BPL Test Plan

Test Plan Number: TP05-84818 -3

Prepared for: **Corinex**

Model Number(s): MV Gateway

Specification(s): FCC 15 G

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NOTICE:

Due to changes in manufacturing and availability of information at the time this test plan was generated, all information contained in this document must be verified by the testing engineer. Any corrections/adjustments shall be documented by the test engineer in a revision of this test plan. The revision shall be reviewed and approved by appropriate personnel.

Table of Contents

1 General Information

1.1 Scope

This document offers guidance for Access BPL standards and/or tests which have been identified and determined necessary for compliance of the equipment herein listed within the framework of the Federal Communications Commission.

1.2 Revision History

Rev	*Date*	*History*
0	2/17/06	Original
1	2/27/06	Rev 1 – added requirements pursuant to FCC comments.
2	3/23/06	Rev 2- added LV requirements pursuant to customer request changed model number updated test site location information updated report requirements updated customer requirements updated operational modes
3	5/5/06	Rev 3 Updated LV requirements to increase frequency range Update operation mode for LV requirements

1.3 Assumptions / Information Log

I. Assumptions:

- Equipment operates with "modes" as defined by the 10 MHz blocks in which the device intentionally generates RF energy.
- Equipment is capable of demonstrating compliance to all FCC requirements.

II. Contact Log:

- Brian Donnelly 2/16/06
- Andy Leimer (FCC) 2/24//06
  - Clarified method of demonstration of certain compliance requirements
  - Clarified frequency range of investigation
  - Requested demonstration of slant range calculation in test report.
- Andy Leimer (FCC) 3/23/06
  - Clarified testing configuration for EUT.

2 Certification Requirements

The FCC requires direct filing to OET for equipment authorization under Certification pursuant to 47 CFR Part 2 Subpart J.

Draft copy of this test report approved by Andy Leimer (FCC) on 2/24/06 for MV testing. The commission made several recommendations which were subsequently incorporated into this plan.

3 EUT information

3.1 Models

The following model is to be tested in accordance with this test plan:

- Model Number(s): MV Gateway

3.2 System Description

The Corinex Medium Voltage Access Gateway/ Regenerator allows utilities to use their existing Powerline infrastructure to provide high-speed broadband signals to commercial and residential buildings in urban or rural areas. System additionally contains a low voltage option.

3.3 Modes of Operation

The EUT must be tested in the following modes or configurations:

A. Installed in underground medium voltage power distribution facility.

B. Installed in over-head medium voltage lines

C. Installed in underground low voltage power distribution facility..

D. Installed in over-head low voltage lines.

Note: Equipment must be tested for compliance while in normal operational mode using maximum data rate. The full frequency range of operating frequencies must be investigated in order to determine compliance. As necessary, this may require testing subsets of each configuration.

3.3.1 Mode Frequency Selection: MV Testing

The equipment operates in the following modes (channels) during medium voltage operation.

1. 2 to 12 MHz
2. 13 to 23 MHz
3. 24 to 34 MHz

	Medium Voltage	
	<30MHz	>30MHz
Underground	123	12, 23 *
Overhead	12, 23	12, 23 *

*Final data for MV will be tested in mode 23 only above 30MHz. Engineering data from 12 mode showed no detectable signals above 30MHz therefore testing with mode 23 demonstrates worst case.

For low voltage testing there is only one mode, operating from 2-30MHz. During actual deployment any portion of this band could be used. The entire band is not necessarily used.

3.4 Technical Summery

Equipment Type		
	☐Portable	
Installation Type:	☐Mobile ☐Vehicle	
	☒Fixed	
	☐Transmitter	☐BlueTooth
Device Type:	☐Receiver	☐802.11
	☒Transceiver	☒CCS / BPL
Equipment Specifications		
Input Power Requirements:	120 / 240	☒AC
		☐DC
Temperature Range:	-20 - +50ºC	
Humidity Range:	10% - 80%	
Line Coupler Voltage	12.5 / 25.0 kV MV	
	120 / 240 - LV	
Power & Antenna Specifications		
Power Output (ERP or EIRP)	NA	☐ERP
		☐EIRP
RF Power Output:	NA	☐at RF Output Port
		☐after specified cable loss
Output Power is:	☒Variable	
	☐Fixed	
Antenna is:	☐NON-Removable (Integral)	
	☐Removable	
RF Connector Type:	NA	(if removable)
Number of Antennas:	NA	
Antenna Type & Gain:	NA	
Antenna Bias:	NA	
Frequency Summary		
Operating Frequency Range:	2 – 34 MHz MV	Three channels
	2 – 12 MHz LV	One channel only
Channel Bandwidth:	10 MHz	
Channel Spacing:		
Lowest Frequency Used:	2 MHz	
Highest Frequency Used:	80 / 160 MHz	
Other Frequencies Used:	None	
Agency Information		
Necessary Bandwidth:		
Emissions Designator:		
FCC Equipment Class:	BPL	
IC Equipment Type:		
EU Frequency Classification	☐Narrowband	
	☐Wideband	

4 Customer Requirements

- Equipment must be capable of operating continuously for an extended period.
- Equipment must be capable of transmitting on all available channels
- Equipment must be capable of selecting operational modes as necessary for testing
- Equipment to be installed and configured by authorized personnel. CKC Laboratories testing staff is not responsible for device setup or configuration during testing.
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4.1 Responsibility of BPL operator

It is recommended that a BPL operator perform initial installation and periodic testing of Access BPL systems on his power lines. These tests shall be performed to ensure that the system in conjunction with the installation site complies with the appropriate emission limits using the measurement procedures outlined in Section 3 of this document. The BPL operator should use typical installation sites within his service area as outlined in section 2(a) of this document. Selection of typical sites shall be made according to the characteristics of the installation as a whole. The BPL operator is not required to submit the test results. In the instance that the Access BPL system was tested on the operator's network for certification purposes, the initial installation tests do not need to be repeated. However, periodic testing of installed Access BPL systems is recommended to ensure that the system maintains compliance with Part 15 emission limits.

5 Compliance Summary

Agency	Test Specification(s)	Document Title
FCC	15.209 <30MHz	
FCC	15.109 Class A >30 MHz	

5.1.1 Testing Checklist

Access BPL Requirements

Done	P/F	Requirement	Explanation	Comments
	Pass	15.603(e)	*Low Voltage power line.* A power line carrying low voltage, *e.g.*, 240/120 volts from a distribution transformer to a customer's premises.	Device operates on low voltage lines as an optional configuration.
	Pass	15.603(f)	Medium Voltage power line. A power line carrying between 1,000 to 40,000 volts from a power substation to neighborhoods. Medium voltage lines may be overhead or underground, depending on the power grid network topology.	Device operates on medium voltage lines.
	NA	15.611(a)	Conducted emissions do not apply	
X	Pass	15.611(b)	Radiated emissions limits below 30MHz.	15.209
X	Pass	15.109	Radiated emissions limits above 30MHz	15.109 Class A
	NA	15.611(c)(1)	Interference mitigation and Avoidance: Access BPL systems shall incorporate adaptive interference mitigation techniques to remotely reduce power and adjust operating frequencies, in order to avoid site-specific, local use of the same spectrum by licensed services. These techniques may include adaptive or "notch" filtering, or complete avoidance of frequencies, or bands of frequencies, locally used by licensed radio operations	Customer to provide information in operational description, and attestation of compliance.
	NA	15.611(c)(1)(i)	For frequencies below 30 MHz, when a notch filter is used to avoid interference to a specific frequency band, the Access BPL system shall be capable of attenuating emissions within that band to a level at least 20 dB below the applicable Part 15 limits.	Customer to provide information in operational description, and attestation of compliance.

	NA	15.611(c)(1)(ii)	For frequencies above 30 MHz, when a notch filter is used to avoid interference to a specific frequency band, the Access BPL system shall be capable of attenuating emissions within that band to a level at least 10 dB below the applicable Part 15 limits.	Customer to provide information in operational description, and attestation of compliance.
	NA	15.611(c)(2)	Access BPL systems shall comply with applicable radiated emission limits upon power-up following a fault condition, or during a start-up operation after a shut-off procedure, by the use of a non-volatile memory, or some other method, to immediately restore previous settings with programmed notches and excluded bands, to avoid time delay caused by the need for manual re-programming during which protected services may be vulnerable.	Customer to provide information in operational description, and attestation of compliance.
	NA	15.611(c)(2)	Access BPL systems shall incorporate a remote-controllable shut-down feature to deactivate, from a central location, any unit found to cause harmful interference, if other interference mitigation techniques do not resolve the interference problem	Customer to provide information in operational description, and attestation of compliance.
	NA	15.615	General Administrative Requirements	Notification required to BPL database prior to installation of equipment.
	NA	15.615(f)	Exclusion bands – device shall not transmit on the frequencies listed in this section. Exclusion zones – device shall not be operated within the distance specified from the geographic locations listed in this section. Consultation areas - Access BPL operators shall provide notification to the appropriate point of contact specified below regarding Access BPL operations at any frequencies of potential concern in the following consultation areas, at least 30 days prior to initiation of any operation or service.	Customer to provide information in operational description, and attestation of compliance.

6 Compliance Requirements

6.1 Emissions Requirements for Intentional radiators under 47 CFR 15 G for US.

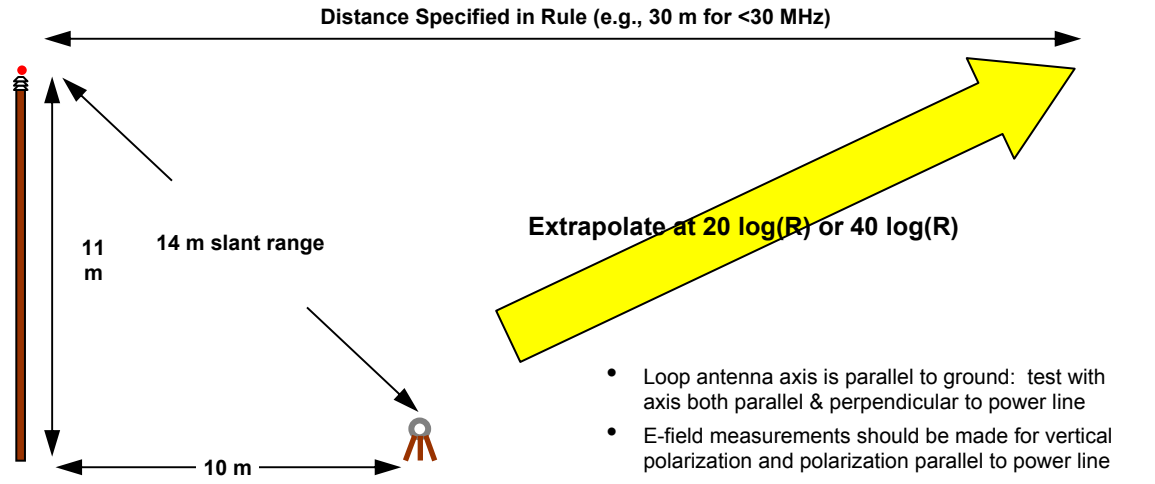
Para	Description	Application	Criteria	Mode	Test Procedure
15.613	Test procedure	ALL			FCC 04-245A1 appendix C (FCC 04-245(c))
15.611(b)	Radiated Emissions below 30MHz	ALL	Ant Height is 1m	ABCD	FCC 04-245(c)
15.611(b)	Radiated Emissions above 30MHz	ALL	Ant Height 1-4m or at 1m with +5dB	ABCD	FCC 04-245(c)
15.109	Radiated Emissions (digital)	Digital ONLY	Class A		ANSI C63.4

6.1.1 Testing Notes

Summary of specific measurement procedure requirements

Test distance	Test distance is determined using slant range distance from overhead power lines (see section 6.1.2).
Frequency range	Frequency range of investigation is 2MHz to 1000MHz.
Test positions	Test positions for underground sites must be on a minimum of 16 radials, equally spaced around the installation site (measurements to be performed to the best extent practical.) Test positions for overhead lines must be on 0, ¼, ½, ¾, and 1 wavelength of the midband operating frequency. In addition, if the mid-band frequency exceeds the lowest frequency injected onto the power line by more than a factor of two, testing shall be extended in steps of ½ wavelength of the mid-band frequency until the distance equals or exceeds ½ wavelength of the lowest frequency injected.
Overhead line height	The method of determining overhead line height must be shown in the test report. One method is to use power company line charts and show heights. Another method may be to photograph each test point using a standard length pole (or 2x4). Other methods are also acceptable.
Antenna Polarity	Note for frequencies below 30 MHz, test with loop antenna axis vertical at 0 and 90º to power line. For frequencies above 30 MHz, test with antenna axis vertical and horizontal, including parallel to the power line. In all cases, note the polarity of the highest emissions detected. (see section 6.1.2).
Test sites	Photos of each test site must be included in test report. Test sites are to include the following: o 3 Sites with overhead medium voltage lines o 3 Sites with underground medium voltage lines o 3 Sites with overhead low voltage lines o 3 Sites with underground low voltage lines

6.1.2 Example calculation of slant range distance.



Source: FCC Access BPL presentation, FEB 2006

6.1.3 Wavelength Calculations

For Medium Voltage Testing:

Freq (MHz)	λ (m)
2.0	150.00
18.0	16.67
34.0	8.82

For Low Voltage Testing:

Freq (MHz)	λ (m)
2.0	150.00
16.0	18.75
30.0	10.00

6.1.4 Test points for overhead lines

Medium Voltage Test Points:
Calculated using mid-band frequency of 18MHz.

n	λ(m)
0.00	0.00
0.25	4.17
0.50	8.33
0.75	12.50
1.00	16.67
1.50	25.00
2.00	33.33
2.50	41.67
3.00	50.00
3.50	58.33
4.00	66.67
4.50	75.00

Low Voltage Test Points:
Calculated using mid-band frequency of 16MHz.

n	λ(m)
0.00	0.00
0.25	4.69
0.50	9.38
0.75	14.06
1.00	18.75
1.50	28.13
2.00	37.5
2.50	46.88
3.00	56.25
3.50	65.63
4.00	75.00

Note: test points are determined based on the low voltage overhead lines only. Measurements are to be performed to the best extend practical given overhead line length limitations.

6.1.5 Selection of test sites

The following represents the selected test sites prior to testing, actual test sites may vary as necessary to avoid excessive ambient conditions which may preclude accurate testing.

6.1.5.1 Minimum Separation Distance Between Sites

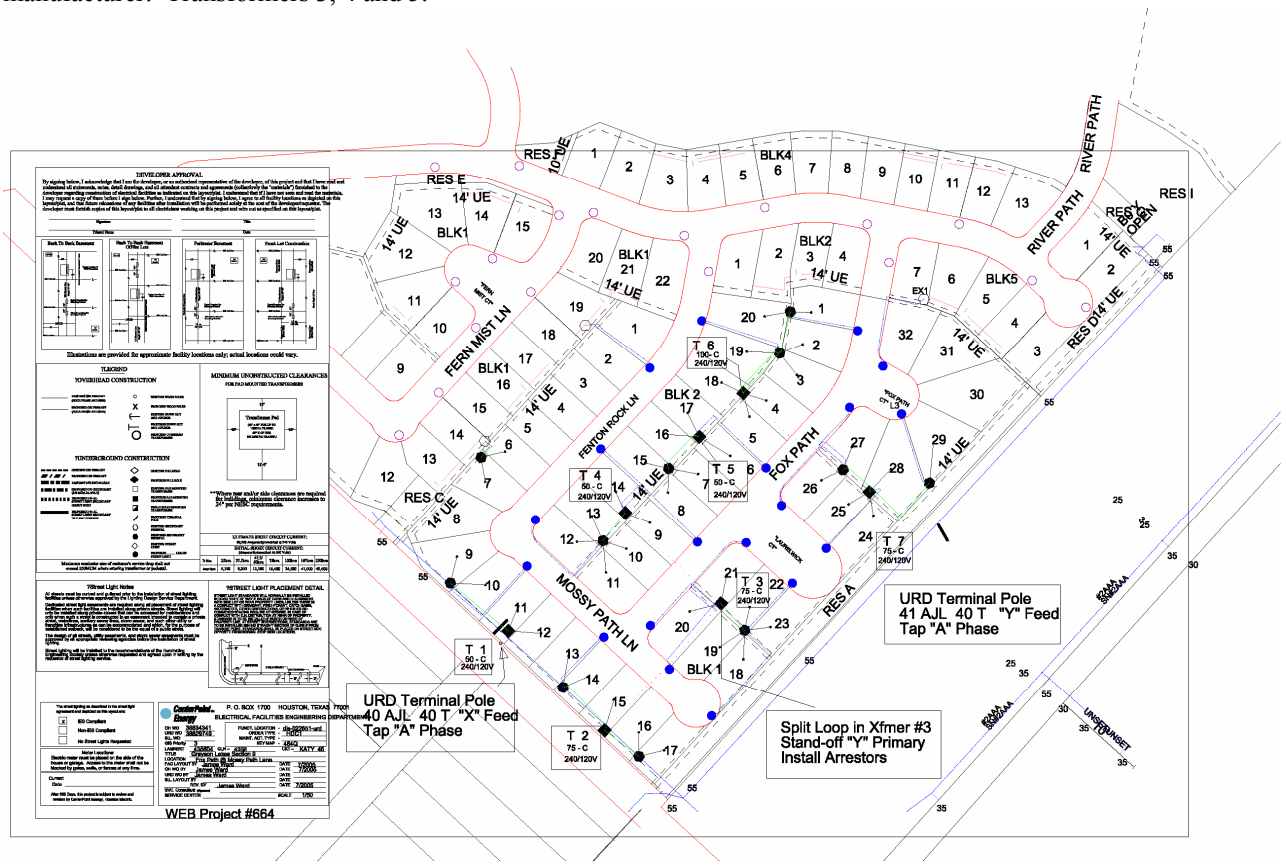
The FCC has suggested a minimum separation distance between test sites as listed below (source FCC Email referencing KDB inquiry 728628)

Though the FCC has not specified how distinct those installation sites should be, the following conditions apply:
- Each site must be representative of typical installation sites;
- Each site should be considered to be a distinct radiating environment. We will assume this requirement is met if the following conditions are satisfied:
  >> For a device that mounts in, or adjacent to, a ground-sitting transformer and operates through underground wiring, tests are conducted at three different transformers.
  >> For a device that couples to overhead power lines, device test locations are separated by at least 200 meters or twice the typical communication distance along overhead lines (e.g., distance between repeaters), whichever is larger.

The FCC further suggests that all test sites be chosen such that they are away from cable boxes, telephone lines and other sources of ambient signals.

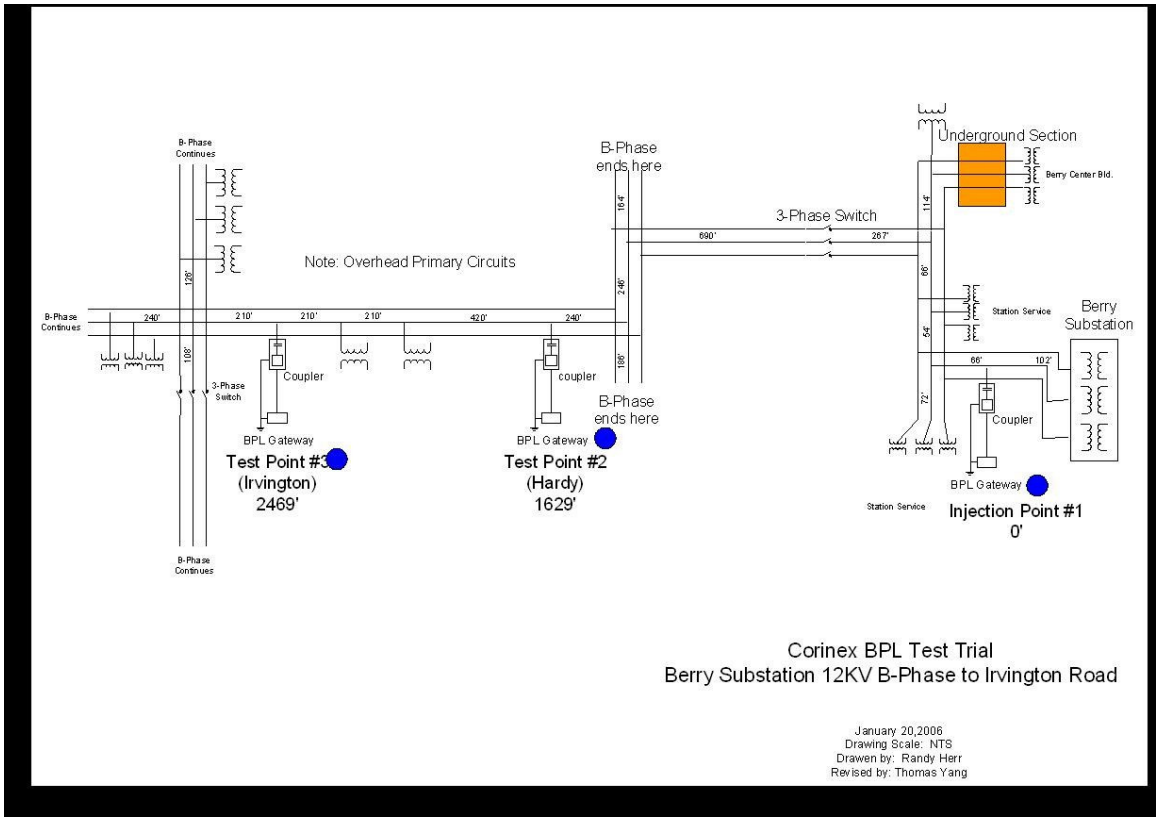
6.1.5.2 Underground Locations

The following underground locations for both Low & Medium Voltage have been selected by the manufacturer: Transformers 3, 4 and 5.



6.1.5.3 Overhead lines

The following Low and Medium voltage overhead lines have been identified by the manufacturer. The three test sites are as follows: Post Street east of Cochran Street, Westford Street west of Cochran Street and Bennington Street west of Cochran Street.



6.1.6 Line Coupler Information

Manufacturer: Arteche
Underground coupler model: UNIC
Overhead medium voltage coupler model: OVERCAP-S-17

6.2 Special Notes and Considerations

NO PROTOTYPES ALLOWED, UNITS MUST BE PRODUCTION

Frequency Range to be Investigated	9kHz to 1000MHz	
Power Output	NA	***Warning!***
Antenna Bias	None	
Receiver Testing	NA	

WARNING: Watch for compression and overload

Recommend use of high pass filters at 1.705 MHz

6.3 Test Equipment Required for In-Situ Testing

Caution: Verify power rating of all test equipment prior to testing.

Equipment	Comments	Notes
Spectrum Analyzer	9kHz to 1GHz	
Antennas	Mag Loop Bicon Log Periodic	Active and Passive
Preamplifiers	9kHz – 30MHz 30-1000MHz	 Note 1
Suitable Attenuation	(2)6dB Pads, (2)10dB Pads or directional coupler	Note 2
Filter	1.705 MHz High Pass	(Use Krohn-Hite programmable filter with calibrated filter curve for 1.8MHz cutoff frequency.)
Temp Chamber	NA	
AC Power Supply	Power Generator / inverter	Customer Requirement
DC Power Supply		
Other	Antenna Mast	

Notes:
1. For emissions testing above 1GHz, place amplifier next to the receive antenna.
2. Verify frequency range and power rating of attenuators and directional couplers.
3. Active mag loop may saturate due to ambient conditions. Use attenuation, filtering and or passive loop antenna.

7 Report Requirements

- FCC Part 15 G In-Situ Report for 6 installations
  - Test report must show line height for all overhead sites.
  - Report must include a sample calculation of slant range distance
  - Test report photos must be included for all test sites
  - Any variations from FCC test procedures must be clearly documented for inclusion in the test report.

7.1 Certification Technical Report Requirements for Access PBL Devices

1) Certification applications shall be accompanied by a technical report in accordance with Section 2.1033 of the Rules. Each device used in an Access BPL system requires its own Certification.
2) For Access BPL devices, the statement describing how each device operates shall include the following information: modulation type, number of carriers, carrier spacing, channel bandwidth, notch capability/control, power settings/control, and range of signal injection duty factors.
3) For Access BPL devices, the measurement report shall include representative emissions spectrum plot(s) of the reported data.

7.2 FCC Filing Requirements

Obtained	Exhibit	FCC Reguired?	Comments
	Attestation Statements	Reserved for legal use only	
x	Block Diagram	Required	
	Cover Letters: Confidentiality Letter Power of Authority	Necessary	
	External Photos	Required	
	ID Label / Location Info	Required	no special requirements
	Internal Photos	Required	
	Operation Description	Required	
	Parts List / Tune-up Info		
	RF Exposure Info SAR Test Report MPE Test Report or Calculations	N/A	
	SDR Executable Files	N/A	
	Schematics	Optional	
	Test Report	Required	
	Test Setup Photos	Required	all in-situ sites
	Users Manual	Required	Not sold to general public Compliance instructions to utility operator OR Compliance letter exhibits for notch capability, power-up defaults, etc. If an exhibit in this category contains confidential information, it may be held confidential with proper justification.

Appendix A: Measurement Procedures

Federal Communications Commission FCC 04-245
APPENDIX C
GUIDELINES
Measurement Guidelines for Broadband Over Power Line (BPL) Devices Or Carrier Current Systems (CCS) and Certification Requirements For Access BPL Devices

This appendix is intended to provide general guidance for compliance measurements of Broadband over power line (BPL) devices and other carrier current systems (CCS). For BPL systems, the measurement principles are based on the Commission's current understanding of BPL technology. Modifications may be necessary as measurement experience is gained.

1. General Measurement Principles for Access BPL, In-House BPL and CCS

1) Testing shall be performed with the power settings of the Equipment Under Test (EUT) set at the maximum level.
2) Testing shall be performed using the maximum RF injection duty factor (burst rate). Test modes or test software may be used for uplink and downlink transmissions.
3) Measurements should be made at a test site where the ambient signal level is 6 dB below the applicable limit. (See ANSI C63.4-2003, section 5.1.2 for alternatives, if this test condition cannot be achieved.)
4) If the data communications burst rate is at least 20 burst per second, quasi-peak measurements shall be employed, as specified in Section 15.35(a). If the data communications burst rate is 20 bursts per second or less, measurements shall be made using a peak detector.
5) For frequencies above 30 MHz, an electric field sensing antenna, such as a biconical antenna is used. The signal shall be maximized for antenna heights from 1 to 4 meters, for both horizontal and vertical polarizations, in accordance to ANSI C63.4-2003 procedures. For Access BPL measurements only, as an alternative to varying antenna height from 1 to 4 meters, these measurements may be made at a height of 1 meter provided that the measured field strength values are increased by a factor of 5 dB to account for height effects.
6) For frequencies below 30 MHz, an active or passive magnetic loop is used. The magnetic loop antenna should be at 1 meter height with its plane oriented vertically and the emission maximized by rotating the antenna 180 degrees about its vertical axis. When using active magnetic loops, care should be taken to prevent ambient signals from overloading the spectrum analyzer or antenna preamplifier.
7) The six highest radiated emissions relative to the limit and independent of antenna polarization shall be reported as stated in ANSI C63.4-2003, section 10.1.8.2. 8) All operational modes should be tested including all frequency bands of operation, as required by 47 C.F.R. § 15.31(i).

2. Access BPL Measurement Principles a. Test Environment

1) The Equipment Under Test (EUT) includes all BPL electronic devices *e.g.,* couplers, injectors, extractors, repeaters, boosters, concentrators, and electric utility overhead or underground medium voltage lines.
2) *In-situ* testing shall be performed on three typical installations for overhead line(s) and three typical installations for underground line(s).

b. Radiated Emissions Measurement Principles for Overhead Line Installations

1) Measurements should normally be performed at a horizontal separation distance of 10 meters from the overhead line. If necessary, due to ambient emissions, measurements may be performed a distance of 3 meters. Distance corrections are to be made in accordance with Section 15.31(f) of the Rules.

2) Testing shall be performed at distances of 0, ¼, ½, ¾, and 1 wavelength down the line from the BPL injection point on the power line. Wavelength spacing is based on the mid-band frequency used by the EUT. In addition, if the mid-band frequency exceeds the lowest frequency injected onto the power line by more than a factor of two, testing shall be extended in steps of ½ wavelength of the mid-band frequency until the distance equals or exceeds ½ wavelength of the lowest frequency injected. (For example, if the device injects frequencies from 3 to 27 MHz, the wavelength corresponding to the mid-band frequency of 15 MHz is 20 meters, and wavelength corresponding to the lowest injected frequency is 100 meters. Measurements are to be performed at 0, 5, 10, 15, and 20 meters down line—corresponding to zero to one wavelength at the mid-band frequency. Because the mid-band frequency exceeds the minimum frequency by more than a factor of two, additional measurements are required at 10-meter intervals until the distance down-line from the injection point equals or exceeds ½ of 100 meters. Thus, additional measurement points are required at 30, 40, and 50 meters down line from the injection point.)

3) Testing shall be repeated for each Access BPL component (injector, extractor, repeater, booster, concentrator, etc.)

4) The distance correction for the overhead-line measurements shall be based on the slant range distance, which is the line-of-sight distance from the measurement antenna to the overhead line. Slant range distance corrections are to be made in accordance with Section 15.31(f) of the Rules. (For example, if the measurement is made at a horizontal distance of 10 meters with an antenna height of 1 meter and the height of the BPL-driven power line is 11 meters, the slant range distance is 14.1 meters [10 meters vertical distance and 10 meters horizontal distance]. At frequencies below 30 MHz, the measurements are extrapolated to the required 30-meter reference distance by subtracting 40 log(30/14.1), or 13.1 dB from the measured values. For frequencies above 30 MHz, the correction uses a 20 log factor and the reference distance is as specified in section 15.109 of the rules.) Note: In cases where Access BPL devices are coupled to low-voltage power lines (*i.e.*, Home-Plug or modem boosters), apply the overhead-line procedures as stated above along the low-voltage lines.

c. Radiated Emissions Measurement Principles for Underground Line Installations

1) Underground line installations are those in which the BPL device is mounted in, or attached to, a pad mounted transformer housing or a ground-mounted junction box and couples directly only to underground cables.

2) Measurements should normally be performed at a separation distance of 10 meters from the in-ground power transformer that contains the BPL device(s). If necessary, due to ambient emissions, measurements may be performed a distance of 3 meters. Distance corrections are to be made in accordance with Section 15.31(f) of the Rules.

3) Measurements shall be made at positions around the perimeter of the in-ground power transformer where the maximum emissions occur. ANSI C63.4-2003, section 8.1, specifies a minimum of 16 radial angles surrounding the EUT (In-ground transformer that contains the BPL device(s)). If directional radiation patterns are suspected, additional azimuth angles shall be examined.

d. Conducted Emissions Measurement Principles

1) Conducted emissions testing is not required for Access BPL.

3. In-House BPL and Carrier Current Systems Measurement Principles

1) In-House BPL devices are typically composite devices consisting of two equipment classes (Carrier current system and personal computer peripheral (Class B)). While carrier current systems require Verification, personal computer peripherals require Declaration of Conformity (DoC) or Certification, as specified in Section 15.101 of the Rules. Appropriate tests to determine compliance with these requirements shall be performed.

2) *In-situ* testing is required for testing of the carrier current system functions of the In-House BPL device.

3) If applicable, the device shall also be tested in a laboratory environment, as a computer peripheral, for both radiated and conducted emissions tests per the measurement procedures in C63.4-2003.

a. Test Environment and Radiated Emissions Measurement Principles for *In-Situ* Testing

1) The Equipment under Test (EUT) includes In-House BPL modems used to transmit and receive carrier BPL signals on low-voltage lines, associated computer interface devices, building wiring, and overhead or underground lines that connect to the electric utilities.

2) *In-situ* testing shall be performed with the EUT installed in a building on an outside wall on the ground floor or first floor. Testing shall be performed on three typical installations. The three installations shall include a combination of buildings with overhead-line(s) and underground line(s). The buildings shall not have aluminum or other metal siding, or shielded wiring (e.g.: wiring installed through conduit, or BX electric cable).

3) Measurements shall be made at positions around the building perimeter where the maximum emissions occur. ANSI C63.4-2003, section 8.1, specifies a minimum of 16 radial angles surrounding the EUT (building perimeter). If directional radiation patterns are suspected, additional azimuth angles shall be examined. 4) Measurements should normally be performed at a separation distance of 10 meters from the building perimeter. If necessary, due to ambient emissions, measurements may be performed a distance of 3 meters. Distance corrections are to be made in accordance with Section 15.31(f) of the Rules.

b. Additional Measurement Principles for *In-Situ* Testing With Overhead Lines

1) In addition to testing radials around the building, testing shall be performed at three positions along the overhead line connecting to the building (*i.e.* the service wire). It is recommended that these measurements be performed starting at a distance 10 meters down the line from the connection to the building. If this test cannot be performed due to insufficient length of the service wire, a statement explaining the situation and test configuration shall be included in the technical report.

2) Measurements should normally be performed at a horizontal separation distance of 10 meters from the overhead line connecting to the building. If necessary, due to ambient emissions, measurements may be performed a distance of 3 meters. Distance corrections are to be made in accordance with Section 15.31(f) of the Rules using the slant range distance (see paragraph 2.b.4, above).

3) The distance correction for the overhead-line measurements shall be based on the slant range distance, which is the line-of-sight distance from the measurement antenna to the overhead line. Slant range distance corrections are to be made in accordance with Section 15.31(f) of the Rules.

c. Measurement Principles for Testing as a Computer Peripheral
1) The data rate shall be set at the maximum rate used by the EUT. Test modes or test software may be used to simulate data traffic.
2) For In-House BPL devices operating as unintentional radiators below 30 MHz, the conducted emissions shall be measured in the 535 – 1705 kHz band as specified in Section 15.107(c). For In- House BPL devices operating as unintentional radiators above 30 MHz, the conducted emissions shall be measured as specified in Section 15.107(a). Conducted emissions measurements shall be performed in accordance with ANSI C63.4-2003 (Section 7 and Annex E).
3) For In-House BPL devices operating as unintentional radiators either below 30 MHz or above 30 MHz, the radiated emissions limits of Section 15.109(a) apply. The radiated emissions from the computer peripheral shall be measured at an Open Area Test Site (OATS) in accordance with the measurement procedures in C63.4-2003 (Section 8 and Annex D)

4. Certification Technical Report Requirements for Access PBL Devices
1) Certification applications shall be accompanied by a technical report in accordance with Section 2.1033 of the Rules. Each device used in an Access BPL system requires its own Certification.2) For Access BPL devices, the statement describing how each device operates shall include the following information: modulation type, number of carriers, carrier spacing, channel bandwidth, notch capability/control, power settings/control, and range of signal injection duty factors.3) For Access BPL devices, the measurement report shall include representative emissions spectrum plot(s) of the reported data.

5. Responsibility of BPL operator
It is recommended that a BPL operator perform initial installation and periodic testing of Access BPL systems on his power lines. These tests shall be performed to ensure that the system in conjunction with the installation site complies with the appropriate emission limits using the measurement procedures outlined in Section 3 of this document. The BPL operator should use typical installation sites within his service area as outlined in section 2(a) of this document. Selection of typical sites shall be made according to the characteristics of the installation as a whole. The BPL operator is not required to submit the test results. In the instance that the Access BPL system was tested on the operator's network for certification purposes, the initial installation tests do not need to be repeated. However, periodic testing of installed Access BPL systems is recommended to ensure that the system maintains compliance with Part 15 emission limits.

Appendix B: Block Diagram

Block Diagram removed from final copy of test plan.
See FCC filing documentation for more detailed information.