Smart Grid

An Explanation For The Layman

or

How Smart Grid Will Affect Your Life

This document is pseudo-technical in presentation. It attempts to convey the intended purpose of the Smart Grid Initiative's pros and cons using an understandable and comprehensible language and style.

As with all technical documents, each subject is numbered as main topic and sub-topic line items for easy reference and corroboration.

Each section contains a number of URL links to Internet articles that explain in greater detail each line item's specific subject. These are mainly links to Wikipedia articles and are meant simply to provide further insight.

There is also a reference listing of each line item's subject at the end of the document proper. This reference listing provides links to further, in-depth information.

Part 1: What is Smart Grid anyway?

1.1 The term Smart Grid refers to a global, all-encompassing communications system infrastructure being surreptitiously and secretly installed right now on the electrical power transmission and distribution grid. As a result of this technology the cost of your electricity will increase by a factor of 6. Your metering charges will increase by a factor of 10. You will have "snoopware" installed on all of your appliances talking to an indoor meter that you will pay $1300 for. You will have microwave streams emitting from all of your electrical outlets 24/7. "They" know what's best for you and decided that you did not need to be informed of all this.

1.1.1 *"A **smart grid** is a digitally enabled electrical grid that gathers, distributes, and acts on information about the behavior of all participants (suppliers and consumers) in order to improve the efficiency, importance, reliability, economics, and sustainability of electricity services.*

http://en.wikipedia.org/wiki/Smart_grid

Smart grid policy is organized in Europe as Smart Grid European Technology Platform. Policy in the United States is described in 42 U.S.C ch. 152 subch. IX § 17381"

42 U.S.C. ch.152 subch.IX

1.1.2 The present state of Smart Grid installation in the USA can be found by following the URL link.

http://www.sgiclearinghouse.org/

1.1.3 The spectrum scans and data evidence that are included in this document are taken from spectrum analysis scans in several cities in several States in the USA, Denmark, Australia, Canada, and the United Kingdom. Some of these spectrum analysis scans are as shown, with first-hand accounts, in Exhibit 23.

1.1.4 The spectrum scans and data evidence that are included in this document can be reproduced and verified anywhere and everywhere on Earth where BPL is operational.

1.1.5 The spectrum scans and data evidence in this document were produced over the period July, 2011 through February, 2012. Total number of different computers used was eleven (11); each computer ran Windows 7 and as such had CPU speeds in excess of 4GHz and 2GB of RAM minimum. Three (3) highly-sophisticated Fast Fourier Transform-based spectrum analysis software suites were utilized, arbitrarily chosen by the author at the time of testing. Cloud computing technology was utilized throughout this investigatory process. Less than 20 years ago the amount of computing and data processing power and capabilities used to complete this global effort would have filled the entire volume of an auditorium with no room remaining in the aisles.

Part 2: So how does it affect me?

2.0 BPL Explained

2.1 This document explains the origin of a global phenomenon known as “The Hum” in terms that can be understood by a non-technical individual. It examines and explains the Smart Grid backbone communications system; Broadband over Power Lines (BPL); its impact on the individual person from a physiological perspective. That is, the effects of BPL-derived emissions on a person’s physical and mental state.

The electrical power industry has, for more than 40 years, attempted to increase the overall throughput or transfer speeds of data signals on the overhead power lines. In the 1970’s it was Bristol, England that was the focus of attention regarding the ominous “Hum”, it is a classic example: Then followed Taos, New Mexico; Kokomo, Michigan; and a slew of other locations worldwide. Every one of these projects was ultimately terminated as the emissions were unpredictable and widespread. The equipment was de-energized, and removed; the emissions disappeared and the “Mysterious Worldwide Hum” remained mysterious. One of the latest cases is Windsor, Ontario, just across the Rouge River from Detroit, Michigan. Their emissions and noise were blamed on railroad cars on Zug Island which have been in operation for over 100 years. Between Zug Island and Windsor is a large Smart Grid/BPL control center.

This time around, on a global scale, it appears that the copious amounts of money that can and are being made from BPL/B-PLC implementation is worth the risk of massive damage to populations (human and otherwise), the food chain, and entire ecosystems worldwide.

BPL is sometimes referred to as Broadband Power Line Communication (B-PLC), or its USA FCC (Federal Communications Commission) roll-out moniker: Access BPL.

http://en.wikipedia.org/wiki/Broadband_over_Power_Lines

2.1.2 Since 2006 reported incidences have been steadily growing worldwide of a persistent, unstoppable, diesel engine-type noise suddenly appearing in people’s lives. Reports from individuals around the world indicate that, at times, these emissions appear to be sufficiently powerful to shake the ground.

2.1.3 To add to these individual's distress this noise appears to be coming from everywhere at once 24/7 with no particular direction of origin, always louder indoors. Exhaustion and many other symptoms follow seemingly endless sleepless nights.

2.1.4 The second factor causing anguish is that individuals hearing this noise find that they seem to be alone with their problem. Everyone that they ask cannot hear it.

2.1.5 Many of these people, in their frustration, contact government agencies and are told that they probably have Tinnitus and should see a medical doctor. A visit to an MD usually does not diagnose Tinnitus

2.1.6 This noise ranges in volume from a background hum through to a running truck outside your window. Many people also report symptoms of abdominal and/or chest pain accompanying this noise's presence. There are those that also suffer from severe emotional distress manifesting itself as trepidation, revulsion, nervousness, and dread, among others. People around the globe tell of suddenly feeling exhausted when exposed to these emissions.

2.1.7 There is a correlation between sub-items 2.1.2 and 2.1.6 and human reaction to infrasound:

"Infrasonic 17 Hz tone experiment

On May 31, 2003, a team of UK researchers held a mass experiment where they exposed some 700 people to music laced with soft 17 Hz sine waves played at a level described as "near the edge of hearing", produced by an extra-long-stroke subwoofer mounted two-thirds of the way from the end of a seven-meter-long plastic sewer pipe. The experimental concert (entitled Infrasonic) took place in the Purcell Room over the course of two performances, each consisting of four musical pieces. Two of the pieces in each concert had 17 Hz tones played underneath. In the second concert, the pieces that were to carry a 17 Hz undertone were swapped so that test results would not focus on any specific musical piece. The participants were not told which pieces included the low-level 17 Hz near-infrasonic tone. The presence of the tone resulted in a significant number (22%) of respondents reporting anxiety, uneasiness, extreme sorrow, nervous feelings of revulsion or fear, chills down the spine and feelings of pressure on the chest. In presenting the evidence to the British Association for the Advancement of Science, Professor Richard Wiseman said, "These results suggest that low frequency sound can cause people to have unusual experiences even though they cannot consciously detect infrasound."

http://en.wikipedia.org/wiki/Infrasound#Human_reactions_to_infrasound

Nowadays tech-savvy teenage pranksters know that if they use a readily-available freeware signal generator (i.e. SigJenny), playing a low-frequency (LF) sine wave centered on 17Hz through a sub-woofer, they can "trick" their friends and parents into feeling frightened and "freaked out". Dependent on the volume of the speaker, these teens observe dramatic increases in people's reactions even though virtually no one can actually hear the "noise".

With Smart Grid BPL-generated LF, Power Companies are "freaking out" entire populations.

2.1.8 Occurrences of this hum noise from individuals and small geo-physically localized groups have become relatively common during the last 2 years worldwide, particularly in the USA and Canada. Those that have been investigated on an individual basis are not correlated to other similar occurrences. All cases have been given a different reason for the causation or no explanation at all.

2.1.9 In the following text a full explanation is given. Irrefutable documented proof and data, in labeled sections, can be downloaded as Exhibits from the author's Cloud address:

Due to the sensitivity of content, Cloud database access will be supplied on an individual "as required and necessary" basis. Contact the originator of this document for access or email your access request to: smartgridexhibits@live.com

Part 3: So what's happening here?

(Sorry about this, but we need to get technical for a couple of paragraphs)

3.0 Overview

3.1 Smart Grid technology is based on digital communication using the electrical power transmission line grid as the backbone communication system. Utilities have been, for decades, communicating with their equipment that is attached to the grid at very-slow data transmission rates when compared to the transmission speeds that computers are capable of communicating today. The successful implementation of the entire Smart Grid initiative meant that the speed of the data transmission through/over the electricity transmission line grid had to increase by many orders of magnitude – It needed to operate hundreds of millions of times faster than it was/is presently operating.

3.1.1 ***"Broadband over power lines*** *(BPL) is a method of power line communication that allows relatively high speed digital data transmission over the public electric power distribution wiring. BPL uses different technologies from other forms of power-line communications to provide high-rate communication over long distances. BPL uses parts of the radio spectrum allocated to other over-the-air communication services. Interference to, and from, these services is a limiting factor in the introduction of BPL systems.*

While some have been in widespread use for a decade, integrated circuits implementing one standard were introduced in May 2011."

http://en.wikipedia.org/wiki/Broadband_over_Power_Lines

3.2 The present deployment of Broadband over Power Lines (BPL), also termed Broadband Power Line Communications (B-PLC) or Access BPL is based on a form of **Frequency-Shift Keying (FSK).**

http://en.wikipedia.org/wiki/Frequency-shift_keying

3.2.1 The particular type of FSK used in this BPL/B-PLC deployment is termed **Digitally-Encoded Phase-Shift Keying.**

http://www.broadbandindiamagazine.com/2010/01/the-common-digital-modulation-techniques-phase-shift-keying

3.2.2 Access BPL appears from research to use at least 10-bits to generate a digitally-encoded phase-shift keying signal utilizing the frequencies of 11.719Hz through 23988Hz in 11.719Hz increments; 10-bits provide 2048 separate and overlaid frequency “dots”. By adding a single bit this frequency “dot” count doubles to 4096, in this BPL mode the “dot” frequency “start point” is 5.8594Hz, increasing to 23988Hz in increments of that frequency. The signal waveform shown in Figure 1 is produced.

3.2.3 Using the algorithm that generated the waveform in Figure 1 and extending the bit count by just 4 bits to 16 bits, an additional 61,440 frequency “dots” would be generated. This would make this waveform persistently capable of passing through any and all inductive and capacitive element utilized on the electricity transmission grid.

3.2.4 The harmonics, interharmonics and consequent subharmonics generated increase linearly with each increase in this waveform’s frequency “dot” overlay. The subharmonics, for instance, would all appear in the <50Hz range, overlay one another, and be very powerful indeed.

3.3 Access-BPL is based on 40MHz transmission of the signal in 3.2.2. In practice transmission speeds of 40MHz are not realized due to actual physical properties of the power lines and signal reflection, loss, and attenuation (scattering). More often than not 30MHz is BPL’s real transmission speed.

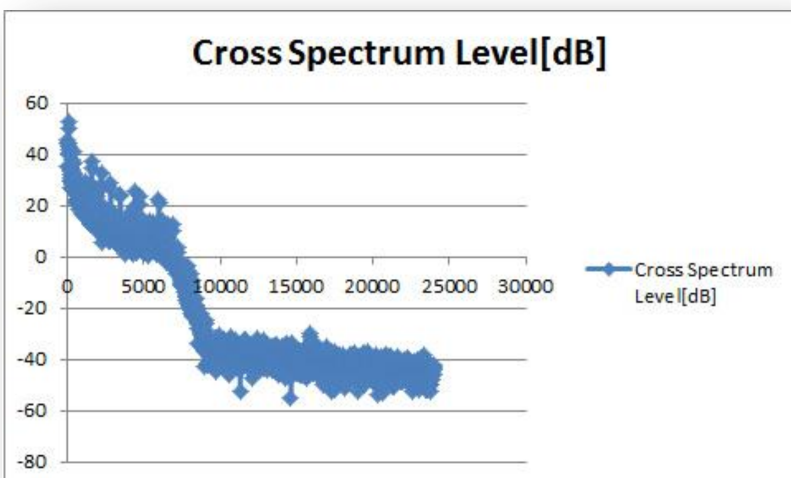


Figure 1: X-Y Plot of BPL Signal Frequencies

3.3.1 Fact: Generally BPL and DSL-labeled power line derived Internet access is offered by BPL ISP's at 500kbs (kilobits/sec). Rule of thumb – Actual data speeds are the transmission speed divided by 60.

3.4 There are 2 main applications, or methods, that are used to get this signal to where it needs to be. Generally speaking the choice of method used is based on population density in a given area.

3.4.1 Let's say that for each installation of BPL requires a paying customer base of 100 for it to be economically viable. Let's assume that 1% of a population in a BPL installation area signs up for Internet access. Given that math, there would need to be 10,000 homes/businesses within a BPL transmission area.

3.4.2 In a city suburb where there are thousands of potential customers in a relatively small area with overhead power lines following the roadways, the above figure is easily achievable. In this case the signal is "injected" into the overhead power lines at the local substation.

3.4.3 In a rural area where 10,000 potential customers are scattered over, perhaps, 100's of square miles the method used is hybrid wireless/wired. A purpose-built mast with purpose-built transmitter dishes, usually in an existing cell-phone tower/mast installation, sends the BPL signal to wireless receivers (network gateways) which are mounted on power line poles or existing buildings. These wireless receivers are wire connected to the nearest power line.

The size (power) of the transmission dishes depends on the distance that the signal has to cover to reach the required number of potential customers. Many of these installations can be seen on top of a hill with up to 10 double-transmitter dish masts arranged in circular fashion. The transmitter dishes are black, inside-out dishes – Boob Dishes. If you are one of those people unlucky enough to be able to hear these transmissions, you can hear these Boob Dishes from 10 miles away.

3.5 **So the Access BPL signal is in the power line, how does it get into my house?**

It's called "The Last Mile". There are demodulator boxes that reverse the procedure explained in 3.4.3. A connection is made onto the power line local to an Access BPL customer's property and taken into a demodulator box. You've seen them on power line poles and ignored them as just another "something on the pole". In the States they are generally beige 15 inch cubes with red and green lights on their right side. The electronics inside these boxes wirelessly transmit 956MHz Access BPL signals, using a protocol (language) called ZigBee, to a receiver box on/in your home that is connected to your electrical wiring.

"To solve the problem of providing enhanced services over the last mile, some firms have been mixing networks for decades. One example is Fixed Wireless Access, where a wireless network is used instead of wires to connect a stationary terminal to the wireline network. Various solutions are being developed which are seen as an alternative to the "last mile" of standard incumbent local exchange carriers: these include WiMAX and BPL (Broadband over Power Line) applications."

http://en.wikipedia.org/wiki/Last_mile

Part 4: Internet access? Is that it?

4.0 The Whole Story

4.1 You guessed it. There is more to this “thing” than just Internet access. Access BPL is small change; a “something” to partly and temporarily fund the on-going Smart Grid effort. Here we take a look at all of the aspects of Smart Grid application.

4.1.1 **Automatic Meter Reading (AMR):** You may have heard of “smart” meters. Their mandatory installation is causing entire communities to take out lawsuits against their respective Power Companies. But that’s all the attention it’s getting, local complaints regarding a global, and in the USA, nationwide, matter. Why aren’t national newspapers and TV stations taking up the issue? More importantly, why is it that government agencies appear to be ignoring the probable health concerns entirely?

The reason is because the present “smart” meters serve as a diversion from the real issues - More on that later.

The present digital meters that people are discovering on their homes are a “test run” for the real thing. They are cheap $3 pieces of junk, made in China, and not tested to meet any standards specifications; as such these meters frequently overheat and burst into flames. These digital meters are arranged along a BPL-carrying power line in “test” configuration. A few thousand installed at designed intervals along, perhaps, a two hundred mile stretch of power line. You may have heard that electrical utility companies are experiencing problems getting these, meshWiFi configured; “smart” meters to work as they should - All part of the overall Smart Grid plan.

The real “Smart Meters” are on their way, and, as the BTO song goes, “You Ain’t Seen Nothin’ Yet.”

*“**Automatic meter reading**, or **AMR**, is the technology of automatically collecting consumption, diagnostic, and status data from water metering or energy metering devices (gas, electric) and transferring that data to a central database for billing, troubleshooting, and analyzing. This technology mainly saves utility providers the expense of periodic trips to each physical location to read a meter.”*

http://en.wikipedia.org/wiki/Automatic_meter_reading

4.1.2 **“Smart” technology in “smart” appliances:** Now we’re getting down to it. Remember when Records disappeared from music stores overnight and Compact Cassette Tapes took their place? (BTW – You’re old if you do!) Remember when cassette tapes disappeared in the same fashion and music CD’s took their place? VHS tapes to DVD’s?

The next big disappearance items are “dumb” appliances.

Your fridge wants to start up – It asks the living-area, wall-mounted “Smart Meter” if it can turn on now or wait 5 minutes and get electricity 0.02 cents per Kilowatt/Hour cheaper. The “smart” meter checks with the Power Company computers and is told to wait. Turns out this saves you 2/10 of one cent.

You decide to get a new fridge. You are surprised to discover that the price has tripled since you last looked. The store assistant informs you that your new fridge is “Smart

Appliance" equipped. A 2 cent silicon chip added to the circuitry that also adds $1200 to the price tag. Does this sound dumb to you? Not if you're an appliance manufacturer it doesn't. Think this is pie-in-the-sky? Take a look at this URL:

http://www.bbc.co.uk/news/technology-17345934

4.1.3 If you scrolled through the Smart Grid Wikipedia article you'll know that:

"Smart energy demand describes the energy user component of the smart grid. It goes beyond and means much more than even energy efficiency and demand response combined. Smart energy demand is what delivers the majority of smart meter and smart grid benefits.

Smart energy demand is a broad concept. It includes any energy-user actions to:

- *Enhancement of reliability*
- *reduce peak demand*
- *shift usage to off-peak hours*
- *lower total energy consumption*
- *actively manage electric vehicle charging*
- *actively manage other usage to respond to solar, wind, and other renewable resources*
- *buy more efficient appliances and equipment over time based on a better understanding of how energy is used by each appliance or item of equipment.*

All of these actions minimize adverse impacts on electricity grids and maximize utility and, as a result, consumer savings. Smart Energy Demand mechanisms and tactics include:

- *smart meters*
- *dynamic pricing*
- *smart thermostats and smart appliances*
- *automated control of equipment*
- *real-time and next day energy information feedback to electricity users*
- *usage by appliance data*
- *scheduling and control of loads such as electric vehicle chargers, home area networks (HANs), and others."*

Now, if you scrutinize each point you will immediately notice that all are pretty flimsy excuses for spending a couple of Trillion dollars in the USA alone on untried and untested equipment on an old and dilapidated machine (the electricity transmission and distribution grid).

There is no real return on Smart Grid. At the end of the day it will be the consumer that foots the bill – As usual.

This entire Smart Grid installation is about nothing more than money in the pockets of "them" – The major corporations. This will occur while the rest of us have to deal with the fallout of this poorly engineered and deadly experimental monstrosity.

Ultimately, Smart Grid and its BPL backbone communication system will get shut down and the equipment removed. Meanwhile it is killing people and animals around the globe; ruining millions of lives, and devastating ecosystems. But "they" will get to keep the money.

Part 5: So what are these emissions?

5.0 BPL-Derived Emissions Explained

Power lines and their associated distribution equipment (substations, etc.) were designed to deliver Alternating Current (AC) electricity from the generating station to the end user. They were first installed during the 1930's under the Electricity Act in many countries. Much of the original equipment is still in use; most (85%) is at least 60 years old. All electrical power distribution and transmission equipment consists of non-insulated, bare metal conductors.

Signal and/or communication transmission cables are purpose built, insulated, dielectric-shielded, and grounded twisted-pair cables. They may be single pair or multi-pair (i.e. 19 pairs in one overall insulated cable is common).

Twisted pair: This is intended to stop cross-talk between the wires of each signal-carrying pair.

Grounded: This is a single, uninsulated wire that is twisted around and along each signal twisted pair. Its purpose is to drain any cross-talk signal that is generated. It is connected at one end only, usually to the ground point (chassis) on the master device.

Dielectric Shield: This is an aluminium or Mylar/aluminium hybrid material and covers each signal pair along its length. It has 2 purposes in Transverse Magnetic (TM) Mode – The transfer mode of all data signals. This shield stops the data leaking/radiating away from the signal cable. It also functions as a "get back in there" medium to return "escaped" signal energy back to where it came from.

Insulated: Each wire of each twisted pair is insulated. There is an overall insulating sheath. This stops shorting between each wire and on anything metal the cable may touch.

Most data cables also include a **ferrite core** near the "receiver" end of the cable. This serves 2 purposes: To stop errant and unintended RF signals and to "catch" and dissipate signal energy reflections due to impedance mismatch.

Purpose-built data transmission/signal carrying cables are designed to stop any leakage of signal energy that may occur. Bare metal, electricity transmission and distribution cables and equipment were not intended or designed to carry data transmissions/signal energy. Doing so results in large signal energy leakage (emissions) and other unwanted, but apparently collaterally acceptable, occurrences.

To cut a long story short; AC electricity is magnet generated and is comprised of electrons that are forced to move along the conductive elements of the electricity grid (overhead cables, transformer substations, etc.). These AC electron "clumps" travel along the outside of the conductor in sine wave configuration at (theoretically) the speed of light in a vacuum – 186,000 miles per second. Therefore, at 60Hz a single AC sine wave on the power line is just over 3083 miles long and would travel around the Earth 8 times in one second. Taking this a step further, if you wired a light bulb in San Francisco to a switch in Manhattan (2582 miles); flick the switch in NY for light in CA around 8 milliseconds (8/1000sec) later.

http://en.wikipedia.org/wiki/Speed_of_light

The above paragraph was simply to demonstrate what we are dealing with. Everything that we discuss from here on in is occurring at the speed of light. The only exceptions to that statement are audible sonic waves, which occur as a direct result of energy releases/emissions from electricity grid equipment.

Sonic, or sound, wave energy pushes air in the atmosphere, increasing the pressure slightly where this energy release is taking place. These pressure waves travel at the speed of sound; in dry air at 68°F (20°C), the speed of sound is 768mph (1,236km/hr); Air pressure reaches your ears and vibrates your eardrums, causing you to hear a sound associated with the frequency of the sonic/sound waves.

http://en.wikipedia.org/wiki/Speed_of_sound

The air pressure changes caused by energy releases can be measured; is termed Sound Pressure Level (SPL), and is measured in units called Decibels (dB). The loudness (volume) of a sound is "weighted" to give a closer association to human hearing capabilities. There are only 2 weighting factors used nowadays, the "A" and "C" weighting factors. A-weighting is generally used for the "normal" range of hearing. C-weighting is used for the low-end of hearing-range frequency spectrum, the deep-bass frequencies. Hearing response in the C-range is flat, that is, over the C-range of frequencies the sound that you would hear stays the same even though the frequency changes. It is for this very reason that BPL emissions "noise" appears to be the same worldwide – A running diesel engine.

Decibels are a measurement unit of energy, a given decibel measurement sample can therefore be mathematically calculated back to the amount of energy that was required to make the decibel measurement sample in question.

dBm is power relative to 1mW (milliwatt)   1 Watt or 30 dBm. 10*log(1/0.001)

Therefore: 100W = 20dB = 50dBm   10W = 10 dB = 40dBm   4W = 6dB = 36dBm

The decibel scale is logarithmic; for a 3dB increase energy/power would need to double. For every 10dB increase, power has to be increased by a factor of 10. By the same token; when a communications signal is said to have reached its -3dB point it has lost half of its original transmission power.

For a dB-Power crash course: http://www.sengpielaudio.com/dB-chart.htm

Figure 2 shows a Power Spectrum Scan taken on January 11, 2012 in the USA. We will be referring to its content throughout this section. This scan is typical of power spectrum scans wherever BPL is installed and operational worldwide. This 60Hz mains scan shows dB level, and is measured using Fast Fourier Transform techniques over the officially recognized 10 second period at a sampling rate of 44,100Hz. What this means is that the graph shows the average dB levels of a set of 441,000 samples across the power spectrum during an arbitrarily chosen 10 second time period. The base line of the plot is 10dB, plotted against its relevant frequency in Hertz. With a 50Hz mains supply the mains peak would be at 50Hz and the remaining peaks frequency-shifted left slightly. Notice the peaks, the spikes; they are all in relevant positions compared to the BPL signal waveform in Figure 1.

5.1 There are at least six (6) emissions attributable to BPL/B-PLC:

- 5.1.1 BPL/B-PLC overhead power line signal leakage
- 5.1.2 BPL/B-PLC overhead power line signal reflection audible Standing Waves
- 5.1.3 BPL/B-PLC overhead power line signal audible low-frequency subharmonics
- 5.1.4 High-power BPL/B-PLC signal transmitter dish audible low frequency subharmonics
- 5.1.5 Fast-Switching Capacitor Bank (FSCB) reactance
- 5.1.6 The "Last Mile" BPL signal attenuation

5.1.1 **BPL/B-PLC overhead power line signal leakage:** Electrical Utility Companies have been able to communicate with their Grid equipment via the power lines for decades. This communication was rudimentary and relatively slow; simply a pulse, or set of pulses, to, for instance, a circuit breaker (switch) at a substation. A simple, “Are you there?” pulse along the power line and a, “Yes,” pulse response 3 times a second via a dedicated phone line hooked up to a modem. There is negligible signal loss at this communication speed, which is approximately 300 Baud (bps = bits per second).

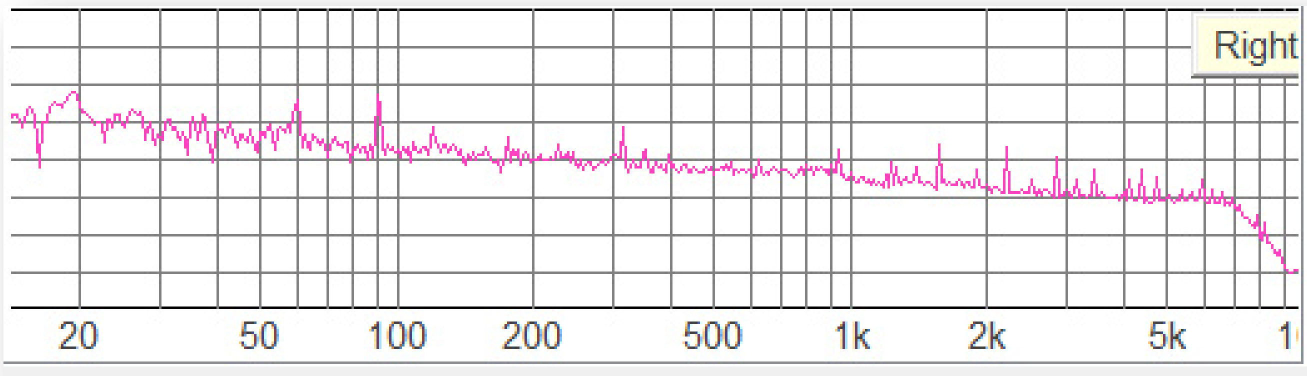


Figure 2: Power Spectrum Scan – BPL power line emissions dB vs. frequency (Hz) plot

The implementation of 40MHz BPL/B-PLC allows for 2-way communication via the power line. No dedicated telephone line is necessary. The “Are you there?” signal cycle repetition is increased to 10 times per second.

There exists, however, many drawbacks when the carrier wave signal reaches and/or exceeds 1MHz. These include losses mainly from signal reflection, but also include losses due to line attenuation, saddle Insulators, splices, tap lines, sag and bends in the overhead cable, and even birds perching on the cables. Each incidence of signal loss is cumulative to those occurring before it.

The above is fully explained in Exhibit 1 – Power Line Carrier Channel & Application Considerations for Transmission Line Relaying. This technical document is available for download here: http://www.pulsartech.com/pulsartech/docs/C045-P0597.pdf

40MHz BPL, or any BPL achieved transmission speed, is well inside of the radio frequency (RF) domain. As such, when radiating away, emitting, from the power lines it is a RF transmission. Taking the highest and lowest peaks in Figure 2 we have 68db at 18Hz and 45dB at 6 KHz; their Mean average is 56.5dB. To convert dB to dBm (milliwatts) the mathematical formula is used: $10\log_{10}(P*(1/0.001)=(nn)dBm$.

Tell-it-like-it-is: Wherever there is an overhead power line with BPL/B-PLC installed and operational an average of 318Watts of energy are constantly emitted at the RF range of

30-40MHz along its length. Generally, at frequencies <48Hz on 60Hz mains power lines these emissions constantly peak between 65dB and 80dB, up to 95dB in many cases (observed). These peaks equate to between a minimum of 2KW through to more than 40KW continuous emissions.

There are no references to the above as you are not supposed to have come to this realization.

The total permitted energy at ground level allowed by law from a cell phone mast is 4 watts.

5.1.2 **BPL/B-PLC overhead power line signal reflection audible Standing Waves:**
Standing waves are a common occurrence in electrical power transmission lines, they occur when the power sine wave hits an area of high impedance (to continuing in the direction it was going) and reflects/bounces back the way it came (because it's the easiest way to go). Traveling in the wrong direction will ultimately lead to a collision with the incoming sine waves. If the sine wave reflects/bounces back with sufficient energy (throw a ball harder and it will bounce higher) it will produce a Walking Standing Wave, a Standing Wave that moves along the power line.

"Special Considerations
When two waves, traveling in opposite directions on a transmission line pass, they create a standing wave.
An improperly terminated line will have a standing wave due to the signal being transmitted out and the reflected wave coming back. The effect of this phenomenon can be detrimental, depending on the length of the line and the relative value of the termination. At the very least, it will create signal attenuation due to the reflection." – Pulsar Technologies Inc., Exhibit 1.

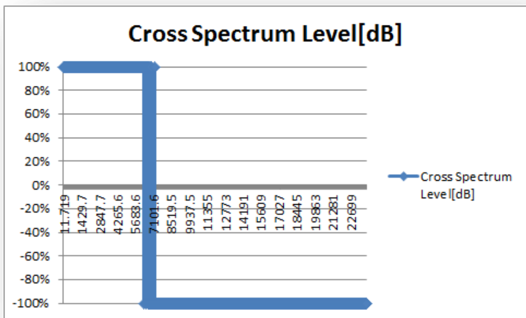
RF emissions due to BPL signal reflection and consequent standing wave attenuation are widespread. Up to 30dB of attenuation is possible according to Exhibit 1.

5.1.3 **BPL/B-PLC overhead power line signal audible low-frequency subharmonics:**
These particular component emissions are caused by the frequency "dot" overlays discussed in 3.2.2. In this example, we assume that the signal "string" comprises of 16 (hexadecimal 10) separate frequency "dots" or pulses in the waveform shape in Figure 1. Being that there are 2048 "dot" pulses this would give a total signal "string" count of 128 one after the other – A very "thick" (wide) signal waveform is produced. Adding just one more bit, 4096 "dots", and there are 256 signal "strings".

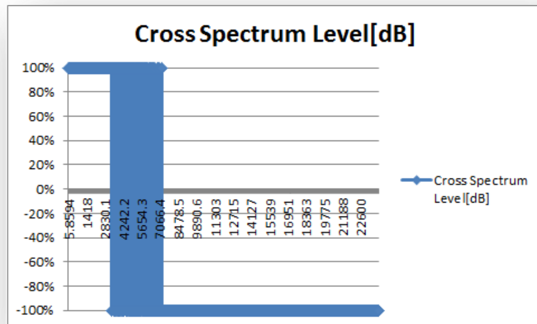
This waveform is a very persistent signal. Even if half of the signal were lost, -3dB point, there would still be sufficient "dots" remaining to reassemble the original waveform at the demodulation point.

Transmitting each waveform in the real-time domain at singly different ANGULAR modulation; 15º, 30º, 45º, 60º, etc. out of phase to the preceding waveform and this waveform is digitally encoded. 15 degrees out of phase = 00, 30 = 10, 45 = 01, 60 = 11, etc. You can set up a whole slew of signal "types" doing this, right up to video streams – IF YOU CAN GET IT TO GO FAST ENOUGH. That's the key – SPEED.

But what happens when these frequencies are introduced into the power lines? The signal pulses "dots" themselves are interharmonics. An interharmonic will generate a harmonic next to it. Both collide; cancel out the difference in the frequencies EXCEPT the DIFFERENCE in their respective frequencies. This DIFFERENCE is a subharmonic and because all of the "dot" frequencies are divisors/multiples of the original frequency, 11.719Hz, there are seven (7) subharmonics that are all the SAME. 128 or 256 subharmonics overlaid on top of one another at EXACTLY the same time at 7 different LOW FREQUENCIES - 11.719, 17.578, 23.438, 29.297, 35.156, 40.016, and 46.875Hz at 60Hz mains frequency, at 50Hz it's simply an integer division calculation of these frequencies. An already highly persistent waveform subharmonic overlaid on itself 128 or 256 times.



BPL Signal Waveform - 10 bits
2048 pulses, 128 lines @ 16 pulses/line



BPL Signal Waveform – 11 bits
4096 pulses – 256 lines @ 16 pulses/line

Figure 3: BPL Signal Waveforms – Time Domain Inserted

There is one more subharmonic that needs to be taken into consideration: Taking any BPL pulse/"dot" frequency, subtracting it from the nearest possibly occurring harmonic of the mains frequency, then subtracting the nearest of the seven (7) LF subharmonics from the result ALWAYS produces a 1.406Hz subharmonic.

Multiplying 1.406Hz by 60 (seconds) results in a pulse per minute (ppm) count, in this case 84.36. So, there is a massively powerful 2KW to >40KW pulse train occurring at 84.36 pulses per minute wherever BPL/B-PLC is operational in the overhead power lines. Human and other animals' heartbeat rate is between 72 and 90ppm; it is a logically-derived consideration that these extremely powerful subharmonic pulses could well be the causation of Ventricular Fibrillation, a common diagnosis in Sudden Adult Death Syndrome, also referred to as Sudden Arrhythmia Death Syndrome (SADS).

First-hand reports from people around the globe tell of an omnipresent, all-pervading, and consistent-tone "White Noise" wherever BPL is operational. Referring back to the Power Spectrum Scan in Figure 2, there is a massive interharmonic spike present at approximately 91Hz. This spike would generate a subharmonic at 31Hz at 60Hz with 23% more energy than the mean average power of total BPL emissions and is the cause of this "White Noise". There would be a comparable frequency subharmonic at 50Hz mains frequency.

All of the subharmonics between 20 and 50Hz are being generated at comparable power levels, on this particular scan, 60dB or 1 kilowatt. All of these subharmonics are regularly scanned at 80dB ~10^4W (observed) and above, to as high as 95dB ~40KW (observed) and above emissions levels. These power levels are as evidenced in Exhibit 23 and Figures 4 and 5.

Below 20Hz there is a massive, wide spike between 17 and 19Hz, the Infrasonic "Ghost Frequency" as detailed in line item 2.1.7. These frequencies are the largest spikes in the BPL emissions across the spectrum, around 30% above the mean average of the total BPL emissions. These are the frequencies that cause intense emotional and mental reactions in humans, leading to a plethora of physiological derogatory effects. Some of these effects are as listed in line item 2.1.7, there are many more.

The above listed spectrum disruptions break every rule, regulation, and law that exists, particularly as defined in IEEE 519, and as covered in Exhibit 21 documentation.

http://en.wikipedia.org/wiki/Power_quality

There are hundreds of millions of people worldwide that hear these emissions 24/7. Sleep deprivation is the leading cause of mental and physical distress demonstrated in humans. A human being can be questioned regarding his problems as associated with these BPL emissions, an animal cannot. It would take years of medical research to prove that these emissions have and are affecting domestic and wild animal populations.

However, the evidence is there and on a global scale; whole areas virtually devoid of animal wildlife; farm livestock dying in their thousands for no apparent reason. Bird populations disappearing; flocks of birds falling to the ground while in flight. Dogs, in particular, among pet animals and kennels losing the use of their back legs and dying shortly afterwards. All can be correlated to BPL equipment installation and operation.

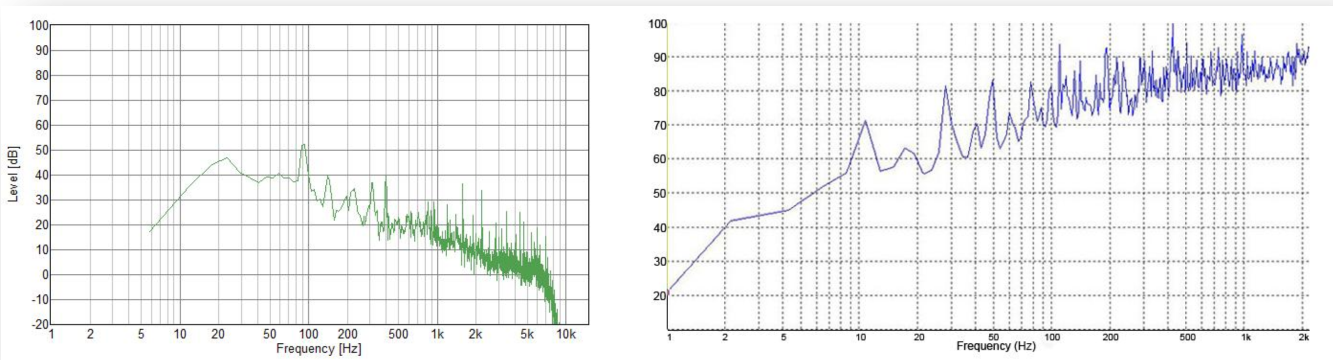
5.1.4 **High-power BPL/B-PLC signal transmitter dish audible low frequency subharmonics:** Should you live in a rural area and your electrical utility decides to install BPL/B-PLC you are very unfortunate indeed. For a BPL installation to be economically viable it has to reach a pre-calculated number of people. In a rural area to reach the same number of people that there are in a square mile of a city suburb an area with a radius of, perhaps, 25 miles would need to be covered by a comparable single BPL installation.

This is achieved, for the most part, wirelessly, utilizing BPL transmitter dish antenna(e) mounted on purpose-built masts. Generally speaking, cell phone masts are not home to BPL transmitter dishes, cell phone mast real estate enclosures, however, are. These transmitter dishes deliver their signals to wireless BPL gateways where the signal is then injected onto the power lines using a BPL/B-PLC Coupler as described in 5.1.3.

The Power Cross Spectrum scans in Figure 4 compare the BPL emission power levels across the low frequency spectrum. The scan on the left shows power line only emissions, whereas the scan on the right shows wireless transmissions adding to the power line emissions. The scan on the right shows the 10dB point at the base line of the scan; scan frequencies of both are similar. Hanning was used on the right, Blackman the left.

In a rural area where transmitter dishes are used to deliver the BPL signal to wireless gateways the resulting power line emissions levels are far higher. The scan on the left tops out at 50dB, the scan on the right tops out at >90dB. Incidences of interharmonics are similar in number, frequency position, and shape.

The reason for this increase is due to the fact that the power lines act as dipoles. The Institute of Electrical and Electronic Engineers (IEEE) describe any straight conductor as an antenna, a dipole. Here the power lines act as receiving antennae for the BPL wireless transmissions and add to the BPL power levels already in the power lines. Thus, more power = more emissions. The scan on the right, taken in Monterey, Massachusetts, shows an emission level of >40KW in the <48Hz spectrum, with massive spikes at 11.719, 17.0, 28.0, and ~40.0Hz.



Power Line Emissions Only **Wireless + Power Line Emissions**

<u>Power Cross Spectrum Scans</u>

Figure 4: BPL Power Line Emissions vs. BPL Wireless Transmissions + Power Line Emissions

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5.1.5 **Fast-Switching Capacitor Bank (FSCB) reactance:** Generally speaking, BPL/B-PLC vendors offer data redundancy. That is, two (2) of the three (3) phases present in the overhead electricity transmission lines are used to transmit the same data, thus guaranteeing data integrity.

i. According to its vendors, BPL/B-PLC is able to be employed on overhead power lines carrying from 7.2 kilovolts (KV) to 138KV. A 3-Phase power line comprises of six (6) cables, three pairs at different heights at the top of the pole. Each pair at the same height carries a single phase or sine wave. Usually, the copper cable is the live, outbound power; the aluminum cable the return or neutral.

ii. Historically, electrical utilities have had no success in reducing Phase Imbalance in more than 50 years. Back at the generating station or directly after the transformer at a tap-line substation the phase balance is near perfect. That is, all three (3) phases are “level” with one another in time as they travel along the power line. But get a couple of miles away from these points and the phases start to get out of synch, the phase sine waves are all at different (angular) places on the power lines.

iii. Having two (2) phase data redundancy is a good idea. But when one phase is leading or lagging the other the data packets arrive at the demodulator at different times. If you wait for both packets to be there before sending data on its way you waste time, you waste bandwidth, which is undesirable.

iv. Fast-Switching Capacitor Banks (FSCB) are used in an attempt to overcome this phase imbalance and lead/lag of data packets. But this equipment introduces problems of its own, and it’s called commutation.

v. FSCB are stand-alone devices, mounted pole-top, they take their power from the power line at the pole where they are mounted. Since the electronics control circuitry both in the box on the pole and in the FSCB itself requires direct current (DC) to operate there is a requirement for a rectifier or rectifiers.

“Since there is a pair of rectifiers (one for positive half cycle of sine wave, one for negative half cycle) for each of the three phases, this is referred to as a six-pulse or six-pole converter. When the control circuitry of the converter turns off one SCR (or thyristor or whatever type of rectifier is used) and turns on the other, there is an overlap period where both devices are turned on. This is because such devices don’t really stop the current flow until the current waveform goes to zero.

Having two devices turned on at once is effectively a short circuit between the phases, which results in a very large current flow for a very short time, until the first device goes off completely. This is the commutation period, and is a synchronous process to the power frequency. As you can picture, these notches occur six times in each power frequency cycle. The “rule” on the resulting harmonic currents is H = n x p +/-1, where “n” is integers 1, 2, 3, etc., and “p” is the number of poles (six, in this case). Hence, the dominate harmonics would be 5, 7, 11, 13, 17, 19, and so on.” - *Richard P. Bingham; Power Quality Engineer and Author: “Why Only Harmonics”: Exhibit 10*

vi. These FSCB units Thyristor switching short circuit commutation also produces Reactance in the 60Hz mains power as shown in Figure 2, as evidenced in Exhibit 12, and as discussed in Exhibit 27. Exhibit 12 shows this reactance to be evident at 58.2705Hz and 63.7354Hz at 60Hz. At 50Hz mains power the reactance frequencies are a simple percentage calculation conversion, the resulting subharmonic frequency would remain the same. This reactance is also evidenced by light flicker or “jitter” in the electrical power supplied to consumers, also known as “Dirty Power”. It is also suspected, and as noted in Exhibit 27, that this could be a cause of Ventricular Fibrillation attributable to SADS (mentioned earlier).

vii. Referring once again to Figure 4 and the left power cross spectrum scan it can be seen that there is a spike at exactly 400Hz. This is an ISO calibration frequency for the FSCB units that are in use throughout the USA in particular. This specific BPL installation has been in operation for over 2 years, since 2009, and attempts are still being made to calibrate the pole-top FCSB’s. This is indicative that BPL/B-PLC installations in general do not work as advertised by BPL/B-PLC vendors.

viii. There has been only a feeble attempt made by electrical utilities globally to rectify this reactance. In the UK, for instance, 1st and 2nd Order Delta Sigma Modulators have been installed on some BPL/B-PLC FCSB sites. This simply introduces further reactance at the mains frequency and harmonics at frequencies in the 3KHz to 5KHz range as shown in Figure 5.

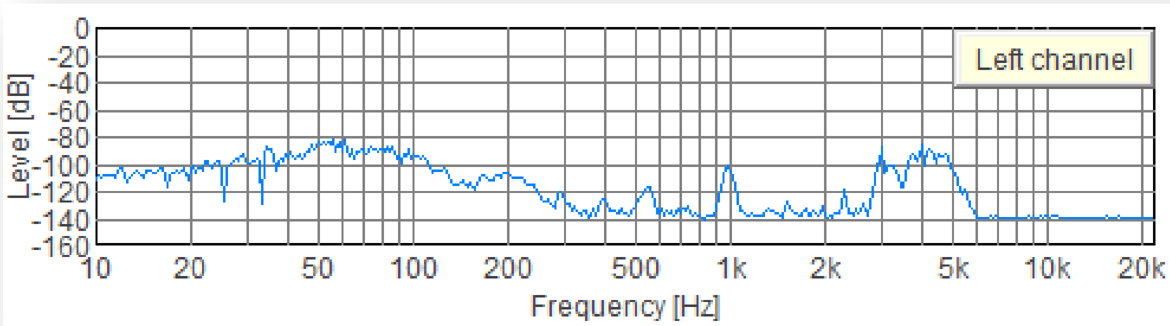

Figure 5: 1st and 2nd Order Delta Sigma Modulator Induced Harmonic Reactance at 3-5KHz

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5.1.6 **The "Last Mile" signals:** There are several unlicensed frequencies used in the "Last Mile" scenario worldwide. There is also one, 956MHz, using ZigBee communications protocol, in the licensed band that is utilized exclusively in the USA and Japan.

http://en.wikipedia.org/wiki/Last_mile

i. Zigbee networks are self-forming, each node can also act as a router, so no setup or configuration is required. When a new house is built the additional node simply connects itself to the network and starts reporting usage. ZigBee, operating at 956MHz, will attempt to attach itself to any computer operating at that frequency, a very useful characteristic in the right situation.

ii. 956MHz is the operating frequency of the on-board computers utilized in Toyota vehicles. Toyota vehicles have had a slew of unexplained problems in the last 2 years, including sudden unexplained acceleration. Many people have died in the ensuing collisions; many others faced criminal charges and are doing jail time for causing them, the authorities citing driver error. Toyota vehicles are sold and are common on the roads worldwide. Toyota vehicles experienced unexplained problems, particularly sudden unexplained acceleration, only in the USA and Japan.

iii. BPL/B-PLC Last Mile uses 900MHz, 915MHZ, WiFi, meshWiFi, WiMAX, and 956MHz ZigBee frequencies; all class as "serious" microwave frequencies. Only the latter is in the licensed band, meaning that its use requires a license, and that costs money.

iv. All Smart Grid equipment is (supposed to be) designed to “sleep” when not in use, thus saving power. However, only the ZigBee protocol is designed to “wake up” when queried while “asleep”, it is, after all, designed for Smart Grid at the fastest possible data transmission speeds.

v. If there is a corner that can be cut, it will be, it is human nature and accountants are running the show in this new millennia. Many countries have installed ZigBee on unlicensed frequency bands. Others have done without the “sleep” function; “Smart” equipment is permanently ON, thus defeating the main requirement of Smart Grid philosophy.

vi. After the BPL signal is “decoupled” from the power lines it is fed into a demodulator. This can be either pole mounted or attached and connected to fiber optic cables also on the poles. In both cases the demodulator also functions as a transmitting antenna. Exhibit 24 is an FCC/ARRL investigative document regarding the above described transmitters in Allentown, Pennsylvania that was released under the Freedom of Information Act. In it FCC investigators claim that although the fiber-optic mounted transmitters were emitting microwave RF in excess of FCC regulatory law requirements; this emissions “overage” was “just 3dB more”. As previously stated, a 3dB increase in power levels requires a 100% increase (doubling) in the transmissions (emissions) levels.

vii. The FCC defines Power Density tolerance as the amount of time that someone can spend in an RF transmission without suffering adverse health effects: Similar to putting your head in a bucket of water. Many of these Access BPL transmitters are less than 10 feet from people’s bedroom windows in city suburbs. FCC regulatory law requires that anyone with a RF transmitter must carry out regular Power Density testing on their equipment as part of a scheduled test routine. These test schedules are also defined by the FCC and appear in FCC ET Docket # 93-62 and OET Bulletin # 65 among other places.

viii. These pole or fiber optic mounted demodulator/transmitters reassemble the BPL, or in this case, the Access BPL signal and transmit it. As evidenced in the above paragraph, these transmissions are not measured by their owners, the electrical utilities, to ensure regulatory safety law compliance. But where is it being transmitted *to*?

ix. Generally, these transmissions are aimed toward an area containing the maximum number of potential customers; remember there are presently very few Access BPL customers in most countries; the electrical utilities are still trying to get their equipment working properly. These potential customers are also the electrical utility’s present customer base for power supply and will ultimately have “smart” metering and appliances. Access BPL and “smart” metering are one and the same.

x. Between these transmitters and people’s home-mounted receivers are overhead power cables. Overhead power cables are transmit/receive dipole antennas, as classified by the IEEE. Much of the transmitted BPL signal is lost to these receiving dipoles. The BPL signal travels along the power lines looking for a ground (earth) point. Evidence shows that in every case the BPL microwave RF “Last Mile” signal is literally dragged from the overhead power lines by the, so-called 40MHz, BPL emissions and from there into the electrical wiring of every building in its path.

5.1.7 **Microwave Auditory Effect (MAE):** One of the major physical reactions to these microwave emissions is the “Microwave Auditory Effect”. A much studied phenomena for over 40 years by the military, NASA, and various universities worldwide; many whitepapers exist covering this topic.

http://en.wikipedia.org/wiki/Microwave_auditory_effect

i. Again worldwide, people have accounted of a noise that ranges from a high-pitched Banshee Wail to a mid-frequency range “disgusting gargle”. Individual accounts of the “interpretation” of this “sound” vary. However, that it accompanies, and is a result of, BPL emissions is without doubt.

ii. Here’s what Dr. Allen Frey had to say about his experiments:

“The intent of this paper is to bring a new phenomenon to the attention of physiologists. Using extremely low average power densities of electromagnetic energy, the perception of sounds was induced in normal and deaf humans. The effect was induced several hundred feet from the antenna the instant the transmitter was turned on, and is a function of carrier frequency and modulation. Attempts were made to match the sounds induced by electromagnetic energy and acoustic energy. The closest match occurred when the acoustic amplifier was driven by the rf transmitter's modulator. Peak power density is a critical factor and, with acoustic noise of approximately 80 dB, a peak power density of approximately 275 mw/cm2 is needed to induce the perception at carrier frequencies of 425 mc and 1,310 mc. The average power density can be at least as low as 400 uw/cm2. The evidence for the various possible sites of electromagnetic energy sensor are discussed and locations peripheral to the cochlea are ruled out.”
Frey, Allan H.: Human auditory systems response to modulated electromagnetic energy Cornell University, Ithaca, New York: J. Appl. Physiol. 17(4):689-692. 1962-

iii. In a nutshell, here’s what researchers discovered: The MAE occurs when microwave frequencies pass through the brain and surrounding tissue. These microwaves excite hydrogen atoms contained in protein-bound (living cells) water, excitation leads to movement of the subatomic particles of which atoms consist, leading to friction and thus heat. Sound familiar? This is exactly what happens in a microwave oven, and everyone knows what they are.

iv. Heating leads to expansion of intra-cranial cells. Due to the fact that BPL microwave frequencies are on/off pulses; exactly the same as in Allen Frey’s Cornell University experiments; the water contained in these cells heats and cools rapidly. This causes the intra-cranial cells to expand and contract, heat/cool, along with the microwave pulses.

v. What Allen Frey and many other researchers concluded was that this expanding and contracting tissue “hit” the inner-ear cochlea thus inducing a “sound”. The “sound” experienced was relative to the microwave pulse train frequency. The BPL microwave emissions induced “sound” that people are experiencing is similar worldwide. It must, therefore, be at a similar frequency worldwide – BPL “Last Mile” frequency.

vi. Researchers of this effect have accepted it as fact. But, as the subjects of these experiments began to show extremely derogatory mental and emotional effects within a short time of their exposure to these microwave frequencies all further experimentation was halted. The military's dream of utilizing the effect as a communications method to individual military personnel ended.

vii. Neither the legal system nor the FCC recognizes this physical effect. If microwaves heat your skin, then there are microwaves present; otherwise it's a "case dismissed".

5.2 BPL Coupler Breakdown

There are reports worldwide of unexplained explosive sounds occurring mainly at night and at/in disparate but localized geo-physical locations, oftentimes firework-like sparks are reported accompanying these explosions.

Owing to the maximum usage of electrical power during hours when populations are awake, thus causing spikes and browns, power companies tend to "tune" BPL couplers/decouplers data modulation/demodulation during off-peak hours. Decouplers are much smaller than couplers due to the fact that they are mounted on lower-voltage power lines. Both share the same design characteristics, that is, both are resistance/capacitance (RC) devices. They are, basically, band-pass filters.

The function that these RC devices perform leads to energy being converted to heat in their passive components. Although the insulators surrounding the tube in which the RC devices are designed also act as cooling elements there is often a sudden surge in temperature. This is due to electrical power being at a peak during off-peak usage hours and these RC devices not being able to contain (hold back) the power levels present in the cables. The RC elements simply melt, disintegrate, and are blown out of the top of their mounting tube, the body of the coupler/decoupler. There is little external damage to the coupler/decoupler body.

Investigations of these phenomena usually give explanations that mislead from the actual cause. For instance, recently the town of Clintonville, Wisconsin experienced explosions and flashes mainly at night over an approximately 2 week period. The USGS gave the reason for the explosive noises as a 1.5 magnitude earthquake. No damage to buildings occurred during this 2 week "earthquake" and no reports emerged of antipode tremors.

6.0 Summary:

i. There are six (6) major emissions issues; eight (8) major entire population and eco-system detrimental and destructive reactions that will result in enormous consequences. Smart Grid, Access BPL, and B-PLC may have their up-side. They may benefit the few in major corporations around the globe that are and continue to profit enormously from their installation and operation for as long as it is allowed to continue.

ii. A far more technologically effective and economically viable solution utilizing the electricity transmission line grid topology is available which would be upgradeable as technology advances. This solution is 100% safe and data secure. Smart Grid, as it right now, is not upgradeable or data secure i.e. once it is installed as supplied, it stays that way forever, or until such time that it is ripped out and started over from scratch.

iii. All of the signs are there; all of the pieces are in place for an unprecedented global catastrophe to imminently occur. There will be a large price to pay when accountability arrives, and it will. This whole “thing” is about energy leaking from places that it was never intended to be. The responsible thing to do would be to put it in its place, a place from where it can’t escape. All it would take is a purpose-built data cable on the Grid. Now that’s what you would call a “Smart” Grid.

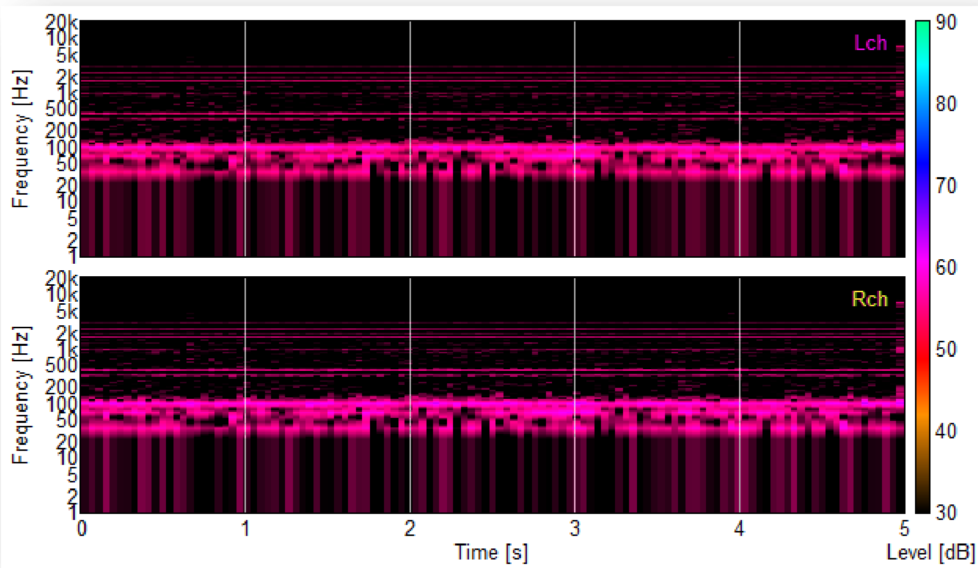

Figure 6: Power Spectrogram showing BPL/B-PLC emissions levels

Part 7: References:

These references to additional material are presented in Line Item order.

Part 1:

1.1.1 Smart Grid:

i. *IEEE SmartGrid Portal IEEE's collection of Smart Grid resources*
ii. *Smart Grids (European Commission)*
iii. *The NIST Smart Grid Collaboration Site NIST's public wiki for Smart Grid*
iv. *Video Lecture: Computer System Security: Technical and Social Challenges in Creating a Trustworthy Power Grid, University of Illinois at Urbana-Champaign*
v. *Video Lecture: Smart Grid: Key to a Sustainable Energy Infrastructure, University of Illinois at Urbana-Champaign*
vi. *The IDEAS project (University of Southampton project developing agent-based mechanisms for the Smart Grid)*
vii. *Institute for Computational Sustainability*
viii. *Perspectives and priorities on RuggedCom Smart Grid Research IEC 61850 Technologies*
ix. *Projects with Smart Substation Solution*
x. *Smart High Voltage Substation Based on IEC 61850 Process Bus and IEEE 1588 Time Synchronization*
xi. *Test and evaluation system for multi-protocol sampled value protection schemes by Dave Ingram*

42 U.S.C ch. 152 subch. IX § 17381

i. *§ 17381. Statement of policy on modernization of electricity grid*
ii. *§ 17382. Smart grid system report*
iii. *§ 17383. Smart Grid Advisory Committee and Smart Grid Task Force*
iv. *§ 17384. Smart grid technology research, development, and demonstration*
v. *§ 17385. Smart grid interoperability framework*
vi. *§ 17386. Federal matching fund for smart grid investment costs*

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2.1: Broadband over Power Lines (BPL/B-PLC)

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xiv. *"Electromagnetic Compatibility"*
xv. *http://ec.europa.eu/enterprise/policies/european-standards/documents/harmonised-standards-legislation/list-references/electromagnetic-compatibility/index_en.htm*
xvi. *"Electromagnetic Compatibility (EMC) Legislation: Directive 2004/108/EC"*

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xviii. http://stakeholders.ofcom.org.uk/binaries/research/technology-research/pltreport.pdf
xix. "Power Line Telecommunications (PLT)"
xx. "The Likelihood and Extent of Radio Frequency Interference from In-Home PLT Devices"
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xix. The Kokomo Hum Investigation
xx. http://www.milieuziektes.nl/ELF/KokomoHumFinalReport.pdf
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xxiv. "The Hearers"

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3.2 Frequency Shift Keying

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Cloud Database Exhibit Files:

Below is a list of Exhibits appearing on this document's Cloud database and as filed in litigation proceedings. For access to the Cloud DB please contact the originator of this paper:

Exhibit 1: *Power Line Communication – Explanation of: especially signal/power attenuation.*
Exhibit 2: *Spectrum Analysis Data*
Exhibit 3: *Emails to the PA PUC regarding my formal complaints*
Exhibit 4: *Emails to West Penn Power*
Exhibit 5: *References to 40MHz emissions*
Exhibit 6: *Amperion 40MHz BPL generating equipment*
Exhibit 7: *Sample letters from 40MHz health affected people*
Exhibit 8: *Progress to date update document.*
Exhibit 9: *Power Quality Application Guide – Harmonics and Interharmonics*
Exhibit 10: *Why Only Harmonics? by Richard P. Bingham*
Exhibit 11: *Power Spectrum analysis samples*
Exhibit 12: *Frequency tuner reception video and image files*
Exhibit 13: *Impairment Type Loss*
Exhibit 14: *S & C IntelliCAP PLUS Automatic Capacitor Controls brochure*
Exhibit 15: *Infrasound article*
Exhibit 16: *Photographs: South Fayette Substation – East side*
Exhibit 17: *Update 02 document*
Exhibit 18: *Updated Smart Grid document*
Exhibit 20: *FCC Part 15 and ETSI requirements documentation*
Exhibit 21: *IEEE 519 compliance specifications and regulations*
Exhibit 22: *Spectrum analysis measurement data*
Exhibit 23: *Contact Texts and Power Spectrum Scans*
Exhibit 24: *Allentown, PA FCC/ARRL field measurements reports April 28, 2009*
Exhibit 25: *Letters of complaint from people in the USA regarding BPL emissions*
Exhibit 26: *NASA research document – Mechanical Resonant Frequency of the Human Eye In Vivo*
Exhibit 27: *Sudden Adult Death Syndrome (SADS) and BPL/B-PLC-Induced Reactance Correlation*
Exhibit 28: *This document together with CSV files containing emissions frequency details*
Exhibit 29: *E-Line: Propagating TM Wave Intro.pdf; Surface Wave Animation.gif; Images*

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