measured horizontally, from the CT Bridge OH 5000ml and its associated overhead power-lines. Where placing the antenna at this distance was impractical due to interference from conductive objects within the test area (e.g. parked cars), the antenna was moved further away from the power line. The antenna height was kept at a fixed height of 1 meter. The antenna was moved to the left and right of the CT Bridge's location, parallel to the low-voltage power line, a distance of 36 meters. This distance corresponds to 1.5 wavelengths of the CT Bridge's LV-signal center frequency. The antenna is moved along this 36-meter distance in 6-meter (¼-wavelength) increments. The LV-signal radiated emissions were measured at frequencies from 4.4 MHz to 20.8 MHz. All significant emissions were recorded.

At each test location during this initial sweep, the test antenna was rotated to find the orientation that resulted in maximum emissions. This antenna orientation was used for the remainder of emissions measurements at that antenna location. Small frequency ranges (typically 5 MHz) were spanned in order to increase resolution and to make it easier to identify emissions emanating from the CT Bridge OH 5000ml. The spectrum analyzer was set to peak detection mode with the resolution bandwidth set to 9 kHz.

Quasi-peak measurements were made at each significant emission recorded during the initial sweep. For the quasi-peak measurements, the spectrum analyzer was set to quasi-peak detection and tuned to the recorded emission frequency using a narrow frequency span.

The height of the CT Bridge and associated low-voltage power lines were measured, and horizontal distances from the antenna to the nearest power-line were measured at each test location. The slant-range distance from the antenna to the nearest power-line was then calculated for each test location, and used to determine the distance correction factor to be used for measurements at that location. Measurements were compared to the limits given in Section 3.2, after correcting them for distance using an extrapolation factor of 40 dB/decade.

All significant emissions are reported in Appendix A of this report.

4.2.2. Radiated Emissions Measurement – 30 MHz to 50 MHz

In the frequency band 30 MHz to 50 MHz, the CT Bridge OH 5000ml and CT Backhaul-Point OH 5000g function as Access BPL devices as described in FCC Rules, Sections 15.3(ff). Since the CT Bridge OH 5000ml and CT Backhaul-Point OH 5000g use the same transmit circuitry in this band, the CT Bridge OH 5000ml was tested as being representative of both products. The radiated emissions were measured at three separate installation sites, as required under the rules. Measurements were made with the transmit power set to its maximum output power level.

The CT Bridge OH 5000ml was installed in a residential neighborhood on a utility pole, approximately 7-9 meters above the ground. The CT Bridge OH 5000ml low-voltage wires were connected to the power utility's low-voltage power lines. The CT Bridge OH 5000ml medium-voltage connector was connected to a CURRENT Technologies OH medium-voltage coupler, model number CT Coupler OH 5000, which was installed on the power utility's medium-voltage power line.

The CT Bridge OH 5000ml was operated remotely using Access BPL services. The Access BPL control equipment is described in Section 5. Control equipment was connected to the CT Bridge through public utility wiring. For measurements of radiated emissions associated with the MV-signal (31.4 MHz to 47.9 MHz), the CT Bridge OH 5000ml was configured to transmit as described in Section 5.1.

The test antenna was placed on the ground at a distance of approximately 10 meters, measured horizontally, from the CT Bridge OH 5000ml and its associated overhead power-lines. The antenna height during this initial sweep was kept at a fixed height of 2 meters. The antenna was moved to the left and right of the CT Bridge's location, parallel to the low-voltage power line, a distance of 7.6 meters. This distance corresponds to one wavelength of the CT Bridge's MV-signal center frequency. The antenna is moved along this 7.6-meter distance in 1.9-meter (¼-wavelength) increments. The MV-signal radiated emissions were measured at frequencies from 31.4 MHz to 47.9 MHz. All significant emissions were recorded.

At each test location during this initial sweep, the test antenna polarity was changed to find the orientation that resulted in maximum emissions. This antenna orientation was used for the remainder of emissions measurements at that antenna location. Small frequency ranges (typically 5 MHz) were spanned in order to increase resolution and to make it easier to identify emissions emanating from the CT Bridge OH 5000ml. The spectrum analyzer was set to peak detection mode with the resolution bandwidth set to 120 kHz.

Quasi-peak measurements were made at each significant emission recorded during the initial sweep. For the quasi-peak measurements, the spectrum analyzer was set to quasi-peak detection and tuned to the recorded emission frequency using a narrow frequency span. Maximization of the emission was done by changing the height of the antenna from 1 meter to 4 meters in 0.5-meter increments.

The height of the CT Bridge and associated medium-voltage power lines were measured, and horizontal distances from the antenna to the CT Bridge or power-line were measured at each test location. The slant-range distance from the antenna to the closer of either the CT Bridge or overhead power-line was then calculated for each test location, and used to determine the distance correction factor to be used for measurements at that location. Measurements were compared to the limits given in Section 3.2, after correcting them for distance using an extrapolation factor of 20 dB/decade.

All significant emissions are reported in Appendix A of this report.

4.2.3. Radiated Emissions Measurement – 50 MHz to 1000 MHz

Because of the nature of this equipment, radiated emissions above 50 MHz were measured in two stages. The first stage was to measure emissions at an Open Area Test Site using simulated installations of the CT Bridge OH 5000ml and CT Backhaul-Point OH 5000g. The controlled conditions in the laboratory environment allowed any and all frequencies, from 50 MHz to 1000 MHz, radiating from the CT Bridge OH 5000ml or CT Backhaul-Point OH 5000g to be observed and measured. The second stage was to measure emissions from each device in actual installations. Since ambient conditions at the actual installation sites prevented being able to perform a complete frequency sweep, measurements were made only at the specific radiating frequencies discovered in stage one testing.

4.2.3.1. Radiated Emissions Measurement – 50 MHz to 1000 MHz – Stage One

The CT Bridge OH 5000ml or CT Backhaul-Point OH 5000g was mounted on a wooden table or stand in the same position in which it would be mounted in an actual installation. The stand positions the device under test (DUT) at a height above the ground plane of 0.8 meter. The power leads from the device were connected to the laboratory power source through a LISN. The device's medium-voltage connections were terminated with standard 4' coaxial cables and 50-ohm resistors.

The CT Bridge OH 5000ml or CT Backhaul-Point OH 5000g was operated remotely using a controlling computer and a commercially available power-line modem. The control equipment is described in Section 5. Control equipment was connected to the DUT through the LISN. For measurements of radiated emissions above 50 MHz, the CT Bridge or CT Backhaul-Point was configured to continuously transmit simulated high-density data traffic over both the low-voltage and medium-voltage connections at the maximum output power levels.

The DUT was placed on a turntable at the Open Area Test Site. The test antenna was placed at a distance of 3 meters from the DUT and the radiated emissions were measured. The DUT was rotated in a complete circle while the spectrum analyzer performed a maximum-hold of measured emissions. All significant emissions were recorded.

During this initial sweep, the test antenna was installed on the antenna mast in the horizontal polarity at a height of 1 meter. Small frequency ranges (typically 100 MHz) were spanned in order to increase resolution and aid in the identification of emissions emanating from the DUT. The spectrum analyzer was set to peak detection mode with the resolution bandwidth set to 120 kHz.

Quasi-peak measurements were made at each emission recorded in the initial sweep. For the quasi-peak measurements, the spectrum analyzer was set to quasi-peak detection and tuned to the recorded emission frequency using a large frequency span. The frequency span was then reduced while keeping the spectrum analyzer's center frequency tuned to the emission's peak. The DUT was then rotated in a full circle to determine the direction of maximum emission. Further maximization of the emission was done by changing the height of the antenna from 1 meter to 4 meters.

The initial sweep to identify frequencies with significant emissions and the subsequent quasi-peak measurement process was repeated with the antenna in the vertical polarity.

All significant emissions are reported in Appendix A of this report.

4.2.3.2. Radiated Emissions Measurement – 50 MHz to 1000 MHz – Stage Two

The CT Bridge OH 5000ml or CT Backhaul-Point OH 5000g was installed in a residential neighborhood on a utility pole, approximately 7-9 meters above the ground. The power leads from the device's low-voltage connectors were connected to the power utility's low-voltage power lines. The device's medium-voltage connector was connected to a CURRENT Technologies OH medium-voltage coupler, model number CT Coupler OH 5000, which was installed on the power utility's medium-voltage power line.

The CT Bridge OH 5000ml or CT Backhaul-Point OH 5000g was operated remotely using Access BPL services. The Access BPL control equipment is described in Section 5. Control equipment was connected to the DUT through public utility wiring. For measurements of radiated emissions above 50 MHz, the CT Bridge or CT Backhaul Point was configured to continuously transmit simulated high-density data traffic over both the low-voltage and medium-voltage connections at the maximum output power levels.

The test antenna was placed on the ground at a distance of 3 meters from the CT Bridge OH 5000ml or CT Backhaul-Point OH 5000g, measured horizontally. The antenna height during this initial sweep was kept at a fixed height of 1 meter. The antenna was moved to various locations around the DUT with radial spacings of approximately 22.5°. The radiated emissions were measured at the frequencies discovered in stage one testing. All significant emissions were recorded.

During this initial sweep, the test antenna was installed on the antenna mast in the horizontal polarity. The analyzer was tuned to the desired frequency with a small frequency span (typically 200 kHz or less). The spectrum analyzer was set to peak detection mode with the resolution bandwidth set to 120 kHz. The sweep was repeated with the antenna set to the vertical polarity.

Quasi-peak measurements were made at each significant emission recorded during the initial sweep. For the quasi-peak measurements, the spectrum analyzer was set to quasi-peak detection and tuned to the recorded emission frequency using a narrow frequency span. Maximization of the emission was done by changing the height of the antenna from 1 meter to 4 meters in 0.5 meter increments.

The height of the CT Bridge OH 5000ml or CT Backhaul-Point OH 5000g was measured, and the slant-range distance from the antenna to the DUT was then calculated for each test location. This distance was used to determine the distance correction factor to be used for measurements at that location. Measurements were compared to the limits given in Section 3.2, after correcting them for distance using an extrapolation factor of 20 dB/decade.

All significant emissions are reported in Appendix A of this report.

5. System Test Configuration

Figure 1 shows the system configuration that was used for testing. Using Access BPL services, a manufacturing command was sent from the controller to either the CT Bridge OH 5000ml or CT Backhaul-Point OH 5000g, configuring it to continuously transmit simulated high-density data traffic over the low-voltage and medium-voltage connections at maximum output power levels.

In the laboratory, where a medium-voltage power line was not available, the controller was connected to the test configuration through a LISN and through the low-voltage power connection. An appropriate amount of attenuation was used to ensure that the HomePlug BPL modem's signal did not affect the desired measurement. During field testing, attenuation of signals from control devices was naturally provided by distance.

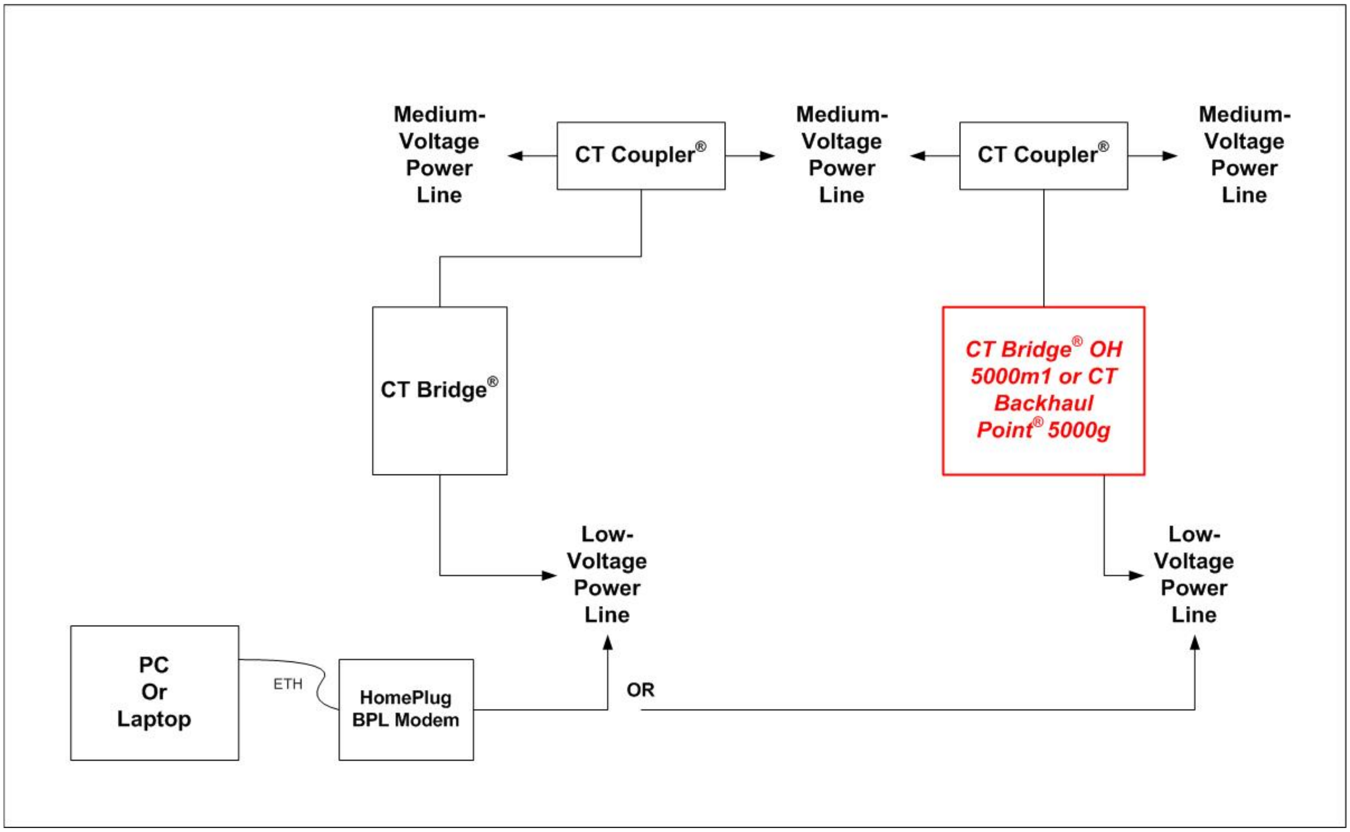

Figure 1: System Test Configuration

5.1. Description of Test Signal and Power Levels

For all testing, traffic was generated using the software application 'nuttcp' to ensure that signal levels consistently generated the maximum possible duty factor. This application was originally designed for network performance and is ideal for emissions testing since it generates a continuous stream of data from the unit under test to a receiving unit. The '-u' parameter was used to provide UDP traffic from the unit under test, since that eliminates the need for the receiving device to generate IP layer acknowledgment packets and increases the duty factor. Both lab and field testing show that the achieved duty factors exceed 80% with this application, and all in situ tests included a verification that this duty factor is achieved.

Additionally, for all testing the power level was set at maximum output on both medium voltage and low voltage outputs. The operator does have the ability to reduce power outputs from the levels set in the factory firmware, but can not increase them.

6. Description of the Test Sites

Radiated emissions testing was performed at nine different locations. Not all testing was performed at each location. A description of each location is given below. A list of the testing performed at each location is included in the descriptive information for that location.

<u>CURRENT Technologies Rockville Test Area – PLB-01</u>

Location:	4707 Macon Road Rockville, MD
Site Description:	System installation on a utility pole in a residential neighborhood. The pole is located next to a residential street and is equipped with a transformer, low-voltage wires and medium-voltage wires. DUT Height: 7.9m LV-wire Height: 7.8m MV-wire Height: 11.3m
Site Diagrams:	See Figures 2a, 2b, and 2c, below.
Site Photos:	See Photographs B-1 and B-2 in Appendix B.
Tests Performed at this Location:	▪ Radiated Emissions, 1.705 MHz to 30 MHz, on August 19, 2006 ▪ Radiated Emissions, 50 MHz to 1000 MHz, on June 2, 2006

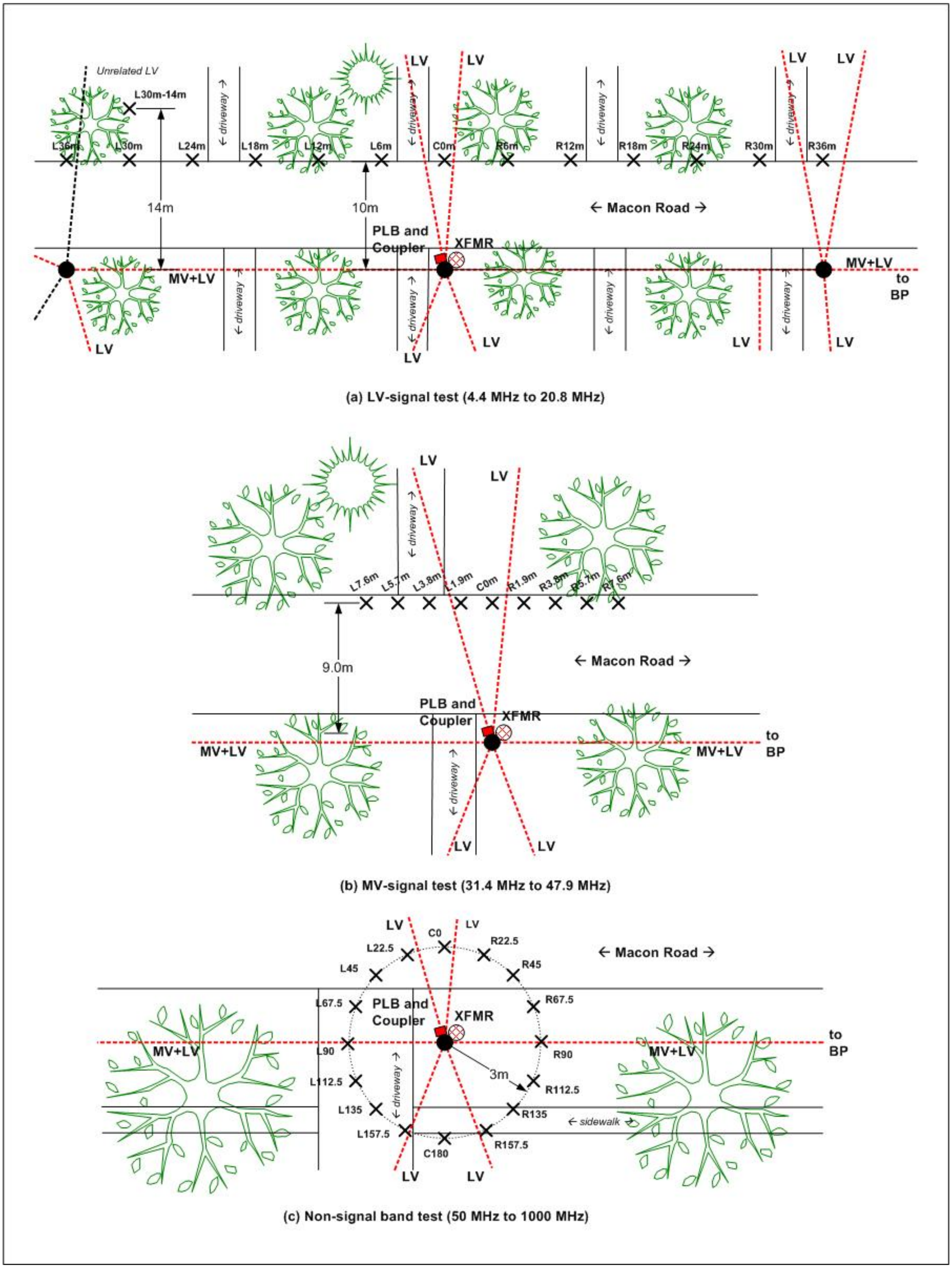

Figure 2: Test Site Diagram – CURRENT Technologies Rockville Test Area – PLB-01

<u>CURRENT Technologies Rockville Test Area – PLB-02</u>

Location:	4803 Macon Road Rockville, MD
Site Description:	System installation on a utility pole in a residential neighborhood. The pole is located next to a residential street and is equipped with a transformer, low-voltage wires and medium-voltage wires.

DUT Height:	8.5m
LV-wire Height:	8.4m
MV-wire Height:	11.16m

Site Diagrams:	See Figures 3a, 3b, and 3c, below.
Site Photos:	See Photographs B-3 and B-4 in Appendix B.
Tests Performed at this Location:	▪ Radiated Emissions, 1.705 MHz to 30 MHz, on August 19, 2006 ▪ Radiated Emissions, 50 MHz to 1000 MHz, on May 31, 2006

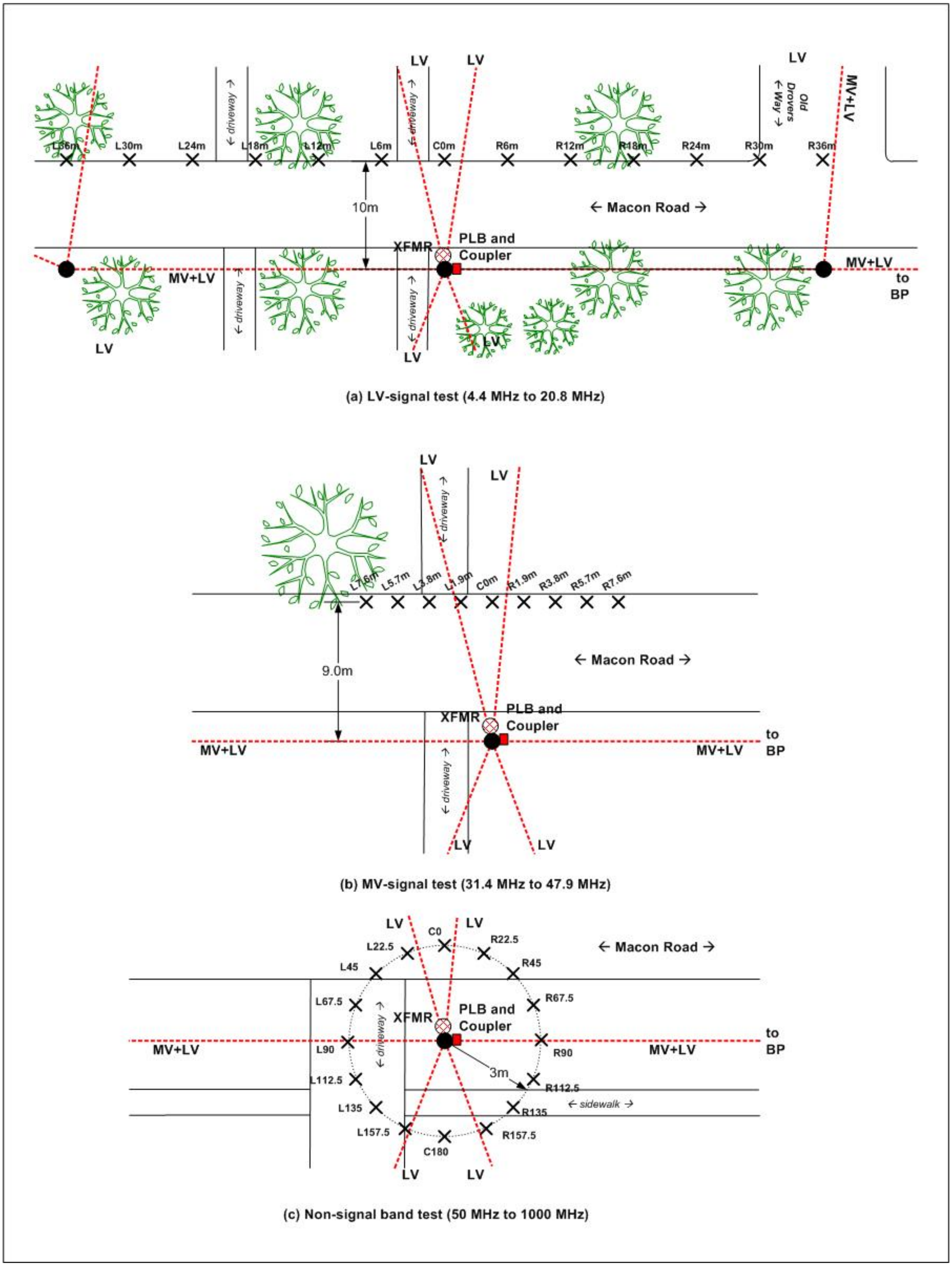

Figure 3: Test Site Diagram – CURRENT Technologies Rockville Test Area – PLB-02

CURRENT Technologies Rockville Test Area – PLB-04

Location:	11818 Old Drovers Way Rockville, MD
Site Description:	System installation on a utility pole in a residential neighborhood. The pole is located next to a residential street and is equipped with a transformer, low-voltage wires and medium-voltage wires. LV-wire Height: 7.1m MV-wire Height: 10.1m
Site Diagrams:	See Figures 4a and 4b, below.
Site Photos:	See Photographs B-5 and B-6 in Appendix B.
Tests Performed at this Location:	▪ Radiated Emissions, 1.705 MHz to 30 MHz, on August 10, 2006

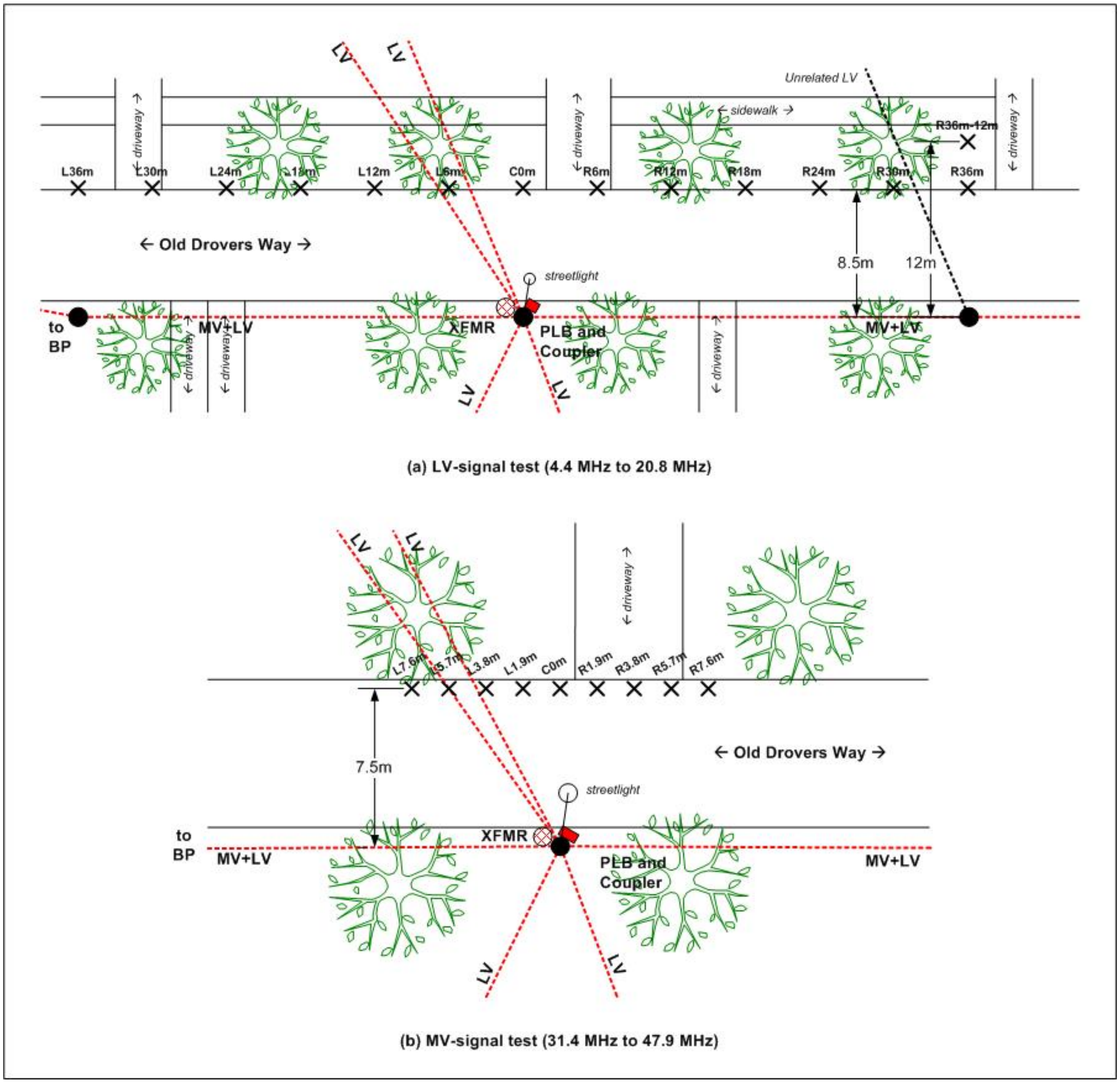

Figure 4: Test Site Diagram – CURRENT Technologies Rockville Test Area – PLB-04

CURRENT Technologies Rockville Test Area – BP-02

Location: 4711 Olden Road
Rockville, MD

Site Description: System installation on a utility pole in a residential neighborhood. The pole is located next to a residential street and is equipped with a transformer, low-voltage wires and medium-voltage wires.

DUT Height:	8.2m
LV-wire Height:	7.5m
MV-wire Height:	10.7m

Site Diagram: See Figure 5, below.

Site Photos: See Photographs B-7 and B-8 in Appendix B.

Tests Performed at this Location:
- Radiated Emissions, 50 MHz to 1000 MHz, on June 7, 2006

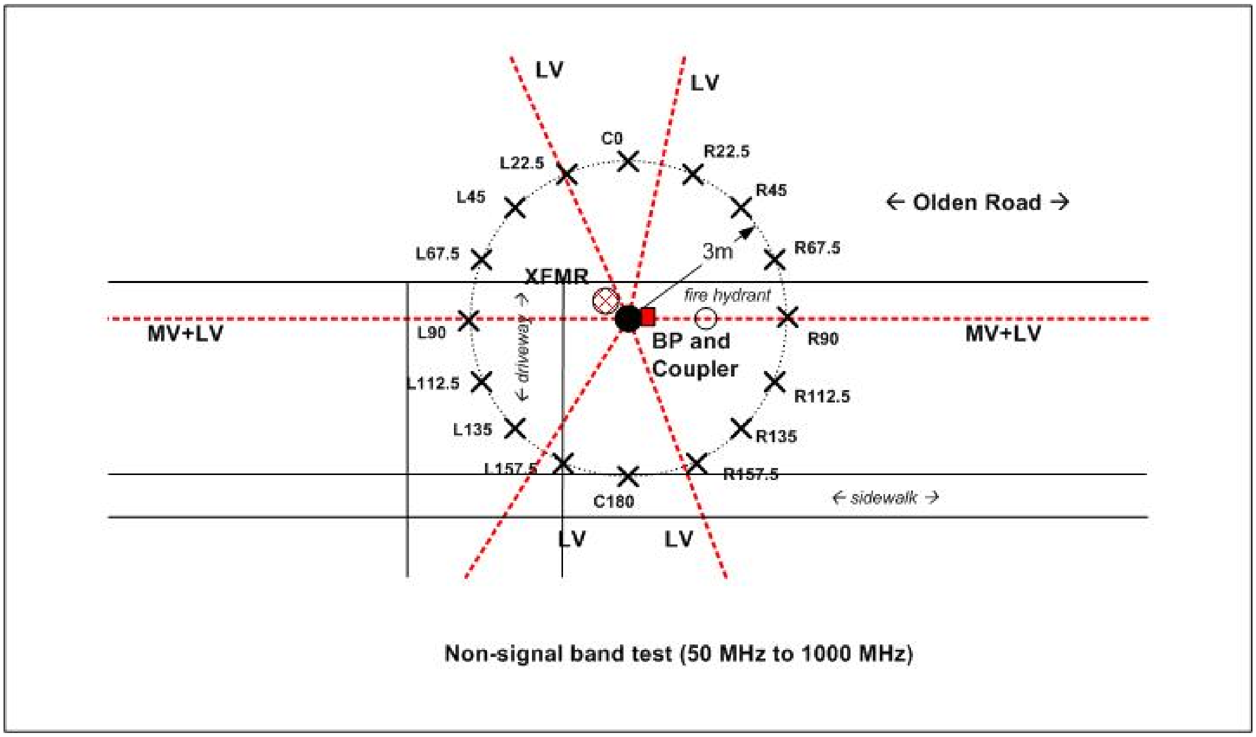

Figure 5: Test Site Diagram – CURRENT Technologies Rockville Test Area – BP-02

CURRENT Technologies Rockville Test Area – BP-03

Location: 4611 Olden Road
Rockville, MD

Site Description: System installation on a utility pole in a residential neighborhood. The pole is located next to a residential street and is equipped with low-voltage wires and medium-voltage wires.

DUT Height:	8.8m
LV-wire Height:	9.0m
MV-wire Height:	10.5m

Site Diagram: See Figure 6, below.

Site Photos: See Photographs B-9 and B-10 in Appendix B.

Tests Performed at this Location:
- Radiated Emissions, 50 MHz to 1000 MHz, on June 8, 2006

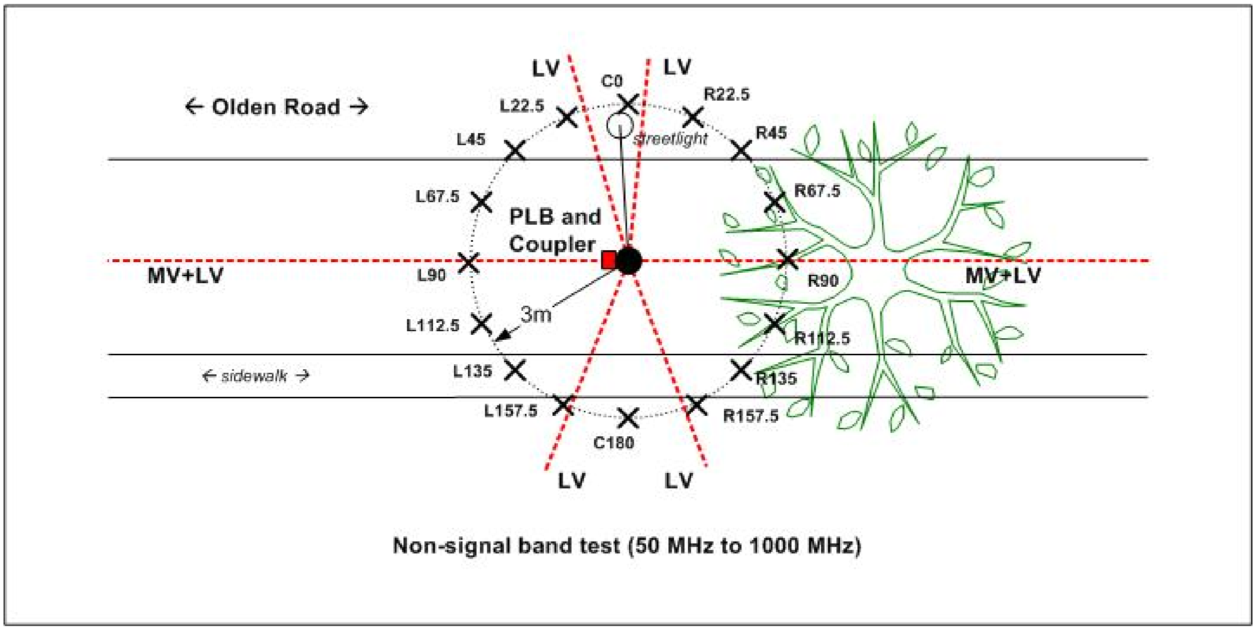

Figure 6: Test Site Diagram – CURRENT Technologies Rockville Test Area – BP-03

Washington Laboratories Open Area Test Site

Location:	Washington Laboratories 7560 Lindbergh Drive Gaithersburg, MD
Site Description:	Simulated system installation at an Open Area Test Site. The CT Bridge OH 5000ml and CT Backhaul-Point OH 5000g were mounted on a wooden platform in approximately the same position in which they would be mounted in the field, at a height of approximately 0.8 meter above the floor. The medium-voltage connections were terminated with 4’ coaxial cables and 50-ohm resistors. The cables were arranged in a way that was representative of the way they would be arranged in an actual installation.
Site Diagram:	See Figure 7 below.
Site Photos:	See Photographs B-11, B-12, B-13 and B-14 in Appendix B.
Tests Performed at this Location:	▪ Radiated Emissions, 30 MHz to 1000 MHz, CT Bridge OH 5000ml, on May 19, 2006 ▪ Radiated Emissions, 30 MHz to 1000 MHz, CT Backhaul-Point OH 5000g, on May 19, 2006

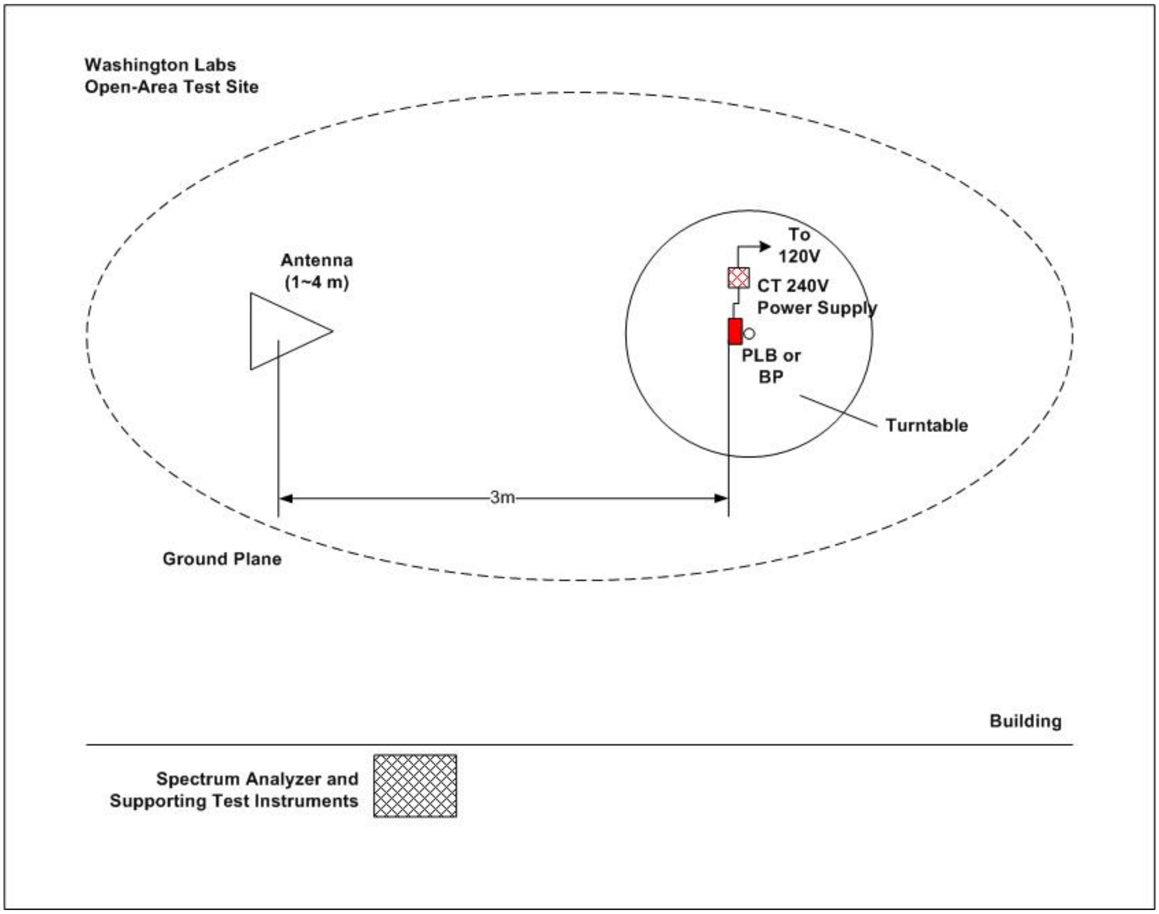

Figure 7: Test Site Diagram – Washington Laboratories Open Area Test Site

CURRENT Technologies Field Research and Test Area – Pole P3

Location:	Urbana Pike Urbana, MD
Site Description:	System installation on a utility pole in a BPL system test area. The pole is located is an open field and is equipped with low-voltage wires and medium-voltage wires. DUT Height: 6.6m MV-wire Height: 8.6m
Site Diagram:	See Figure 8, below.
Site Photos:	See Photographs B-15 and B-16 in Appendix B.
Tests Performed at this Location:	▪ Radiated Emissions, 30 MHz to 50 MHz, on August 17, 2006

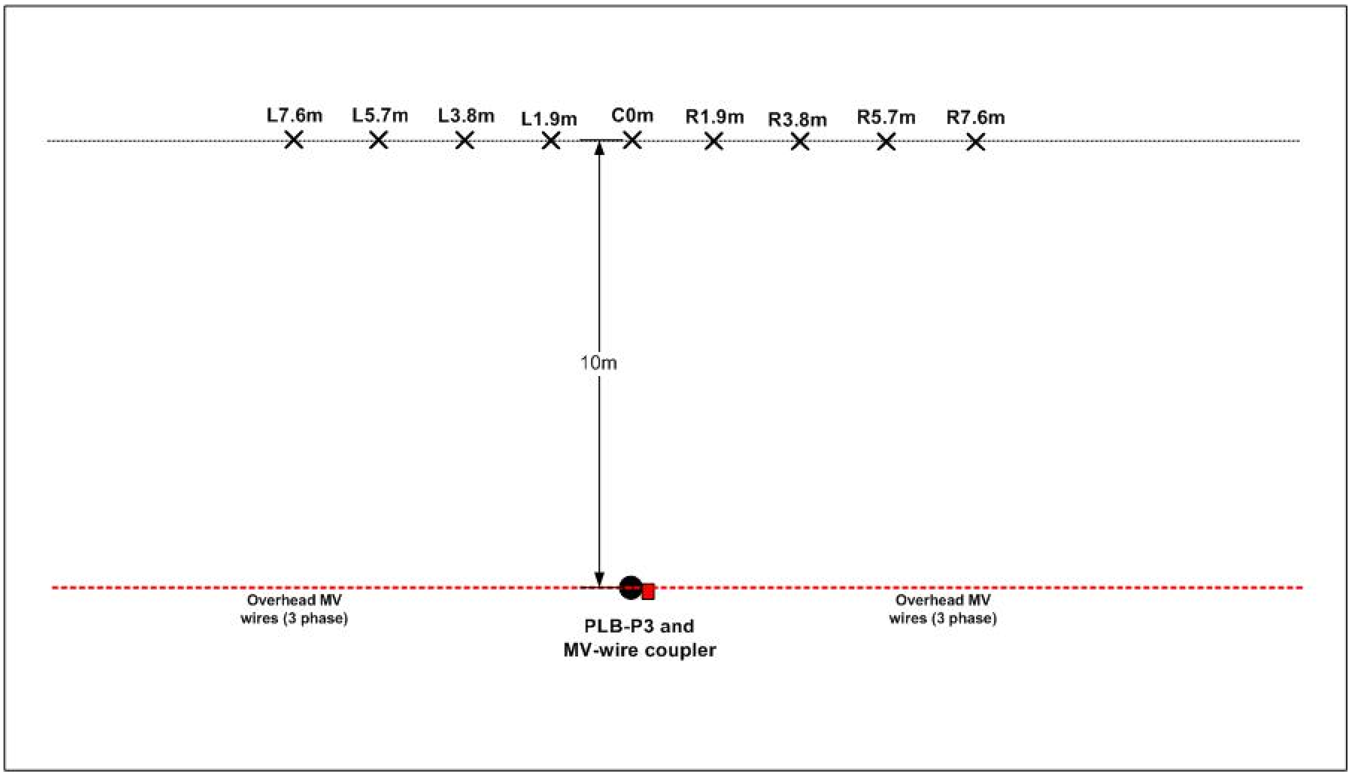

Figure 8: Test Site Diagram - CURRENT Technologies Field Research and Test Area - Pole P3

CURRENT Technologies Potomac Test Area – PLB-K2

Location:	9705 Kentsdale Drive Potomac, MD
Site Description:	System installation on a utility pole in a residential neighborhood. The pole is located next to a residential street and is equipped with low-voltage wires and medium-voltage wires. DUT Height: 9.1 m MV-wire Height: 12.6m
Site Diagram:	See Figure 9, below.
Site Photos:	See Photographs B-17 and B-18 in Appendix B.
Tests Performed at this Location:	▪ Radiated Emissions, 30 MHz to 50 MHz, on August 18, 2006

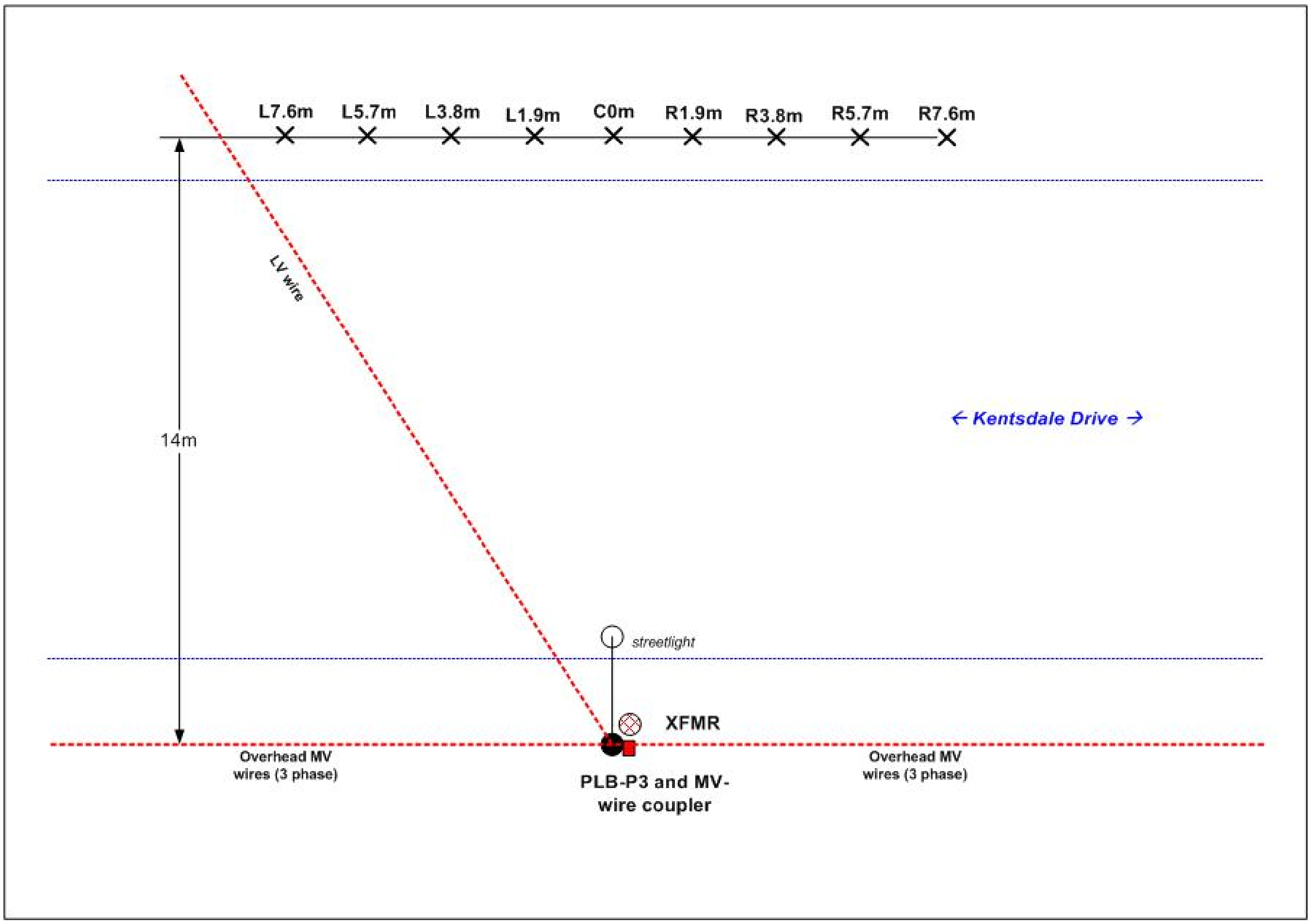

Figure 9: CURRENT Technologies Potomac Test Area - PLB-K2

CURRENT Technologies Potomac Test Area – PLB-K4

Location:	9417 Kentsdale Drive Potomac, MD
Site Description:	System installation on a utility pole in a residential neighborhood. The pole is located next to a residential street and is equipped with low-voltage wires and medium-voltage wires. DUT Height: 9.1m MV-wire Height: 11.5m
Site Diagram:	See Figure 10, below.
Site Photos:	See Photographs B-19 and B-20 in Appendix B.
Tests Performed at this Location:	▪ Radiated Emissions, 30 MHz to 50 MHz, on August 17, 2006

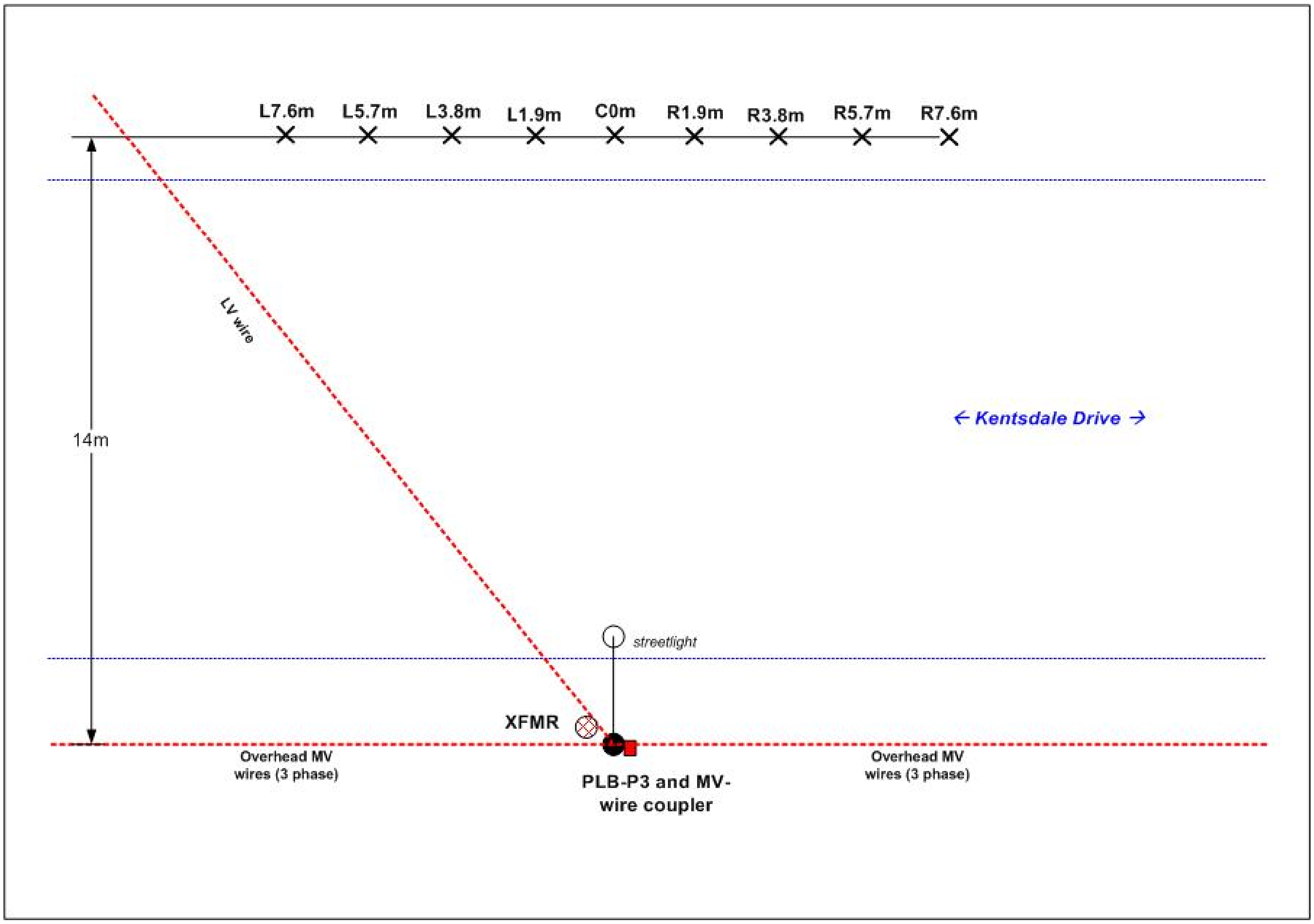

Figure 10: CURRENT Technologies Potomac Test Area - PLB-K4

7. List of Test Equipment Used

The following is a list of test equipment used during testing.

Radiated Emissions Measurement – 1.705 MHz to 30 MHz

Description	Manufacturer and Model Number	Serial Number and Identification Number	Calibration Due Date
EMC Analyzer	HP E7402A or HP E7405A	MY44212893 MY42000076	May 31, 2007 October 10, 2006
Antenna, Active Loop (10 kHz to 30 MHz)	EMCO 6507	00051987	December 6, 2006
RF Cable, 100’	RG-58	CT #100B	January 12, 2007

Radiated Emissions Measurement – 30 MHz to 50 MHz

Description	Manufacturer and Model Number	Serial Number and Identification Number	Calibration Due Date
EMC Analyzer	HP E7405A	MY42000076	October 10, 2006
Antenna, Biconical (20 MHz to 330 MHz)	A.H. Systems SAS-200/540	573	December 6, 2006
RF Cable, 100’	RG-58	CT #100A	January 12, 2007

Radiated Emissions Measurement – 50 MHz to 1000 MHz – Stage One

Description	Manufacturer and Model Number	Serial Number and Identification Number	Calibration Due Date
Spectrum Analyzer	HP 8568B	WL #00072	July 5, 2006
Quasi-Peak Adapter	HP 85650A	WL #00068	July 5, 2006
RF Preselector (w/ OPT 8ZE)	HP 85685A	WL #00070	July 5, 2006
Antenna, Biconlog	Sunol JB1	WL #00382	January 25, 2007
Coaxial cable	WLL RG214	WL #00544	October 4, 2006

Radiated Emissions Measurement – 50 MHz to 1000 MHz – Stage Two

Description	Manufacturer and Model Number	Serial Number and Identification Number	Calibration Due Date
EMC Analyzer	HP E7402A or HP E7405A	MY44212893 MY42000076	May 31, 2007 October 10, 2006
Antenna, Log-Periodic (290 MHz to 2000 MHz)	A.H. Systems SAS-200/510	784	December 6, 2006
Antenna, Biconical (20 MHz to 330 MHz)	A.H. Systems SAS-200/540	573	December 6, 2006
RF Cable, 50’	RG-58	CT #50A	January 12, 2007

8. EMI Test Results

EMI test results for both conducted and radiated emissions measurements are summarized below.

8.1 Conducted Emission Data

Conducted emissions limits do not apply to this Access BPL equipment

8.2 Radiated Emission Data

The final level of the radiated emission, in dBµV/m, is calculated by taking the reading from the spectrum analyzer (in dBµV) and adding the appropriate correction factors (antenna, cable loss, external pre-amplifier, filter, etc.). A distance correction factor is then added to compensate for the actual measurement distance being different from the specified measurement distance. The difference between this result and the FCC limit is calculated, giving the margin of compliance, as shown in Appendix A.

The field strength was calculated using the formula:

$$E(dB\mu V/m) = Vrec(dB\mu V) + AF(dB/m) + CL(dB)$$

Where Vrec is the voltage detected voltage by the spectrum analyzer, AF is the antenna factor at the specified frequency, and CL is the insertion loss on the RF cable which is connected between the antenna and the spectrum analyzer.

Conclusion: The CT Bridge OH 5000ml and CT Backhaul-Point OH 5000g meet the FCC limits for radiated emissions from Access BPL devices in the frequency range 1.705 MHz to 30 MHz when actively transmitting LV signals (4.4 MHz to 20.8 MHz). In this operation mode, and over this frequency range, the minimum passing margin was 0.3 dB.

The CT Bridge OH 5000ml and CT Backhaul-Point OH 5000g meet the FCC limits for radiated emissions from Access BPL devices in the frequency range 30 MHz to 50 MHz when actively transmitting MV signals (31.4 MHz to 47.9 MHz). In this operation mode, and over this frequency range, the minimum passing margin was 0.4 dB.

The CT Bridge OH 5000ml and CT Backhaul-Point OH 5000g meets the Part 15 Class A radiated emission requirements over the frequency range 50 MHz to 1000 MHz. Over this frequency range, the minimum passing margin for the CT Bridge OH 5000ml was 2.9 dB. The minimum passing margin for the CT Backhaul-Point OH 5000g was 1.3 dB.