

## Table of Content

<b>ABSTRACT</b>	<b>I</b>
<b>EXECUTIVE SUMMARY - BPL 2006</b>	<b>III</b>
<b>1.0 Introduction</b>	<b>1</b>
1.1 Project Objectives	1
1.2 Methodology	1
1.3 Study Structure	2
<b>2.0 BPL Progress to 2006</b>	<b>3</b>
2.1 BPL Technology	3
2.1.1 Background & History of BPL	3
2.1.2 BPL Technology Overview	4
2.1.2.1 Access BPL Architectures (US & Europe)	5
2.1.2.2 Access BPL: Technology Configurations	6
2.1.2.3 Home Networking & In-Building BPL	7
2.1.3 Access BPL Technology	11
2.1.4 Generations of Chip Sets	13
2.1.5 BPL Vendors	13
2.1.6 Competitive Technologies (Access BPL)	14
2.1.6.1 Cable Modem Distribution Systems	15
2.1.6.2 Asymmetric Digital Subscriber Line (ADSL)	18
2.1.6.3 WiMAX	19
2.1.6.4 Competitive Communication Technologies (Internal Services)	21
2.1.7 BPL Technology Trends	23
2.2 Standards	29
2.2.1 Standards Overview	29
2.2.2 IEEE 1901 BPL System Standard	32
2.2.3 IEEE 1675 MV Line Installation and Hardware	33
2.2.4 IEEE 1775 EMC Compatibility	34
2.2.5 European and International Initiatives	35
2.2.6 Industry Consortia	38
2.2.6.1 HomePlug	38
2.2.6.1.1 AV	38
2.2.6.1.2 Access	39
2.2.6.1.3 Command & Control	40
2.2.6.2 Universal Powerline Alliance	40
2.2.6.2.1 Specifications	40
2.2.6.3 Consumer Electronic Powerline Alliance	41
2.2.6.3.1 Specification	41
2.3 Regulation	42
2.3.1 Regulation Overview	42
2.3.2 FCC Part 15 BPL Rules	42
2.3.3 Federal Regulation of BPL Broadband Services	44
2.3.4 Texas Legislation & California Rulemaking	45
2.3.5 Other States Initiatives	46
2.3.6 Canadian Status	46

2.4	Deployments	46
2.4.1	Deployment Overview	46
2.4.2	Investor-Owned U.S. Utility Deployments	47
2.4.3	Cooperatives and Municipal Deployments	49
2.5	BPL Utility Services	50
2.5.1	Applications	50
2.5.2	Business Models	52
2.5.3	Grid Automation/Intelligent Grid/Smart Grid – Trends	53
2.6	Commercial Internet Services	54
2.6.1	Applications	54
2.6.2	Business Models	55
<b>3.0</b>	<b>BPL Outstanding Issues</b>	<b>59</b>
3.1	Equipment Standards	59
3.1.1	Current Status	59
3.1.2	Issues Outstanding and Estimated Resolution	59
3.2	Regulatory Issues	60
3.2.1	Current Status	60
3.2.2	Outstanding Issues	60
3.2.2.1	Pending BPL Proceedings at the FCC	61
3.2.2.2	States with Pending BPL Proceedings	62
3.2.2.3	Pole Attachments	62
3.3	Network Security	63
3.4	Interference (ARRL)	68
3.4.1	FCC Position	68
3.4.2	Current Status	68
3.4.3	Technology Solutions	69
3.4.4	Estimated Resolution	69
3.5	Valuation of the Benefits of Standalone Internal Services	70
3.5.1	Current Status (Needs Access BPL to make case)	70
3.5.2	Outline Program that would Value Standalone Internal Services	70
<b>4.0</b>	<b>BPL Opportunities</b>	<b>73</b>
4.1	Access BPL Broadband Services	73
4.1.1	Access BPL Opportunities	73
4.1.2	Rural Broadband	74
4.2	In-Building BPL	75
4.3	Internal Utility Services	76
4.3.1	Large Scale Smart Metering Projects	76
4.3.1.1	Canadian Projects (Ontario & Manitoba)	76
4.3.1.2	U.S. Projects (CentrePoint   PEPCO   TXU)	78
4.3.2	Large Grid Automation Projects	80
4.3.2.1	EPRI Intelligent Grid	80
4.3.2.2	Hydro Quebec Grid Automation	82
<b>5.0</b>	<b>Conclusions &amp; Recommendations</b>	<b>85</b>
5.1	Conclusions	85
5.2	Recommendations	86